DOCUMENT RESUME

ED 330 545 SE 052 055

AUTHOR	Mullis, Ina V. S.; Dossey, John A.; Owen, Eugene H.; Phillips, Gary W.
TITLE	The State of Mathematics Achievement: NAEP's 1990 Assessment of the Nation and the Trial Assessment of the States.
INSTITUTION	Educational Testing Service, Princeton, N.J.; National Assessment of Educational Progress, Princeton, NJ.
SPONS AGENCY	National Center for Education Statistics (ED), Washington, DC.
REPORT NO	ETS-21-ST-04; ISBN-0-88685-15-7; NCES-91-1259
PUB DATE	Jun 91
NOTE	593p.; The entire Report consists of a composite report (this volume), an executive summary, and 40 separate reports for 37 states, District of Columbia, Guam, and the Virgin Islands, respectively; see SE 052 056-096.
AVAILABLE FROM	Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.
PUB TYPE	Statistical Data (110) -- Reports - Research/Technical (143)
EDRS PRICE	MF03/PC24 Plus Postage.
DESCRIPTORS	Academic Achievement; *Educational Assessment; *Grade 4; *Grade 8; *Grade 12; High Schools; Intermediate Grades; Junior High Schools; *Mathematics Achievement; Mathematics Instruction; Mathematics Skills; Mathematics Tests; National Programs; Problem Solving; State Programs
IDENTIFIERS	*National Assessment of Educational Progress; *Numeracy; Trial State Assessment (NAEP)

ABSTRACT

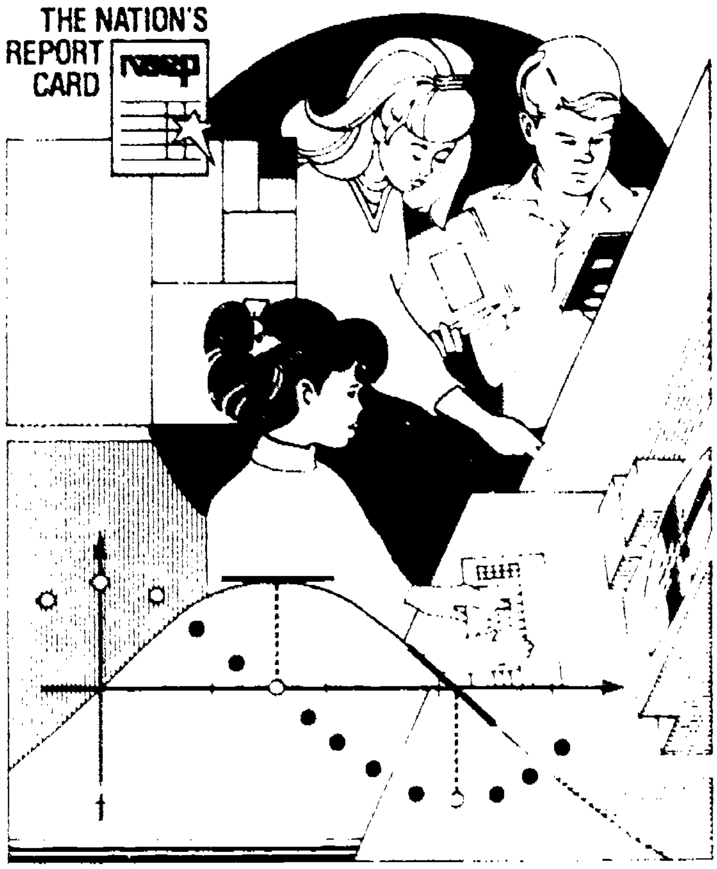
The National Assessment of Educational Progress (NAEP), also known as "The Nation's Report Card," is a congressionally mandated survey of educational achievement of American students in a variety of curriculum areas and of changes in that achievement across time. Part 1 of this report consists of the results of NAEP's 1990 national mathematics assessment of nationally representative samples of more than 26,000 students in grades 4, 8, and 12 in more than 1,300 schools. Part 2 consists of the results of NAEP's 1990 "Trial State Assessment Program," a voluntary eighth-grade mathematics assessment administered to representative samples of 2,500 public school students at grade 8 in about a 100 schools in each of the 40 participating states and jurisdictions. This is the first time NAEP has provided results by state. The report is organized as follows: (1) executive summary; (2) NAEP history; (3) scope of the assessment; (4) results for grade 4, 8, 12, respectively; (5) results of the Trial State Assessment Program. Appendices include: contextual and background factors; participation rates; procedures; anchoring processes; and tabular data. Overall mathematics performance in the nation at each of the three grade levels tested was characterized as follows: FOURTH GRADE: 72 percent demonstrated the ability to consistently solve third grade level problems (e.g., addition and subtraction with whole numbers); 11 percent demonstrated a grasp of fifth grade level problems (e.g.,

multiplication). No fourth graders indicated an understanding of fractions, decimals, percents, or simple algebra. EIGHTH GRADE: 98 percent demonstrated a grasp of third grade level problems; 67 percent consistently understood fifth grade content; only 14 percent showed successful performance with seventh grade material (fractions, decimals, percents, simple algebra); no eighth graders showed the breadth of understanding necessary to begin the study of relatively advanced mathematics. TWELFTH GRADE: All high school seniors demonstrated success with third-grade materials; 91 percent showed mastery of fifth-grade material; 46 percent demonstrated a consistent grasp of seventh grade material (decimals, percents, fractions, simple algebra); 5 percent showed an understanding of geometry and algebra. Many students appear to be graduating from high school with little of the mathematics understanding required by the fastest growing occupations or for college work. Approximately half of graduating twelfth graders appear to have an understanding of mathematics that does not extend much beyond simple problem solving with whole numbers. The Trial State Assessment Program showed great variation in student achievement within each state, to the extent that the variation within states tended to exceed the variation in average performance across states. The higher performing states (e.g., North Dakota, Montana, Iowa, Nebraska, Minnesota, Wisconsin) appear to have fewer urban areas, fewer disadvantaged students, and fewer minority students. (JJK/WTB)

NATIONAL CENTER FOR EDUCATION STATISTICS

The STATE of Mathematics Achievement

NAEP's 1990 Assessment of the Nation and the Trial Assessment of the States



Prepared by Educational Testing Service under Contract with the National Center for Education Statistics
Office of Educational Research and Improvement • U.S. Department of Education

What is The Nation's Report Card?

THE NATION'S REPORT CARD, the National Assessment of Educational Progress (NAEP), is the only nationally representative and continuing assessment of what America's students know and can do in various subject areas. Since 1969, assessments have been conducted periodically in reading, mathematics, science, writing, history/geography, and other fields. By making objective information on student performance available to policymakers at the national, state, and local levels, NAEP is an integral part of our nation's evaluation of the condition and progress of education. Only information related to academic achievement is collected under this program. NAEP guarantees the privacy of individual students and their families.

NAEP is a congressionally mandated project of the National Center for Education Statistics, the U.S. Department of Education. The Commissioner of Education Statistics is responsible, by law, for carrying out the NAEP project through competitive awards to qualified organizations. NAEP reports directly to the Commissioner, who is also responsible for providing continuing reviews, including validation studies and solicitation of public comment, on NAEP's conduct and usefulness.

In 1988, Congress created the National Assessment Governing Board (NAGB) to formulate policy guidelines for NAEP. The board is responsible for selecting the subject areas to be assessed, which may include adding to those specified by Congress; identifying appropriate achievement goals for each age and grade; developing assessment objectives; developing test specifications; designing the assessment methodology; developing guidelines and standards for data analysis and for reporting and disseminating results; developing standards and procedures for interstate, regional, and national comparisons; improving the form and use of the National Assessment; and ensuring that all items selected for use in the National Assessment are free from racial, cultural, gender, or regional bias.

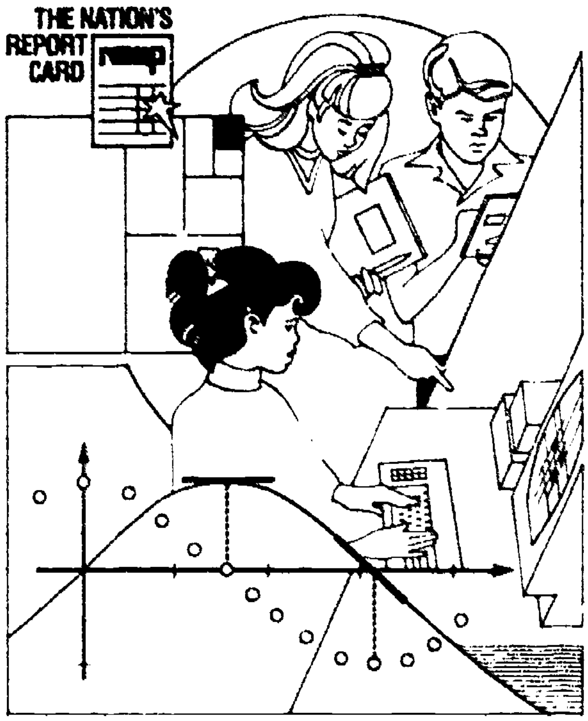
The National Assessment Governing Board

NATIONAL CENTER FOR EDUCATION STATISTICS

The STATE of Mathematics Achievement

NAEP's 1990 Assessment of the Nation and the Trial Assessment of the States

Ina V.S. Mullis • John A. Dossey
Eugene H. Owen • Gary W. Phillips



Report No: 21-ST-04

June 1991

Prepared by Educational Testing Serv ce under Contract with the National Center for Education Statistics
Office of Educational Research and Imprcvement • U.S. Department of Education

U.S. Department of Education
Lamar Alexander
Secretary

Office of Educational Research and Improvement
Bruno V. Manno
Acting Assistant Secretary

National Center for Education Statistics
Emerson J. Elliott
Acting Commissioner

FOR MORE INFORMATION:

The States participating in the NAEP Trial State Assessment of Mathematics are listed alphabetically in both the composite report of results for the Nation and all State participants, and in the Executive Summary. Copies of individual State reports are available directly from the participating States (for ordering information, please contact the assessment division of your State Department of Education). For ordering information on the composite report or for single copies of the Executive Summary while supplies last, write:

Education Information Branch
Office of Educational Research and Improvement
U.S. Department of Education
555 New Jersey Avenue, NW
Washington, D.C. 20208-5641

or call 1-800-424-1616 (in the Washington, D.C. metropolitan area call 202-219-1651).

Library of Congress, Catalog Card Number: 91-61481

ISBN: 0-88685-15-7

The work upon which this publication is based was performed for the National Center for Education Statistics, Office of Educational Research and Improvement, by Educational Testing Service.

Contents

Executive Summary

The State of Mathematics Achievement

NAEP's 1990 Assessment of the Nation and the Trial Assessment of the States

INTRODUCTION

The mathematical skills of our nation's children are generally insufficient to cope with either on-the-job demands for problem solving or college expectations for mathematical literacy.[1] Because of the emergence of the importance of mathematics to so many areas of education, citizenship, and careers, business and industry spend billions in training, colleges and universities devote large amounts of resources to remediation, and still the United States is having difficulty maintaining its competitive edge in the global marketplace.[2]

Not only are students generally ill equipped to cope confidently with the mathematical demands of today's society, such as the graphs that permeate the media and the regulations and procedures that underlie credit cards, discounts, taxation, insurance, and benefit plans, further, relatively small numbers of students persevere in the study of higher mathematics. Approximately half the students leave the mathematics pipeline each year.[3] For example, of the nearly 10 million secondary school students who study mathematics each year, fewer than 800 eventually receive doctorates in the mathematical sciences, and this number has been declining since the 1970s.

A number of publications addressing this national problem have been issued, including the landmark effort of the mathematics teachers to set

[1] *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

[2] *The Business Roundtable Participation Guide: A Primer for Business on Education* (New York, NY: National Alliance of Business, 1990).

[3] *Moving Beyond Myths: Revitalizing Undergraduate Mathematics* (Washington, DC: National Research Council, National Academy Press, 1991).

standards for the mathematics curriculum and for teaching mathematics.[4] These efforts and others recommend ways of teaching and learning that rely on the application of mathematics to relevant everyday problems and situations, that foster students' thinking skills, and that push them to use their minds to solve problems in unfamiliar and new settings and discover alternative solutions. These initiatives also describe the benefits provided by calculators and computers to relieve the tedium of hand calculations, to provide a basis for more complex problem-solving situations, and to engage students in mathematics learning.

Finally, the large gaps in achievement and interest in mathematics between Asian/Pacific Islander and White students and their Black and Hispanic counterparts, and to some extent between male and female students, have been widely documented.[5] There has also been considerable research showing that the differences in mathematics achievement by minority and female students may be linked to differences in motivation.[6] Teachers' and parents' expectations, school and home climate, and content and delivery of instruction may tend to seriously impede the number of minorities and females who pursue mathematics studies with sufficient interest, motivation, and preparation. Moreover, parents may often accept and even expect that their children will perform poorly in mathematics, because the parents "could never do math either."

---

[4] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

Professional Standards for Teaching Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1991).

[5] *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

[6] Floretta Dukes McKenzie, "Education Strategies for the '90s" in *The State of Black America* (New York, NY: The National Urban League, Inc., 1991).

Elizabeth Fennema, "Justice, Equity, and Mathematics Education" in *Mathematics and Gender*, Elizabeth Fennema and Gilah C. Leder, editors (New York, NY: Teacher College Press, 1990).

THE NATIONAL EDUCATION GOALS

In 1990, the President and the governors adopted six ambitious education goals to be met by the year 2000. Two explicitly mention mathematics education:

- American students will leave grades four, eight, and twelve having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography; and every school in America will ensure that all students learn to use their minds well, so they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy.

- U.S. students will be first in the world in science and mathematics achievement.

The remaining four goals address improving children's readiness for school learning, increasing the high-school graduation rate, adult literacy, and freeing the schools from drugs and violence.

THE 1990 NAEP MATHEMATICS ASSESSMENT

For more than 20 years, the National Assessment of Educational Progress (NAEP) has been monitoring the educational achievement of American students and changes in that achievement across time. However, as part of the 1990 mathematics assessment of fourth, eighth, and twelfth graders, a new dimension was added to NAEP whereby states (including the District of Columbia) and territories could, on a voluntary basis, participate in the mathematics assessment of eighth graders. The assessment was designed to provide state-level data comparable to results for the nation and other participating states and territories. The Trial State Assessment Program provides information about mathematics achievement as well as programs and practices in mathematics instruction.

This summary describes the results of NAEP's assessment of fourth, eighth, and twelfth graders nationwide, as well as for the 40 participants in the 1990 Trial State Assessment Program in eighth-grade mathematics.[7]

The Trial State Assessment participants include:

Alabama	Iowa	Ohio
Arizona	Kentucky	Oklahoma
Arkansas	Louisiana	Oregon
California	Maryland	Pennsylvania
Colorado	Michigan	Rhode Island
Connecticut	Minnesota	Texas
Delaware	Montana	Virginia
District of Columbia	Nebraska	West Virginia
Florida	New Hampshire	Wisconsin
Georgia	New Jersey	Wyoming
Hawaii	New Mexico	
Idaho	New York	
Illinois	North Carolina	Guam
Indiana	North Dakota	Virgin Islands

The mathematics achievement results for the nation and the participating states and territories are supported by extensive contextual information collected from the students, their teachers, and the administrators in their schools. Together, these data provide the richest source of information ever assembled about mathematics education in our country.

Developing and implementing the 1990 Trial State Assessment Program was a considerable undertaking involving participation and teamwork from the federal government, the states, the schools, the students, mathematics educators, and measurement and assessment experts. Every effort was made to ensure the

[7]For detailed results and an explanation of procedures see the full report, Ina V.S. Mullis, John A. Dossey, Eugene H. Owen, and Gary W. Phillips, *The State of Mathematics Achievement: NAEP's 1990 Assessment of the Nation and the Trial Assessment of the States* (Washington, DC: National Center for Education Statistics, 1991).

reliability and credibility of the results, including a congressionally mandated independent evaluation.[8]

The assessment was based on a framework and questions developed through a process of successive reviews by mathematics educators, measurement specialists, state representatives, and other interested parties. The materials were given to representative samples of students across the country--including 26,000 students in 1,300 private and public schools nationally and, in addition, to approximately 2,500 students in about 100 public schools in each of the 40 participating states and territories.

The NAEP data are designed to provide a detailed portrait that can be used in examining where the nation is in relation to its overarching goals for mathematics education and how far mathematics educators have moved toward meeting their standards. The results can also be used by each state to determine in a general sense what its students know and can do in mathematics and how this compares to the nation and other states. The data also permit an analysis of the distribution of achievement, resources, and practices among demographic subgroups in the nation and the states. This information can be used to monitor students' progress in achieving what has been recommended for reform in school mathematics, to explore issues of equity in opportunity to learn mathematics, and to examine both school and home contexts for educational support.

The components -- social, economic, instructional, and political -- that contribute to effective mathematics learning are massive in number. Yet information related to many of these factors has been collected, and the results provide extensive material for analysis by all concerned with improving mathematics education in our nation. The NAEP data do not suggest a "quick fix" for improving mathematics education; in fact, the assessment was not designed to determine causal relationships. The results do show, however, quite clearly and in some detail that mathematics education in our nation and in our states is far from the vision described in the recommendations for reform of what mathematics education could be. The findings further underscore the large differences in achievement and instructional contexts among some segments of our population, particularly Black and Hispanic students and

---

[8]Panel on the Evaluation of the NAEP Trial State Assessment Project, *April 1991 Interim Report on the Evaluation of the 1990 Trial State Assessment* (Palo Alto, CA: National Academy of Education, 1991).

students attending schools in our disadvantaged urban areas, as compared to Asian/Pacific Islander and White students and those attending schools in advantaged urban communities.

OVERALL MATHEMATICS PERFORMANCE IN THE NATION

TABLE 1 presents the average mathematics proficiency for nationally representative samples of fourth, eighth, and twelfth graders, as well as the percentages of students performing at or above four anchor levels on the 0 to 500 NAEP mathematics proficiency scale.

TABLE 1 Overall Mathematics Proficiency

		Grade 4	Grade 8	Grade 12
Average Proficiency		216 (0.7)	265 (1.0)	295 (1.1)
Level	Description	Percentage of Students at or Above		
200	Simple Additive Reasoning and Problem Solving with Whole Numbers	72 (1.1)	98 (0.4)	100 (0.0)
250	Simple Multiplicative Reasoning and Two-Step Problem Solving	11 (0.6)	67 (1.1)	91 (0.6)
300	Reasoning and Problem Solving Involving Fractions, Decimals, Percents, Elementary Geometry, and Simple Algebra	0 (0.0)	14 (1.1)	46 (1.4)
350	Reasoning and Problem Solving Involving Geometry, Algebra, and Beginning Statistics and Probability	0 (0.0)	0 (0.1)	5 (0.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the estimate for the whole population is within plus or minus two standard errors of the value for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. Although no fourth-grade students achieved at or above Level 300, a few eighth graders (0.3 percent) did perform at or above Level 350. However, percentages less than 0.5 percent are rounded to 0 percent.

To summarize the levels on the NAEP scale, a panel of 19 distinguished mathematics educators analyzed the assessment questions to provide the anchor descriptions. Based on their collective experience with mathematics curriculum and classrooms, the panel further characterized Level 200 as material typically covered by the third grade, Level 250 as material generally covered by the fifth grade, Level 300 material as content introduced by the seventh grade, and Level 350 as content generally covered in high-school mathematics courses in preparation for the study of advanced mathematics.

Fourth Grade. Approximately 72 percent of the fourth graders demonstrated the ability to consistently solve simple addition and subtraction problems with whole numbers--material typically covered by the third grade. However, 11 percent demonstrated a grasp of multiplication and two-step problems--material often included in the fifth grade. No fourth graders attained Level 300 on the NAEP scale, which would have indicated a consistent grasp of fractions, decimals, percents, and simple algebra. This finding is understandable, considering the composition of the current curriculum in this country.

Eighth Grade. Virtually all the eighth graders (98 percent) demonstrated a grasp of the third-grade material typified by Level 200--adding and subtracting with whole numbers. Two-thirds showed that their mathematics understanding included consistent success with multiplication and division of whole numbers, or problems involving more than one step (typically fifth-grade content). Only 14 percent consistently demonstrated successful performance with problems involving fractions, decimals, percents, and simple algebra--topics generally introduced by the seventh grade. No eighth graders showed the breadth of understanding necessary to begin the study of relatively advanced mathematics (Level 350).

Twelfth Grade. All the high-school seniors demonstrated success with the third-grade material. However, 91 percent showed mastery of the fifth-grade content, indicating that not all students are graduating from high school with a grasp of how to apply the four basic arithmetic operations to solve simple problems with whole numbers. Fewer than half the high-school seniors (46 percent) demonstrated a consistent grasp of decimals, percents, fractions, and simple algebra, and only 5 percent showed an understanding of geometry and algebra that suggested preparedness for the study of relatively advanced mathematics.

These figures show that many students appear to be graduating from high school with little of the mathematics understanding required by the fastest growing occupations or for college work.[9] Approximately half the twelfth graders graduating from today's schools appear to have an understanding of mathematics that does not extend much beyond simple problem solving with whole numbers.

PERFORMANCE IN THE MATHEMATICS CONTENT AREAS FOR THE NATION

The national assessment was designed to measure mathematics proficiency in six content areas, including numbers and operations; estimation; measurement; geometry; data analysis, statistics, and probability; and algebra and functions.[10] FIGURE 1 shows that twelfth graders had approximately the same average proficiency in each of these areas, but there were some differences at grades 4 and 8.

At grade 4, students' performance was relatively lower in numbers and operations and estimation and relatively higher in measurement. At grade 8, average proficiency was slightly higher in numbers and operations and estimation than in the other content areas. These findings fit with the current school mathematics curriculum, which emphasizes arithmetic knowledge in the earlier years of schooling. In each content area, twelfth graders performed more similarly to eighth graders than eighth graders did to fourth graders, suggesting that as presently configured, the mathematics curriculum facilitates more learning in the lower grades.

---

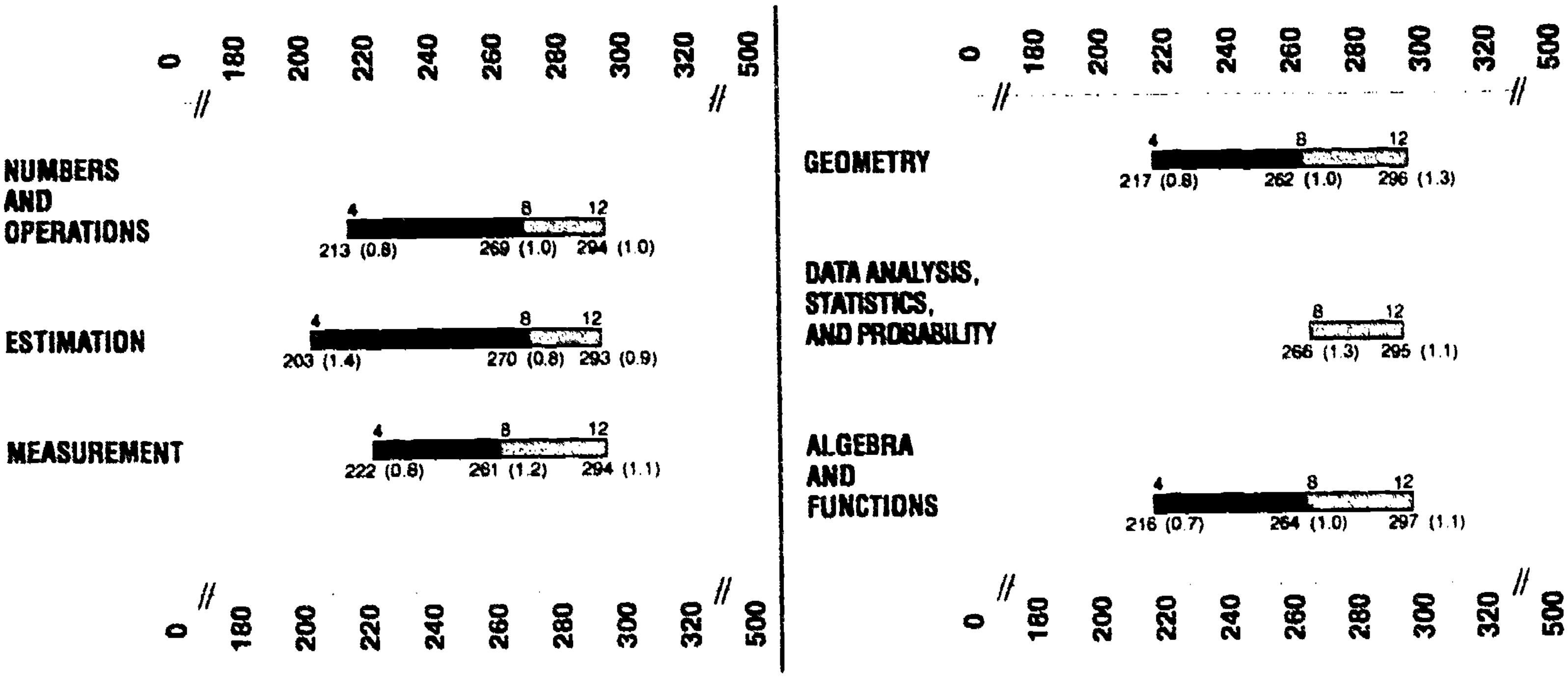
[9] *Workforce 2000: Work and Workers for the 21st Century* (Indianapolis, IN: Hudson Institute, 1987).

Moving Beyond Myths: Revitalizing Undergraduate Mathematics (Washington, DC: National Research Council, 1991).

[10] In creating the overall scale, the content scales were weighted as specified in *Mathematics Objectives, 1990 Assessment.* These were numbers and operations--45 percent at grade 4, 30 percent at grade 8, and 25 percent at grade 12; measurement--20 percent at grade 4 and 15 percent at grades 8 and 12; geometry--15 percent at grade 4 and 20 percent at grades 8 and 12; data analysis, statistics, and probability--10 percent at grade 4 and 15 percent at grades 8 and 12; and algebra and functions--10 percent at grade 4, 20 percent at grade 8, and 25 percent at grade 12. In addition, the estimation scale was constructed based on materials in a special paced-audiotape study administered only to national samples at all three grades.

FIGURE 1

Average Proficiency in Mathematics Content Areas at Grades 4, 8, and 12



The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

Although questions requiring students to construct their responses were included for all content areas covered by the assessment, a special study of some open-ended questions was conducted for national samples of students. Among these items, one which was given at all three grades follows. It demonstrates the difficulty students had in applying basic mathematics skills. Thirty-seven percent of the fourth graders, 66 percent of the eighth graders, and 77 percent of the high-school seniors accurately determined the cost of the meal from the menu.

LUNCH MENU

Soups—Made by Our Chef Daily

Onion Soup	.80
Soup of the day	.70

Grilled Sandwiches

Beefburgers, cooked to order; 1/4 lb of the finest beef available, seasoned to perfection, and served on a lightly buttered bun	2.15
Beefburger with Fries	2.70
Grilled Cheese	1.50
Grilled Ham and Cheese	2.50

Cold Sandwiches

Sliced Turkey	2.30
Turkey Salad	1.75
Chicken Salad	1.75
Tuna Fish Salad	1.90

Beverages

Tea	.65
Cola	.60
Milk	.50

Desserts

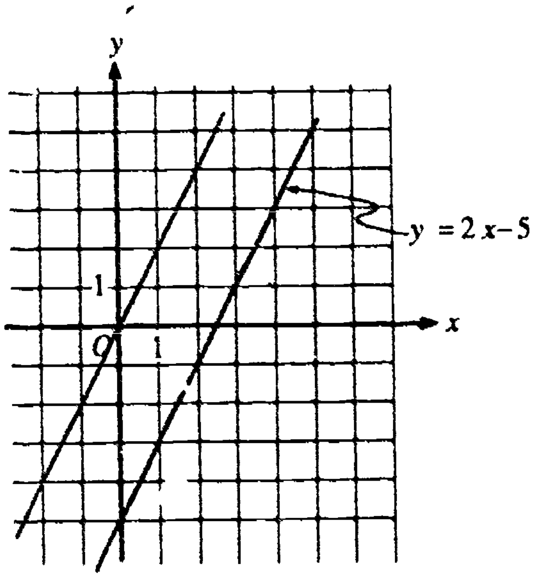
Ice Cream (vanilla, chocolate, strawberry)	1.10
Pie (checkerboard)	1.75

According to the menu above, what is the cost of the following order?

Soup of the day.....................
Beefburger with Fries................
Cola.............................

Total: $4.00

When the mathematics became at all complicated, performance fell off dramatically, even for twelfth graders. For example, high-school seniors had considerable difficulty with the following set of questions.



a. On the axes above, draw a line parallel to $y = 2x - 5$ that goes through the origin O.

b. On the line below, write an equation of the new line.

Equation: y = 2X

Only 32 percent of the high-school seniors drew the new parallel line on the graph, when a correct response essentially required the ability to find the origin 0 on the graph, the ability to find the existing line on the graph, and an understanding of the term "parallel." Sixteen percent of the twelfth graders answered both parts of this question correctly. Three percent of the students provided the equation of the new line but did not draw it correctly.

MATHEMATICS PERFORMANCE BY DEMOGRAPHIC SUBGROUPS

Much of the concern about low mathematics achievement is centered on the particularly low achievement of Black and Hispanic students, and many recommendations for reform address this situation. The NAEP results by demographic subgroup enumerated below substantiate the concern that the goal of mathematics for all students is not being met, particularly for Black and Hispanic students and for students attending schools in our inner cities.

- In general, Asian/Pacific Islander and White students demonstrated the highest average mathematics achievement overall and in each of the separate mathematics content areas. Between the two groups, Asian/Pacific Islander students tended to outperform White students. Hispanic and Black students showed much lower average proficiency overall and in the content areas, but Hispanic students tended to perform better than the Black students did. The achievement gaps between Asian/Pacific Islander and Black students were large. For example, 70 percent of the Asian/Pacific Islander twelfth graders demonstrated a grasp of fractions, decimals, percents, and simple algebra (Level 300), compared to only 16 percent of the Black twelfth graders.

- At grades 4 and 8, there seemed to be few gender differences, except males had higher average proficiency in measurement and estimation. However, at grade 12, males showed an advantage in every content area except algebra and functions. The gender differences in overall performance were most noticeable at the higher anchor levels on the scale.

- Consistently, those students attending schools in advantaged urban communities had the highest average proficiency and those in disadvantaged urban schools the lowest average proficiency. Those students in extreme rural schools or schools in other community types performed somewhere in between the two urban groups.

- Students in the Southeast had the lowest average achievement overall and in each of the content areas. At grade 12, for example, 16 to 23 percent fewer students in the Southeast attained Level 300 than did students in the other regions of the country.

- At grade 12, students in academic school programs and with plans to attend a four-year college after high school had substantially higher average mathematics achievement than students in general or vocational/technical programs or those planning to enter the work force upon high-school graduation. Yet the average proficiency of students in academic programs was barely above Level 300 (material typically introduced by the seventh grade).

As shown in TABLE 2, when average proficiency by school was calculated, 10 percent of the high school seniors in the top one-third of the schools demonstrated breadth of mathematical understanding (Level 350). Even in the higher-performing schools, relatively few twelfth graders appear to be prepared for the study of relatively advanced mathematics.

TABLE 2 Average Proficiency and Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale for the Top One-Third of the Schools and the Bottom One-Third of the Schools

	Percent of Students	Average Proficiency	Percentage of Students at or Above			
			Level 200	Level 250	Level 300	Level 350
Grade 4						
Top One-Third Schools	34 (2.6)	232 (0.8)	90 (1.1)	22 (1.4)	0 (0.0)	0 (0.0)
Bottom One-Third Schools	29 (2.4)	198 (1.2)	46 (2.0)	3 (0.6)	0 (0.0)	0 (0.0)
Grade 8						
Top One-Third Schools	29 (3.8)	284 (1.3)	100 (0.2)	88 (1.3)	29 (2.3)	1 (0.3)
Bottom One-Third Schools	33 (2.8)	[illegible]	94 (1.3)	44 (1.8)	4 (0.5)	0 (0.0)
Grade 12						
Top One-Third Schools	35 (3.9)	312 (1.0)	100 (0.0)	97 (0.6)	66 (1.5)	10 (1.1)
Bottom One-Third Schools	25 (2.9)	273 (1.1)	100 (0.2)	77 (1.7)	18 (1.2)	1 (0.3)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable.

In the lower-performing schools, fewer than half the fourth graders demonstrated a systematic grasp of addition with whole numbers (Level 200), and less than half of the eighth grader showed consistent success in two-step problem solving with whole numbers (Level 250). Only 18 percent of the graduating seniors demonstrated understanding of fractions, decimals, percents, and simple algebra (Level 300). Two-thirds of the Black students and nearly half the Hispanic students at all three grades attended lower-performing schools, as did about half to two-thirds of the students attending schools in disadvantaged urban communities.

HOME SUPPORT FOR SCHOOL

Parents are children's first teachers and should remain instrumental to their children's educational success.[11] Whether their children are in public or private schools, parents can support learning in many ways, including monitoring homework, turning off the television in favor of reading or other literacy-related activities, and making sure that students are attending school. The NAEP data, however, suggest that sizable proportions of students are in home situations that are less than ideal for fostering school learning.

- Students in homes with resource materials such as newspapers, magazines, and books had higher average mathematics proficiency, as did students who read more pages each day for school and homework. Those students with access to fewer resource materials and who did less daily reading for school had lower average proficiency.

- Similarly, students who did homework on a daily basis tended to have higher proficiency than those who did not do homework, particularly at grades 8 and 12.

- The impact of parents' level of education was once again reinforced by NAEP mathematics results. Students with well-educated parents had significantly higher achievement than did students with less well-educated parents.

- Fourth and eighth graders attending Catholic schools and other private schools had higher proficiency than did students attending public schools, but at grade 12, the difference was greatly reduced.

[11]Carnegie Council on Adolescent Development, *Turning Points: Preparing American Youth for the 21st Century* (New York, NY: Carnegie Corporation of New York, 1989).

James P. Comer, "Home, School, and Academic Learning" in *Access to Knowledge: An Agenda For Our Nation's Schools*, John T. Goodlad and Pamela Keating, editors (New York, NY: College Entrance Examination Board, 1990).

The Harvard Education Letter, "Parents and Schools" (Cambridge, MA: Harvard University Press, November/December 1988).

- Students with both parents in the home had higher mathematics achievement, but only about three-fourths of the students at all three grades reported having both parents in the home.

- Eighth and twelfth graders who attended school regularly also performed better on the mathematics assessment. Yet 22 percent of the eighth graders and one-third of the twelfth graders had missed three or more days of school in the month preceding the assessment.

- Finally, there was a negative association between mathematics proficiency and amount of television watched each day. At all three grades, students who reported watching six hours or more of television per day had substantially lower average mathematics proficiency than their classmates who watched less television. One-fourth of the students at grade 4 reported watching six or more hours of television each day.

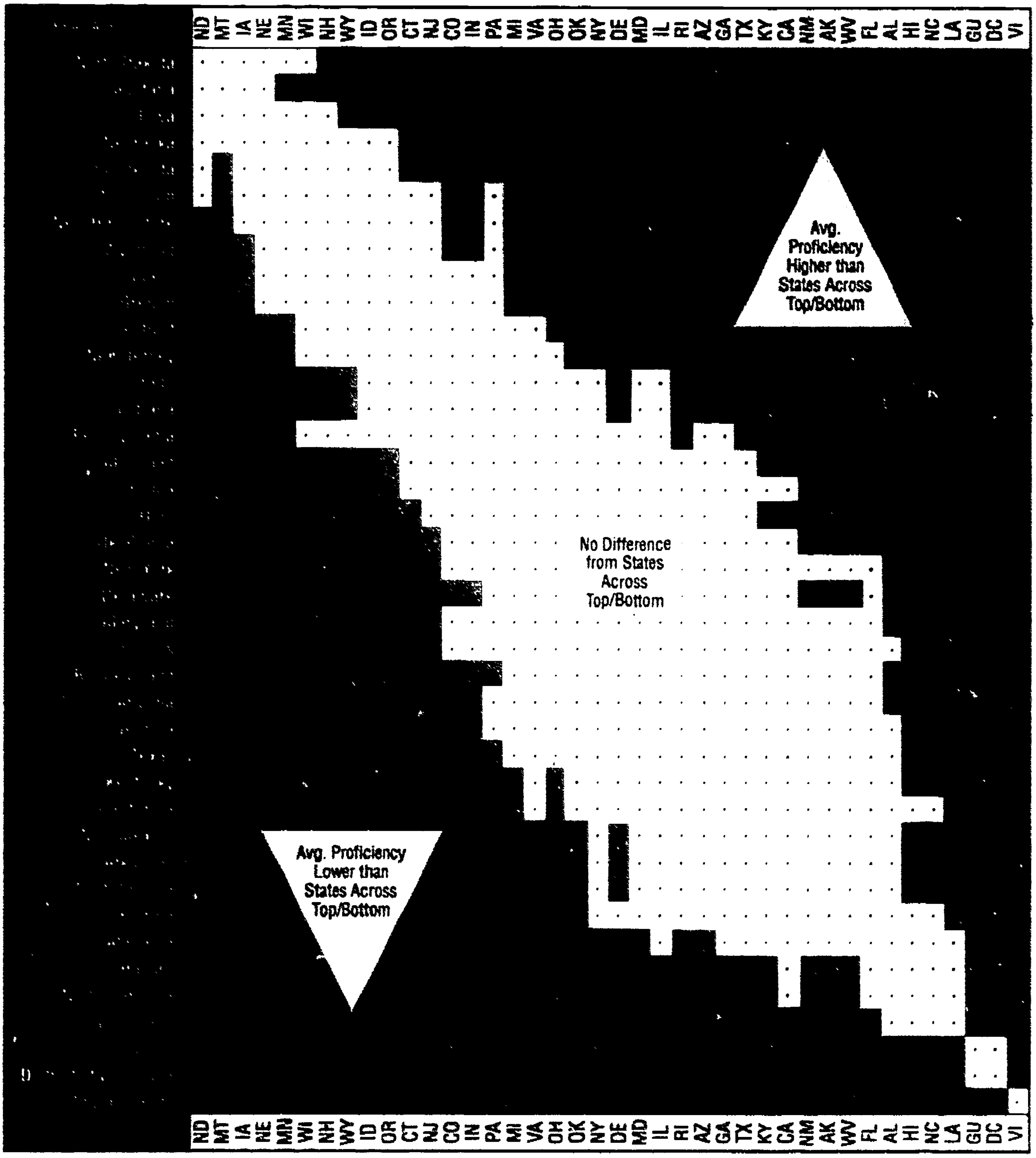
MATHEMATICS PERFORMANCE AT GRADE 8 IN THE STATES

FIGURE 2 provides a method for making appropriate comparisons in average overall mathematics proficiency across the states (including the District Columbia) and territories participating in NAEP's 1990 Trial State Assessment Program. The states are listed by overall average mathematics proficiency. However, the information presented in FIGURE 2, which uses appropriate tests of statistical significance to determine when average proficiency between states differs, shows that it would be quite misleading to assign numerical rankings (1 to 40) to these results. As can be seen, the pattern for most states is one of having lower average proficiency than some states, the same average proficiency as some states, and higher average proficiency than some states. To find out how any one state performed in comparison to the other states, find the state's name in the left column in FIGURE 2 and then read across the figure.

Essentially, North Dakota, Montana, Iowa, Nebraska, Minnesota, and Wisconsin had similar overall average mathematics proficiency for public-school eighth graders, although Montana had higher average proficiency than did Minnesota and Wisconsin. Because the overall average proficiency from state to state tended to be very similar, and the degree of the measurement error was slightly different from state to state, this type of overlapping

FIGURE 2

Comparisons of Overall Mathematics Proficiency
Based on Appropriate Tests of Statistical Significance



Note: Reading across, from left to right, this chart shows whether the average proficiency of each state or territory is lower than, the same as, or higher than that of other participants.

*Significance determined by an application of the Bonferroni procedure based on 780 comparisons by comparing the difference between the two means with four times the square root of the sum of the squared standard errors.

For any given state:

Overall average proficiency statistically significantly higher than comparison state.

No statistically significant difference from comparison state.

Overall average proficiency statistically significantly lower than comparison state.

prevailed across the assessment results. For example, performance in New Hampshire, Wyoming, Idaho, and Oregon, did not differ from that in Nebraska, Minnesota, and Wisconsin.

However, there was considerable difference between overall average mathematics proficiency in the higher-performing states and overall average mathematics proficiency in the lower-performing states. An examination of contextual background data from the NAEP assessment and other sources suggests that the higher-performing states tended to have had fewer students in large-city schools, fewer students in free-lunch programs, smaller percentages of Black and Hispanic students, smaller percentages of students watching six hours or more of television each day, and larger percentages of students with both parents in the home. Higher-performing states also tended to be less densely populated in general. The lower-performing states tended to be in the Southeast. The District of Columbia and the two participating territories (Guam and the Virgin Islands) were also among the lower-performing participants. The Virgin Islands participated in the 1990 Trial State Assessment Program despite losing five weeks of school prior to the mathematics assessment as a result of Hurricane Hugo.

TABLE 3, which presents state-level results in alphabetical order, provides the overall average proficiency for each state and territory and the percentage of students performing at or above each anchor level on the NAEP scale. TABLE 3 also provides national and regional results for a subset of the grade 8 national data that provides a better basis for making state-to-nation comparisons.[12] Thus, these national and regional results differ from those presented previously. When considering results for the nation and its regions, it is best to use the data already presented. When comparing state results to the nation or a region, it is best to use the accompanying results in the tables.

[12] Whereas the results for eighth graders presented for the 1990 national assessment are based on the full NAEP samples, including eighth graders in both public and private schools who were assessed during January to mid-May, those used for national comparisons in the Trial State Assessment Program involve only eighth graders attending public schools who were assessed during a shorter January to mid-March time period (also a nationally representative sample). The 1990 Trial State Assessment Program was conducted during the month of February, and only public school students were assessed.

TABLE 3 | Overall Average Mathematics Proficiency and Anchor Level Results

GRADE 8 PUBLIC SCHOOLS	Average Proficiency	Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale			
		Level 200	Level 250	Level 300	Level 350
NATION	261 (1.4)	97 (0.7)	64 (1.6)	12 (1.2)	0 (0.2)
Northeast	269 (3.4)	99 (0.6)	72 (4.8)	16 (2.7)	0 (0.5)
Southeast	253 (2.7)	94 (2.2)	52 (3.2)	8 (1.8)	0 (0.0)
Central	265 (2.6)	98 (0.9)	70 (3.2)	12 (2.5)	0 (0.2)
West	261 (2.6)	97 (1.0)	63 (2.8)	12 (2.4)	0 (0.4)
STATES					
Alabama	**252 (1.2)**	**96 (0.7)**	**52 (1.7)**	**7 (0.7)**	**0 (0.1)**
Arizona	**259 (1.2)**	**98 (0.3)**	**61 (1.9)**	**10 (1.0)**	**0 (0.1)**
Arkansas	**256 (0.9)**	**97 (0.5)**	**57 (1.6)**	**7 (0.7)**	**0 (0.0)**
California	**256 (1.3)**	**95 (0.9)**	**56 (1.6)**	**11 (1.0)**	**0 (0.1)**
Colorado	267 (1.0)	99 (0.3)	72 (1.5)	14 (0.9)	0 (0.0)
Connecticut	270 (1.1)	98 (0.4)	72 (1.4)	19 (1.0)	0 (0.1)
Delaware	261 (0.7)	97 (0.5)	60 (1.2)	13 (0.9)	0 (0.2)
District of Columbia	231 (0.7)	86 (0.8)	23 (1.0)	2 (0.5)	0 (0.1)
Florida	255 (1.2)	96 (0.7)	54 (1.7)	10 (1.0)	0 (0.0)
Georgia	**258 (1.3)**	**96 (0.5)**	**59 (1.6)**	**12 (1.1)**	**0 (0.1)**
Hawaii	**251 (0.6)**	**93 (0.6)**	**49 (1.0)**	**10 (0.6)**	**0 (0.2)**
Idaho	**272 (0.7)**	**100 (0.2)**	**79 (1.0)**	**15 (0.9)**	**0 (0.1)**
Illinois	**260 (1.7)**	**96 (0.8)**	**64 (2.1)**	**12 (1.1)**	**0 (0.1)**
Indiana	**267 (1.1)**	**99 (0.4)**	**71 (1.5)**	**14 (1.2)**	**0 (0.1)**
Iowa	278 (1.0)	100 (0.1)	84 (1.3)	21 (1.4)	0 (0.2)
Kentucky	256 (1.1)	98 (0.5)	57 (1.7)	8 (0.8)	0 (0.0)
Louisiana	246 (1.2)	94 (0.8)	43 (1.8)	4 (0.6)	0 (0.0)
Maryland	260 (1.4)	96 (0.5)	61 (1.8)	14 (1.2)	0 (0.1)
Michigan	264 (1.1)	98 (0.3)	67 (1.5)	13 (1.0)	0 (0.1)
Minnesota	**276 (0.9)**	**99 (0.3)**	**82 (1.0)**	**20 (1.1)**	**0 (0.1)**
Montana	**280 (0.8)**	**100 (0.1)**	**88 (0.9)**	**23 (1.4)**	**0 (0.1)**
Nebraska	**276 (0.9)**	**99 (0.3)**	**81 (1.2)**	**21 (1.2)**	**0 (0.2)**
New Hampshire	**273 (0.8)**	**100 (0.2)**	**79 (1.2)**	**17 (1.1)**	**0 (0.2)**
New Jersey	**269 (1.0)**	**99 (0.4)**	**72 (1.5)**	**19 (1.3)**	**0 (0.2)**
New Mexico	256 (0.8)	98 (0.5)	56 (1.3)	8 (0.8)	0 (0.0)
New York	261 (1.3)	96 (0.6)	62 (1.9)	13 (1.0)	0 (0.1)
North Carolina	250 (1.0)	94 (0.6)	49 (1.4)	7 (0.7)	0 (0.0)
North Dakota	281 (1.2)	100 (0.2)	88 (1.4)	24 (1.7)	0 (0.4)
Ohio	264 (1.0)	98 (0.3)	67 (1.3)	12 (0.9)	0 (0.0)
Oklahoma	**263 (1.2)**	**99 (0.4)**	**67 (1.7)**	**10 (1.0)**	**0 (0.0)**
Oregon	**271 (1.0)**	**99 (0.2)**	**76 (1.4)**	**18 (1.0)**	**0 (0.1)**
Pennsylvania	**266 (1.6)**	**98 (0.4)**	**69 (2.1)**	**15 (1.2)**	**0 (0.1)**
Rhode Island	**260 (0.5)**	**96 (0.5)**	**61 (0.8)**	**12 (0.8)**	**0 (0.1)**
Texas	**258 (1.3)**	**97 (0.6)**	**58 (1.8)**	**10 (0.9)**	**0 (0.1)**
Virginia	264 (1.5)	98 (0.4)	64 (1.6)	15 (1.6)	1 (0.4)
West Virginia	256 (0.9)	98 (0.4)	56 (1.4)	7 (0.8)	0 (0.0)
Wisconsin	274 (1.3)	99 (0.3)	80 (1.4)	20 (1.4)	0 (0.2)
Wyoming	272 (0.6)	100 (0.1)	80 (1.0)	15 (0.7)	0 (0.1)
TERRITORIES					
Guam	**231 (0.6)**	**81 (1.0)**	**28 (0.8)**	**3 (0.4)**	**0 (0.1)**
Virgin Islands	**218 (0.5)**	**76 (1.5)**	**11 (0.8)**	**0 (0.2)**	**0 (0.0)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent. Descriptions of mathematics proficiency at the four anchor levels are found in Chapter One.

More than 90 percent of the students across the states and sometimes all (or nearly all) reached Level 200, except in the District of Columbia and the two territories. Thus, most eighth graders attending public schools in the participating states demonstrated a grasp of additive reasoning with whole numbers typical of materials generally covered by the third grade. Conversely, very few eighth-grade students attending public schools, if any, reached Level 350 across all the states and territories participating in the Trial State Assessment Program.

The large variability in performance within each state or territory and the differences in achievement across participating entities are illuminated by the differing percentages of students who performed at or above Levels 250 and 300. For example, in the District of Columbia, Guam, and the Virgin Islands, the percentages of public-school eighth graders attaining Level 250 or above ranged from 11 to 28 percent and for the participating states, the percentage of students attaining Level 250 ranged from 43 percent in Louisiana to 88 percent in North Dakota and Montana. Thus, while most of the students in some states demonstrated a grasp of mathematics that included multiplicative reasoning and two-step problem-solving with whole numbers, in other states and territories, far fewer eighth graders had reached this level of understanding. Similarly, the percentages of eighth graders attending public schools performing at or above Level 300 ranged from 0 to 24 percent, showing that in some states and territories, very few eighth graders demonstrated a grasp of decimals, fractions, percents, and simple algebra. However, in North Dakota (24 percent) and Montana (23 percent) almost one-fourth of the eighth graders demonstrated this understanding

TABLE 4 summarizes the average proficiency in each of the five mathematics content areas for each of the states. North Dakota, Iowa, and Montana were the higher performing states in numbers and operations, although Nebraska, Minnesota, and Wisconsin did not have lower average proficiency than Iowa or Montana. North Dakota, Montana, Iowa, Nebraska, Wisconsin, New Hampshire, and Minnesota all had similar average proficiency in measurement, although Montana had higher average proficiency than did Minnesota. Also, a number of other states had average proficiency that did not differ from average proficiency in Iowa, Nebraska, Wisconsin, New Hampshire, and Minnesota. Although this type of overlapping prevailed across the average proficiency results for the content areas, Montana, North Dakota, and Iowa had higher average proficiency in geometry than many other participating states and territories. North Dakota, Montana, Iowa, and Minnesota generally had higher average proficiency in data analysis, statistics, and probability. In algebra and functions, Montana, North Dakota, Iowa, Minnesota, and Nebraska were the higher-performing states.

TABLE 4 | Average Proficiency in Mathematics Content Areas

GRADE 8 PUBLIC SCHOOLS	Numbers and Operations	Measurement	Geometry	Data Analysis, Statistics, and Probability	Algebra and Functions
NATION	266 (1.4)	258 (1.7)	259 (1.4)	262 (1.8)	260 (1.3)
Northeast	271 (3.1)	268 (4.7)	268 (3.6)	273 (3.6)	267 (3.4)
Southeast	259 (2.9)	246 (3.8)	249 (2.6)	250 (3.3)	254 (2.7)
Central	270 (2.7)	263 (3.4)	262 (3.1)	265 (3.2)	263 (2.1)
West	264 (2.6)	258 (3.0)	260 (2.6)	262 (3.6)	259 (2.4)
STATES					
Alabama	259 (1.2)	247 (1.4)	248 (1.2)	251 (1.6)	251 (1.4)
Arizona	264 (1.2)	257 (1.4)	256 (1.1)	258 (1.4)	258 (1.3)
Arkansas	262 (0.8)	253 (1.2)	253 (1.0)	254 (1.2)	253 (1.1)
California	259 (1.2)	252 (1.5)	255 (1.3)	254 (1.7)	256 (1.3)
Colorado	269 (1.0)	265 (1.3)	266 (1.1)	269 (1.1)	266 (1.1)
Connecticut	273 (1.0)	269 (1.5)	266 (1.1)	272 (1.4)	268 (1.2)
Delaware	265 (0.8)	258 (1.0)	256 (0.7)	261 (1.0)	260 (1.0)
District of Columbia	238 (0.8)	221 (1.0)	229 (0.9)	222 (1.1)	235 (1.1)
Florida	260 (1.2)	251 (1.4)	251 (1.3)	255 (1.5)	255 (1.3)
Georgia	263 (1.2)	252 (1.5)	258 (1.3)	260 (1.5)	257 (1.5)
Hawaii	256 (0.9)	249 (0.8)	252 (0.7)	242 (1.0)	249 (0.8)
Idaho	274 (0.8)	270 (1.0)	269 (0.8)	274 (0.9)	269 (0.9)
Illinois	265 (1.7)	256 (2.0)	258 (1.7)	262 (2.0)	260 (1.7)
Indiana	271 (1.2)	263 (1.3)	264 (1.1)	269 (1.4)	265 (1.2)
Iowa	283 (1.0)	277 (1.5)	275 (1.3)	281 (1.2)	274 (1.1)
Kentucky	261 (1.2)	253 (1.5)	253 (1.2)	257 (1.3)	256 (1.1)
Louisiana	253 (1.1)	241 (1.5)	242 (1.3)	243 (1.6)	245 (1.3)
Maryland	264 (1.4)	256 (1.7)	256 (1.4)	260 (1.5)	263 (1.6)
Michigan	268 (1.2)	260 (1.3)	262 (1.0)	264 (1.4)	264 (1.2)
Minnesota	279 (1.0)	272 (1.1)	273 (1.1)	279 (0.9)	274 (0.9)
Montana	282 (1.0)	279 (1.4)	280 (0.8)	282 (0.8)	278 (0.9)
Nebraska	279 (1.0)	274 (1.4)	273 (1.1)	279 (1.0)	273 (1.0)
New Hampshire	275 (1.0)	272 (1.3)	272 (1.0)	276 (0.9)	271 (1.0)
New Jersey	274 (1.1)	267 (1.4)	268 (1.1)	270 (1.3)	268 (1.1)
New Mexico	258 (0.8)	253 (0.8)	257 (0.9)	253 (1.1)	256 (1.0)
New York	263 (1.3)	255 (1.6)	259 (1.4)	263 (1.7)	260 (1.2)
North Carolina	255 (1.0)	241 (1.1)	249 (1.0)	247 (1.3)	251 (1.0)
North Dakota	286 (1.1)	280 (1.9)	278 (1.3)	286 (1.5)	275 (1.1)
Ohio	268 (1.0)	259 (1.2)	260 (1.1)	266 (1.2)	262 (1.0)
Oklahoma	268 (1.2)	258 (1.5)	259 (1.4)	264 (1.6)	262 (1.2)
Oregon	273 (1.0)	269 (1.3)	270 (0.9)	274 (1.3)	270 (1.1)
Pennsylvania	270 (1.5)	265 (2.0)	263 (1.7)	268 (1.9)	265 (1.6)
Rhode Island	264 (0.6)	256 (0.8)	256 (0.6)	258 (0.6)	261 (0.6)
Texas	262 (1.2)	253 (1.4)	258 (1.4)	256 (1.7)	256 (1.5)
Virginia	268 (1.4)	259 (1.8)	261 (1.5)	264 (1.8)	265 (1.6)
West Virginia	260 (0.9)	252 (1.3)	254 (0.9)	256 (1.2)	254 (1.0)
Wisconsin	278 (1.2)	273 (1.7)	272 (1.3)	277 (1.4)	271 (1.3)
Wyoming	275 (0.7)	270 (0.9)	270 (0.6)	274 (0.7)	270 (0.7)
TERRITORIES					
Guam	239 (0.7)	227 (0.9)	236 (0.8)	213 (0.8)	230 (0.7)
Virgin Islands	227 (0.6)	214 (1.3)	222 (0.8)	196 (1.2)	218 (0.8)

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Descriptions of the content area scales are found in Chapter Three.

In general, for both overall mathematics proficiency and for average proficiency in the content areas, the performance by demographic subgroups within each state reflected the achievement gaps described for the nation. However, there was tremendous variation from state to state in composition of the population of public school eighth graders by racial/ethnic subgroup, type of community, level of parents' education, the amount of reading resource materials in the homes, absenteeism, and even television-viewing habits.

CURRICULAR EMPHASES IN CONTENT AREAS AT GRADES 4 AND 8 IN THE NATION

To collect information about students' curriculum in the content areas covered by the 1990 NAEP assessment at grades 4 and 8, students' teachers were asked to estimate the degree of instructional emphasis they placed on each of the various content areas for which mathematics educators recommend a broad and balanced approach.[13] These results are summarized in TABLE 5. In addition, eighth and twelfth graders were asked about their course taking in mathematics.

[13] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

TABLE 5 Summary of Teachers' Reports on the Instructional Emphasis Placed on Each of Five Content Areas

	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
Numbers and Operations						
Grade 4	42 (2.1)	213 (1.4)	33 (2.2)	216 (1.3)	25 (2.1)	213 (1.7)
Grade 8	51 (2.7)	264 (1.3)	35 (2.4)	270 (1.8)	14 (1.3)	292 (2.7)
Measurement						
Grade 4	18 (2.0)	221 (2.3)	67 (2.3)	244 (1.0)	15 (2.0)	222 (2.4)
Grade 8	17 (1.7)	264 (1.3)	50 (2.6)	260 (1.6)	33 (2.5)	274 (2.9)
Geometry						
Grade 4	8 (1.1)	214 (3.3)	53 (2.6)	219 (1.1)	39 (2.6)	218 (1.5)
Grade 8	27 (2.2)	263 (2.0)	49 (2.5)	262 (1.6)	23 (2.4)	265 (3.6)
Data Analysis, Statistics, and Probability						
Grade 4*	11 (1.3)	--	29 (2.5)	--	59 (2.4)	--
Grade 8	14 (1.7)	271 (3.0)	30 (2.2)	269 (3.0)	56 (2.8)	266 (1.8)
Algebra and Functions						
Grade 4*	1 (0.4)	212 (6.2)	15 (1.7)	215 (2.0)	84 (1.7)	218 (0.8)
Grade 8	50 (2.1)	278 (1.7)	33 (2.1)	256 (2.1)	17 (1.8)	246 (2.5)

*At grade 4, for data analysis, statistics, and probability and for algebra and functions, the question was phrased to cover only introductory concepts. (--) Because of too few questions in that area, no proficiency scale was developed at grade 4 for data analysis, statistics, and probability. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent due to rounding

According to their teachers, the greatest percentage of fourth graders (42 percent) were receiving heavy instructional emphasis in numbers and operations. Less than one-fifth were receiving heavy emphasis in any other mathematics content area. However, two-thirds were receiving moderate instructional emphasis in the area of measurement and the majority were receiving moderate emphasis in geometry.

Eighty-four percent of the fourth-grade students were receiving little or no instructional emphasis in introductory concepts pertinent to algebra and functions. The average proficiency of the fourth graders did not tend to differ by the instructional emphases provided in the content areas, except in measurement, where those students whose teachers provided a moderate degree of emphasis had higher proficiency than either the students whose teachers provided heavy emphasis or little or no emphasis.

At grade 8, the teachers reported a less balanced approach in their instructional emphases across the mathematics curriculum. Half the students were receiving heavy emphasis in numbers and operations and half were receiving heavy emphasis in algebra. About one-fourth were receiving heavy instructional emphasis in geometry and relatively few were receiving heavy instructional emphasis in the other two content areas.

This pattern reflects tracking eighth graders into at least three different courses--eighth-grade mathematics, pre-algebra, and algebra. The percentages of students in these courses and their proficiency are presented in TABLE 6.

TABLE 6 Average Proficiency in Algebra and Functions by Algebra Course Taking: Grade 8

	Eighth-Grade Mathematics		Pre-Algebra		Algebra	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Nation	58 (1.5)	255 (1.0)	22 (1.3)	274 (1.5)	16 (1.0)	297 (2.2)
White	55 (1.8)	261 (1.2)	23 (1.7)	279 (1.3)	18 (1.3)	301 (2.2)
Black	68 (2.8)	235 (1.8)	21 (2.1)	255 (3.2)	7 (1.3)	265 (6.1)
Hispanic	69 (2.3)	243 (1.7)	17 (1.8)	263 (2.3)	10 (1.3)	274 (4.6)
Asian/Pacific Islander	35 (6.8)	263 (4.6)	24 (5.3)	281 (7.8)	38 (5.3)	310 (4.9)
Advantaged Urban !	48 (5.2)	271 (4.6)	25 (4.4)	287 (2.4)	26 (2.5)	306 (7.0)
Disadvantaged Urban	64 (3.5)	243 (2.6)	17 (2.4)	260 (5.7)	15 (2.0)	285 (3.7)
Extreme Rural	62 (7.6)	253 (3.1)	21 (4.2)	270 (4.7)	13 (4.9)	291 (3.4)
Other	59 (1.7)	254 (1.4)	23 (1.6)	274 (2.4)	15 (1.1)	297 (2.4)
Public Schools	60 (1.6)	253 (1.1)	21 (1.4)	274 (1.4)	15 (1.0)	298 (2.4)
Private Schools	47 (4.2)	270 (2.0)	27 (2.8)	277 (2.5)	23 (2.8)	294 (3.8)
Male	59 (1.5)	255 (1.1)	21 (1.3)	276 (1.6)	16 (1.1)	300 (2.4)
Female	58 (1.8)	254 (1.2)	23 (1.5)	273 (1.6)	16 (1.2)	294 (2.4)
Northeast	59 (3.7)	259 (2.1)	18 (2.7)	279 (3.2)	18 (2.1)	299 (4.0)
Southeast	57 (3.3)	244 (2.5)	29 (3.8)	271 (2.3)	12 (1.9)	294 (3.5)
Central	59 (2.5)	260 (1.7)	22 (2.1)	276 (1.7)	15 (1.8)	296 (3.6)
West	58 (2.6)	255 (2.3)	19 (1.9)	273 (2.2)	19 (2.3)	299 (4.4)
Did Not Finish High School	74 (2.7)	241 (1.7)	18 (2.5)	267 (3.8)	3 (0.7)	269 (8.3)
Graduated High School	66 (2.2)	250 (1.3)	21 (2.2)	267 (2.0)	9 (1.0)	281 (3.2)
Some Education After High School	58 (2.0)	261 (1.2)	24 (1.8)	277 (1.6)	15 (1.3)	298 (2.0)
Graduated College	48 (1.9)	263 (1.5)	24 (1.6)	280 (1.5)	25 (1.5)	303 (2.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages may not total 100 percent because a few students reported taking other mathematics courses. !Interpret with caution--the nature of the sample does not allow accurate determination of the variability of the results for this population subgroup.

More than half of the students reported taking eighth-grade mathematics, 22 percent pre-algebra, and 16 percent algebra. However, 38 percent of the Asian/Pacific Islander eighth graders and approximately one-fourth of the students attending schools in advantaged urban areas, those in private schools, and those with at least one parent who had graduated from college were taking algebra. In contrast, two-thirds of the Black eighth graders were in eighth-grade mathematics classes, as were two-thirds of the Hispanic students. This was also true for students whose parents had at most a high-school education and for those eighth graders attending schools in disadvantaged urban areas.

Because students tend to be assigned to eighth-grade mathematics courses based on their previous achievement, it follows that the mathematics proficiency of students in pre-algebra and algebra courses was higher than that of students in eighth-grade mathematics classes. It may also help explain why, as was shown in TABLE 5, the students receiving heavy emphasis in numbers and operations tended to have lower average proficiency than those receiving less emphasis. The students with higher proficiency tend to have been assigned to pre-algebra and algebra courses and were receiving heavy instructional emphasis in algebra.

CURRICULAR EMPHASES IN CONTENT AREAS AT GRADE 8 IN THE STATES

TABLE 7 presents the course-taking results for eighth graders attending public schools across the states. In each participating state, higher average mathematics proficiency was associated with each successively higher level mathematics course. However, this relationship did not necessarily hold across states. For example, the District of Columbia had the largest percentage of public-school eighth graders taking algebra (32 percent), but its average mathematics proficiency was among the lowest of the participating states and territories. North Dakota, on the other hand, had one of the lowest percentages of eighth graders taking algebra (8 percent), but its overall average proficiency was one of the highest.

Teachers' reports about the percentages of students receiving heavy instructional emphasis across the states in the five mathematics content areas are presented in TABLE 8. The instructional emphasis reported by teachers in the states mirrored the course-taking results, with students receiving the most instructional emphasis in either numbers and operations or algebra and functions. In 15 states, the majority of the eighth graders attending public schools were receiving heavy emphasis in numbers and operations. Only in Colorado, Wisconsin, New Hampshire, Minnesota, Maryland, and Oregon were less than 40 percent of the students receiving heavy emphasis in numbers and operations.

With the exception of Georgia and the Virgin Islands, less than one-third of the eighth graders in any participating state were receiving heavy instructional emphasis in the area of measurement. Compared to the emphasis placed on numbers and operations, the eighth graders in public schools across the states also were receiving much less emphasis in geometry, although this tended to differ considerably from state to state. For example, in New York, 40 percent of the eighth graders attending public schools were receiving heavy emphasis in geometry, compared to 20 percent or fewer of the students in 22 of the other participating states. Few states were giving much emphasis to eighth-graders' learning in data analysis, statistics, and probability. In 17 states, 10 percent or fewer of the students were given heavy instructional emphasis in this area.

In 16 states, the majority of the eighth graders attending public schools were receiving heavy emphasis in algebra and functions. In all the participating states except Hawaii, at least one-third of the students received heavy instructional emphasis in algebra and functions. However, across the states, considerable percentages of eighth graders, from 8 to 36 percent, were receiving little or no emphasis in algebra and functions.

TABLE 7 | **Students' Reports on Their Current Mathematics Course**

GRADE 8 PUBLIC SCHOOLS	Eighth-Grade Mathematics		Pre-Algebra		Algebra	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	62 (2.1)	251 (1.4)	19 (1.9)	272 (2.4)	15 (1.2)	296 (2.4)
Northeast	63 (5.8)	259 (2.9)	16 (3.9)	278 (6.7)!	18 (3.3)	297 (3.6)
Southeast	64 (3.7)	241 (3.4)	23 (4.4)	269 (4.6)	11 (2.2)	296 (4.8)!
Central	58 (4.8)	255 (3.1)	22 (4.3)	276 (3.1)!	15 (2.8)	289 (5.4)
West	63 (2.7)	252 (2.4)	15 (2.7)	266 (3.6)	17 (1.8)	299 (4.5)
STATES						
Alabama	66 (2.5)	243 (1.6)	20 (1.9)	268 (2.1)	11 (1.2)	287 (3.0)
Arizona	48 (1.5)	246 (1.3)	29 (1.5)	266 (1.6)	18 (1.3)	289 (2.4)
Arkansas	72 (2.2)	248 (1.0)	16 (1.9)	270 (2.3)	10 (1.1)	289 (2.4)
California	59 (1.9)	242 (1.1)	21 (1.4)	272 (2.2)	16 (1.0)	293 (2.0)
Colorado	46 (2.5)	255 (1.4)	32 (2.1)	270 (1.2)	18 (1.1)	295 (2.0)
Connecticut	50 (1.9)	251 (1.3)	30 (1.6)	280 (1.0)	17 (1.0)	308 (1.1)
Delaware	48 (1.2)	243 (0.7)	25 (1.2)	264 (1.3)	24 (0.9)	295 (1.7)
District of Columbia	57 (1.0)	217 (0.6)	10 (0.6)	241 (1.7)	32 (0.9)	253 (1.4)
Florida	63 (1.6)	242 (1.4)	19 (1.2)	271 (1.8)	14 (1.0)	298 (1.8)
Georgia	57 (2.5)	244 (1.1)	28 (1.9)	271 (1.8)	14 (1.3)	300 (2.4)
Hawaii	61 (1.0)	237 (0.6)	24 (0.9)	273 (1.3)	10 (0.6)	298 (2.2)
Idaho	47 (1.1)	264 (0.7)	32 (1.2)	271 (1.1)	18 (1.1)	301 (1.2)
Illinois	63 (2.4)	251 (1.7)	18 (2.0)	268 (3.7)	16 (1.3)	290 (2.6)
Indiana	66 (2.1)	256 (1.1)	16 (1.8)	262 (2.2)	13 (1.1)	306 (2.4)
Iowa	69 (2.8)	272 (1.1)	19 (2.7)	267 (2.1)	10 (1.0)	311 (2.4)
Kentucky	67 (2.2)	247 (1.1)	18 (1.7)	270 (1.9)	12 (1.2)	289 (2.2)
Louisiana	53 (2.9)	238 (1.5)	34 (2.6)	251 (2.3)	12 (1.1)	265 (4.2)
Maryland	38 (2.0)	237 (1.4)	32 (1.4)	261 (1.6)	27 (1.5)	291 (1.7)
Michigan	59 (2.8)	253 (1.4)	24 (2.1)	272 (1.5)	14 (1.4)	300 (2.1)
Minnesota	54 (3.0)	266 (1.3)	25 (2.4)	281 (1.1)	17 (1.4)	303 (1.6)
Montana	59 (2.4)	276 (1.0)	26 (1.9)	281 (1.1)	12 (1.5)	299 (3.8)
Nebraska	66 (2.5)	271 (1.2)	20 (2.1)	277 (1.4)	11 (1.0)	307 (2.0)
New Hampshire	55 (1.3)	262 (1.0)	28 (1.0)	280 (1.0)	14 (0.9)	308 (1.6)
New Jersey	55 (2.2)	255 (1.2)	24 (2.1)	275 (2.0)	18 (1.1)	306 (1.4)
New Mexico	62 (1.2)	247 (0.7)	23 (1.1)	265 (1.5)	11 (0.6)	288 (1.9)
New York	73 (1.8)	252 (1.4)	8 (1.2)	273 (2.7)	13 (1.1)	291 (2.7)
North Carolina	58 (1.8)	234 (1.1)	22 (1.4)	262 (1.4)	17 (1.3)	290 (1.3)
North Dakota	73 (2.0)	277 (1.4)	17 (1.9)	289 (2.4)	8 (1.0)	307 (4.4)
Ohio	63 (2.2)	254 (1.2)	20 (2.0)	270 (1.9)	16 (1.1)	300 (1.5)
Oklahoma	53 (2.7)	254 (1.5)	30 (2.7)	267 (1.8)	13 (1.1)	290 (2.8)
Oregon	43 (1.5)	254 (1.2)	30 (1.2)	278 (1.4)	20 (1.1)	305 (1.5)
Pennsylvania	49 (2.5)	248 (1.6)	24 (2.2)	275 (1.5)	25 (1.6)	296 (1.4)
Rhode Island	52 (1.1)	243 (0.7)	29 (0.8)	272 (0.9)	16 (0.8)	298 (1.7)
Texas	72 (2.0)	249 (1.4)	14 (1.5)	274 (2.6)	12 (1.0)	296 (1.6)
Virginia	46 (2.0)	244 (1.5)	35 (1.8)	271 (1.5)	16 (1.0)	305 (2.4)
West Virginia	63 (2.0)	244 (1.2)	19 (1.8)	267 (1.3)	16 (1.2)	291 (1.8)
Wisconsin	68 (2.5)	266 (1.4)	17 (1.8)	284 (2.3)	13 (1.3)	307 (1.9)
Wyoming	48 (1.0)	266 (0.9)	31 (0.9)	270 (1.1)	16 (0.8)	303 (1.2)
TERRITORIES						
Guam	77 (1.0)	225 (0.6)	12 (0.7)	255 (2.1)	7 (0.6)	280 (4.1)
Virgin Islands	88 (0.7)	216 (0.6)	3 (0.5)	*** (***)	6 (0.6)	240 (4.3)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. The percentages may not add to 100 percent because a small number of students reported taking other mathematics courses. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 8 — Teachers' Reports on Placing Heavy Instructional Emphasis on Specific Content Areas

GRADE 8 PUBLIC SCHOOLS	Numbers and Operations: Percent of Students	Numbers and Operations: Average Proficiency	Measurement: Percent of Students	Measurement: Average Proficiency	Geometry: Percent of Students	Geometry: Average Proficiency	Data Analysis, Statistics, and Probability: Percent of Students	Data Analysis, Statistics, and Probability: Average Proficiency	Algebra and Functions: Percent of Students	Algebra and Functions: Average Proficiency
NATION	49 (3.8)	260 (1.8)	17 (3.0)	250 (5.6)	28 (3.8)	260 (3.2)	14 (2.2)	269 (4.3)	46 (3.6)	275 (2.5)
Northeast	41 (6.9)	268 (2.9)	32(11.5)	257(11.7)!	46(11.9)	264 (6.1)!	12 (6.1)	*** (***)	52(11.5)	273 (8.6)!
Southeast	59 (7.3)	256 (3.1)	13 (6.8)	242 (7.6)!	22 (7.0)	253 (7.5)!	19 (5.9)	274 (5.8)!	42 (6.0)	277 (5.6)
Central	54 (7.2)	264 (4.3)	17 (5.7)	247(12.5)!	26 (7.0)	261 (7.9)!	12 (2.5)	262 (7.5)	50 (7.6)	273 (3.6)
West	42 (7.4)	257 (3.6)	11 (2.8)	251 (7.7)!	24 (6.3)	260 (2.8)!	14 (3.7)	264(10.6)!	43 (5.6)	277 (5.2)
STATES										
Alabama	58 (3.0)	254 (1.8)	24 (3.3)	244 (3.7)	26 (3.0)	251 (2.4)	11 (1.8)	242 (5.6)	41 (3.0)	266 (1.8)
Arizona	52 (3.3)	259 (1.9)	10 (1.6)	250 (4.5)	14 (1.8)	260 (3.7)	7 (1.3)	252 (3.9)	51 (2.8)	271 (2.0)
Arkansas	60 (3.3)	259 (1.2)	17 (2.7)	246 (3.4)	16 (2.5)	254 (2.7)	9 (2.3)	259 (5.1)!	33 (2.8)	273 (2.1)
California	40 (3.1)	251 (1.7)	21 (2.5)	246 (2.7)	25 (3.1)	259 (2.7)	17 (2.7)	263 (5.0)	46 (2.4)	273 (2.4)
Colorado	37 (3.0)	262 (1.7)	7 (1.2)	259 (4.5)	20 (3.1)	269 (2.4)	14 (2.0)	271 (2.8)	51 (3.5)	276 (1.7)
Connecticut	41 (3.4)	266 (1.9)	28 (3.3)	263 (3.8)	27 (2.9)	268 (2.5)	16 (3.2)	279 (3.3)	48 (2.6)	287 (1.6)
Delaware	43 (1.5)	255 (1.3)	20 (1.1)	251 (2.2)	17 (0.9)	256 (1.9)	17 (0.7)	274 (2.0)	39 (1.1)	285 (1.5)
District of Columbia	47 (0.9)	231 (1.4)	25 (0.8)	217 (1.8)	25 (0.9)	229 (1.9)	31 (0.8)	220 (1.7)	46 (1.0)	251 (1.4)
Florida	56 (2.4)	253 (1.6)	19 (2.3)	240 (2.9)	18 (2.4)	255 (2.7)	16 (2.0)	256 (3.1)	42 (2.2)	279 (2.0)
Georgia	57 (2.7)	255 (1.6)	33 (2.8)	242 (2.2)	30 (2.6)	255 (2.5)	24 (2.8)	256 (3.0)	47 (2.2)	272 (2.0)
Hawaii	46 (1.0)	246 (1.2)	15 (0.8)	239 (2.5)	17 (0.7)	264 (1.7)	9 (0.6)	250 (3.2)	29 (0.8)	283 (1.4)
Idaho	48 (1.8)	271 (1.1)	10 (1.1)	266 (2.5)	14 (0.7)	269 (2.2)	9 (0.8)	273 (3.3)	58 (1.5)	281 (0.9)
Illinois	41 (4.3)	257 (2.7)	17 (3.4)	235 (9.0)!	29 (4.0)	258 (3.6)	14 (3.0)	253 (6.3)!	55 (3.5)	272 (2.2)
Indiana	55 (2.6)	266 (1.9)	9 (1.9)	255 (4.2)!	15 (2.4)	263 (2.8)	4 (1.3)	282 (5.0)!	45 (2.9)	284 (1.9)
Iowa	48 (4.1)	278 (1.7)	14 (2.8)	272 (4.7)	25 (3.5)	282 (2.8)	4 (1.7)	293 (8.6)!	49 (4.4)	284 (2.1)
Kentucky	58 (3.8)	255 (1.5)	19 (3.0)	257 (3.4)	25 (3.4)	256 (2.5)	15 (2.7)	262 (2.9)	46 (2.9)	272 (1.8)
Louisiana	57 (4.4)	248 (1.5)	13 (2.3)	232 (5.2)	14 (2.4)	238 (4.1)	11 (2.2)	243 (7.4)	59 (2.7)	252 (1.6)
Maryland	35 (2.6)	249 (1.9)	21 (2.6)	237 (3.9)	22 (2.5)	254 (3.1)	14 (2.0)	257 (4.5)	51 (2.4)	283 (2.[illegible])
Michigan	44 (3.7)	259 (2.3)	12 (2.2)	247 (4.6)	20 (2.9)	261 (3.0)	10 (2.1)	259 (7.4)!	47 (3.0)	277 (2.2)
Minnesota	36 (3.3)	275 (1.8)	12 (2.2)	266 (4.1)	19 (3.0)	270 (2.5)	8 (1.8)	287 (3.3)!	50 (3.2)	285 (1.5)
Montana	40 (2.8)	280 (2.0)	9 (1.0)	277 (5.7)	31 (2.5)	286 (1.5)	13 (2.3)	287 (3.0)	58 (3.0)	281 (1.5)
Nebraska	41 (3.0)	277 (1.4)	12 (2.3)	276 (3.2)	19 (2.8)	279 (1.8)	8 (1.5)	287 (3.3)	51 (3.5)	282 (1.9)
New Hampshire	36 (1.8)	269 (1.9)	15 (0.9)	261 (2.0)	27 (1.4)	272 (2.2)	16 (0.8)	269 (3.8)	47 (1.9)	284 (1.8)
New Jersey	50 (3.4)	263 (1.5)	24 (3.1)	255 (3.2)	37 (3.2)	264 (1.7)	14 (1.6)	263 (3.7)	55 (2.6)	280 (2.0)
New Mexico	54 (1.2)	254 (1.0)	16 (1.1)	245 (3.1)	25 (1.1)	256 (2.0)	14 (0.9)	255 (3.3)	53 (1.2)	267 (1.4)
New York	44 (3.7)	255 (2.2)	13 (2.3)	258 (4.9)	40 (3.0)	265 (2.7)	24 (2.8)	272 (3.9)	49 (3.0)	274 (2.0)
North Carolina	49 (2.7)	246 (1.4)	17 (2.3)	228 (3.2)	17 (2.4)	254 (2.5)	13 (2.2)	251 (4.0)	44 (2.6)	273 (1.8)
North Dakota	49 (3.2)	283 (1.9)	13 (2.6)	277 (5.0)!	23 (3.0)	280 (1.8)	9 (2.6)	286 (3.7)!	56 (3.4)	281 (1.2)
Ohio	48 (3.7)	261 (1.8)	17 (2.8)	243 (4.2)	23 (3.1)	264 (2.7)	13 (2.3)	270 (4.4)	50 (3.0)	277 (1.8)
Oklahoma	56 (3.6)	263 (1.4)	11 (2.5)	258 (3.5)!	17 (2.8)	262 (2.4)	5 (1.8)	264 (6.7)!	55 (3.4)	270 (1.8)
Oregon	34 (3.0)	267 (2.3)	13 (2.2)	265 (4.7)	19 (2.1)	271 (2.9)	17 ([illegible])	287 (3.7)	43 (2.7)	289 (1.5)
Pennsylvania	47 (3.0)	260 (1.7)	15 (2.2)	252 (3.7)	17 (2.7)	259 (2.6)	6 (1.1)	266 (3.5)	48 (2.8)	283 (1.9)
Rhode Island	52 (1.0)	252 (0.7)	13 (0.5)	250 (2.6)	17 (0.7)	261 (2.1)	10 (0.5)	274 (2.6)	43 (1.0)	266 (1.1)
Texas	61 (3.5)	257 (1.7)	29 (3.7)	246 (3.0)	37 (3.0)	257 (2.4)	20 (2.5)	259 (4.4)	52 (2.8)	264 (1.9)
Virginia	46 (2.4)	256 (1.8)	12 (2.0)	245 (3.9)	18 (2.1)	266 (3.5)	10 (1.8)	270 (5.0)	52 (2.3)	282 (2.3)
West Virginia	48 (3.7)	255 (1.6)	13 (2.4)	241 (3.6)	14 (2.6)	252 (2.5)	8 (2.0)	259 (3.7)!	41 (2.6)	275 (1.7)
Wisconsin	37 (3.4)	272 (1.9)	11 (2.5)	264 (4.3)!	17 (2.7)	278 (2.9)	8 (1.8)	284 (3.7)!	48 (3.7)	284 (2.2)
Wyoming	42 (1.2)	274 (0.9)	7 (0.4)	268 (3.7)	15 (0.9)	274 (1.5)	6 (0.7)	278 (2.6)	48 (1.3)	282 (1.3)
TERRITORIES										
Guam	55 (0.8)	231 (1.0)	24 (0.7)	233 (2.0)	22 (0.9)	253 (1.6)	12 (0.6)	248 (3.4)	37 (0.8)	255 (1.1)
Virgin Islands	53 (1.1)	227 (1.1)	35 (0.7)	216 (1.6)	11 (0.2)	219 (1.6)	11 (0.4)	197 (2.8)	47 (0.8)	227 (1.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

CURRICULAR EMPHASIS IN SKILL AREAS AT GRADES 4 AND 8 IN THE NATION AND AT GRADE 8 IN THE STATES

Because the recommendations for mathematics education reform stress altering curricular and instructional emphases to help students learn to reason, to think productively, and to communicate in mathematical situations, NAEP asked teachers of fourth and eighth graders participating in the assessment to indicate the degree of emphasis they placed on four skill areas -- learning mathematics facts and concepts, learning procedures needed to solve problems, developing reasoning ability to solve problems in unique or unfamiliar situations, and learning how to communicate ideas in mathematics effectively. The results for grades 4 and 8 for the national samples of students in public and private schools are presented in TABLE 9.

TABLE 9 Teachers' Reports of Mathematics Skills Emphasized

	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Learning Facts and Concepts						
Grade 4	91 (1.4)	217 (0.7)	8 (1.3)	218 (2.9)	0 (0.2)	--
Grade 8	57 (3.0)	266 (1.8)	6 (4.3)	265 (1.6)	7 (1.1)	274 (5.3)
Learning Skills and Procedures						
Grade 4	85 (1.4)	218 (0.8)	15 (1.4)	215 (1.9)	0 (0.1)	--
Grade 8	68 (2.8)	266 (1.6)	29 (2.7)	266 (1.7)	3 (0.8)	270 (5.3)
Developing Reasoning and Analytic Ability						
Grade 4	41 (2.3)	217 (1.2)	49 (2.3)	217 (1.1)	11 (1.6)	218 (1.9)
Grade 8	28 (4.0)	274 (2.1)	42 (2.7)	263 (1.4)	14 (1.4)	253 (2.5)
Learning How to Communicate Ideas Effectively						
Grade 4	36 (3.0)	216 (1.3)	45 (2.7)	218 (1.3)	19 (2.3)	219 (1.5)
Grade 8	37 (2.9)	269 (2.5)	45 (2.9)	266 (1.5)	17 (1.7)	261 (1.7)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is 0 percent, the standard error is inestimable. However, in the table, percentages less than 0.5 percent were rounded to 0 percent.

At both grades 4 and 8, students across the nation were receiving much more emphasis on learning facts and concepts and learning procedures than they were on learning to reason or to communicate in mathematics. Considerable percentages of fourth and eighth graders were receiving heavy emphasis on both learning facts and concepts and learning procedures. These emphases appeared to exist across classrooms, regardless of students' ability levels.

In contrast, teachers at both grades reported providing fewer than half their students with heavy instructional emphasis on developing reasoning and analytic ability. Further, they reported that more students in high-ability classes received emphasis in this area than did those in other classes. For example, 69 percent of the eighth graders in high-ability classes as compared to 28 percent in low-ability classes, received heavy emphasis on reasoning and analytic ability. According to teachers' own reports, 30 percent of the eighth graders in low-ability classes were receiving little or no emphasis in reasoning strategies.

At both grades, teachers reported that approximately one-third of their students were receiving heavy emphasis in mathematics communication, and that about one-fifth were receiving little or no emphasis. Although there seemed to be little difference in the degree of this emphasis according to class ability level at grade 4, more eighth graders in high-ability classes than in low-ability classes received emphasis in how to communicate mathematically.

The results for the eighth-grade students attending public schools across the states are shown in TABLE 10 for teachers' reporting a high degree of emphasis in each skill area. In all the participating states except the District of Columbia, teachers of eighth graders attending public schools reported that more students were receiving emphasis in facts and procedures skills than in reasoning and communication, although the pattern was less clear-cut in California, Colorado, Maryland, and Oregon. In only California, Colorado, the District of Columbia, Georgia, and Maryland were even half the eighth graders receiving heavy instructional emphasis in how to apply their reasoning to solve new problems. Across the states for public-school students at grade 8, even less emphasis tended to be placed on the ability to communicate mathematics ideas effectively than on developing the reasoning ability necessary to apply mathematics to unfamiliar and unique situations.

TABLE 10 | **Teachers' Reports on Placing Heavy Instructional Emphasis on Specific Mathematics Skills and Abilities**

GRADE 8 PUBLIC SCHOOLS	Learning Mathematics Facts and Concepts		Learning Skills and Procedures Needed to Solve Problems		Developing Reasoning Ability to Solve Unique Problems		Learning How to Communicate Ideas in Mathematics Effectively	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	55 (4.2)	264 (2.1)	67 (3.9)	264 (1.9)	45 (3.4)	269 (2.7)	37 (3.6)	264 (3.1)
Northeast	57(12.8)	268 (6.5)!	69(13.7)	269 (4.8)!	47(10.7)	272 (8.0)!	25 (8.7)	259(15.2)!
Southeast	69 (9.1)	260 (2.6)	74 (8.2)	258 (2.9)	49 (6.8)	265 (5.1)	47 (8.0)	256 (4.3)!
Central	41 (7.7)	263 (5.1)	55 (6.2)	264 (3.9)	29 (4.7)	273 (5.6)	23 (6.1)	264 (7.8)!
West	53 (5.7)	265 (4.3)	69 (5.4)	265 (3.7)	54 (6.0)	270 (4.4)	46 (5.8)	271 (5.0)
STATES								
Alabama	60 (4.2)	253 (1.6)	70 (3.2)	254 (1.5)	48 (3.7)	258 (1.6)	43 (3.8)	257 (2.0)
Arizona	58 (3.0)	258 (1.8)	60 (2.7)	259 (1.7)	43 (2.7)	267 (2.4)	38 (2.9)	263 (2.6)
Arkansas	61 (3.5)	256 (1.2)	65 (3.7)	256 (1.3)	36 (3.1)	266 (1.7)	31 (3.4)	263 (2.4)
California	54 (2.9)	257 (1.8)	61 (3.4)	256 (1.8)	50 (2.9)	266 (2.2)	41 (3.4)	264 (2.5)
Colorado	52 (3.2)	265 (1.8)	64 (3.1)	267 (1.6)	50 (3.1)	273 (1.5)	45 (2.9)	272 (1.5)
Connecticut	53 (3.3)	270 (1.8)	61 (3.2)	272 (1.5)	47 (3.1)	282 (1.6)	41 (3.1)	279 (1.7)
Delaware	60 (1.8)	263 (1.1)	61 (1.7)	265 (1.1)	47 (1.5)	273 (1.3)	37 (1.4)	275 (1.7)
District of Columbia	62 (1.1)	232 (0.9)	68 (0.9)	233 (1.0)	65 (1.1)	236 (1.0)	63 (1.0)	236 (1.0)
Florida	62 (3.1)	257 (1.6)	68 (2.6)	258 (1.6)	46 (2.6)	267 (2.0)	43 (3.1)	262 (2.0)
Georgia	65 (2.8)	255 (1.5)	72 (2.5)	256 (1.6)	50 (2.4)	265 (1.9)	52 (3.2)	261 (1.8)
Hawaii	60 (0.9)	252 (0.9)	66 (1.0)	253 (0.9)	42 (0.8)	264 (1.2)	34 (1.0)	264 (1.3)
Idaho	59 (1.4)	271 (0.9)	65 (2.3)	273 (1.0)	39 (1.5)	280 (1.1)	41 (2.1)	277 (1.2)
Illinois	61 (4.0)	261 (2.5)	69 (3.8)	261 (2.3)	48 (3.9)	271 (1.9)	36 (3.6)	265 (3.3)
Indiana	65 (3.6)	265 (1.7)	69 (3.3)	268 (1.6)	35 (3.4)	28[illegible] [illegible]7)	36 (3.7)	276 (2.8)
Iowa	54 (4.2)	278 (1.6)	64 (4.0)	279 (1.5)	38 (4.2)	284 (2.0)	28 (3.6)	285 (2.5)
Kentucky	72 (3.5)	256 (1.5)	69 (3.3)	256 (1.5)	44 (3.4)	265 (1.8)	44 (3.7)	262 (2.4)
Louisiana	64 (3.7)	244 (1.6)	68 (3.8)	245 (1.8)	38 (3.9)	251 (1.9)	40 (4.3)	248 (2.4)
Maryland	55 (2.8)	260 (1.9)	64 (2.7)	261 (1.8)	53 (2.8)	271 (2.3)	48 (3.2)	268 (2.2)
Michigan	58 (3.4)	265 (1.8)	64 (3.4)	266 (1.8)	43 (3.6)	271 (2.4)	35 (3.2)	270 (2.8)
Minnesota	47 (3.3)	278 (1.6)	62 (3.7)	277 (1.3)	36 (3.3)	283 (1.9)	29 (3.4)	282 (2.3)
Montana	52 (2.9)	280 (1.2)	58 (2.5)	280 (1.2)	45 (2.8)	284 (1.2)	33 (2.0)	286 (1.6)
Nebraska	57 (2.3)	278 (1.4)	62 (3.2)	279 (1.2)	39 (3.1)	283 (1.4)	31 (2.9)	282 (1.3)
New Hampshire	53 (1.9)	274 (1.1)	62 (1.8)	273 [illegible]	45 (1.6)	282 (1.3)	37 (1.7)	281 (1.4)
New Jersey	70 (3.0)	270 (1.8)	72 (2.9)	269 (1.5)	49 (3.5)	278 (2.2)	49 (3.6)	278 (2.2)
New Mexico	61 (1.1)	256 (1.1)	70 (1.0)	256 (0.9)	48 (1.5)	262 (1.2)	40 (1.4)	263 (1.4)
New York	56 (3.6)	261 (2.1)	63 (3.6)	260 (2.1)	41 (3.0)	271 (2.4)	37 (3.5)	264 (2.6)
North Carolina	59 (3.4)	250 (1.5)	65 (3.4)	251 (1.3)	46 (3.2)	262 (1.7)	44 (3.1)	258 (1.7)
North Dakota	49 (3.7)	283 (2.1)	64 (2.6)	284 (1.5)	33 (2.9)	288 (1.6)	25 (2.9)	286 (1.9)
Ohio	59 (3.4)	265 (1.9)	67 (3.5)	266 (1.4)	42 (3.6)	273 (2.3)	36 (4.0)	271 (2.3)
Oklahoma	64 (3.7)	263 (1.3)	68 (3.5)	265 (1.3)	41 (3.4)	270 (1.8)	40 (4.0)	269 (1.7)
Oregon	52 (3.2)	272 (1.7)	56 (3.3)	272 (1.6)	49 (3.2)	281 (1.7)	38 (2.6)	279 (2.2)
Pennsylvania	65 (3.4)	270 (1.9)	75 (2.2)	267 (1.6)	48 (3.8)	275 (2.5)	43 (3.5)	275 (2.8)
Rhode Island	59 (1.2)	260 (0.8)	65 (1.0)	260 (0.8)	43 (1.3)	274 (1.1)	37 (1.3)	268 (1.2)
Texas	61 (3.1)	258 (1.8)	68 (3.4)	258 (1.7)	45 (3.1)	261 (2.2)	42 (3.1)	257 (2.6)
Virginia	64 (2.9)	265 (1.7)	75 (2.6)	263 (1.5)	46 (2.5)	275 (2.4)	46 (2.9)	271 (2.4)
West Virginia	62 (2.9)	256 (1.2)	69 (3.3)	257 (1.2)	44 (3.5)	265 (1.9)	38 (3.1)	263 (2.2)
Wisconsin	53 (4.1)	273 (1.8)	63 (3.6)	274 (1.9)	38 (2.9)	283 (1.7)	24 (3.0)	282 (2.9)
Wyoming	48 (1.9)	273 (0.9)	61 (1.8)	272 (0.9)	37 (1.2)	280 (1.1)	37 (1.1)	279 (1.0)
TERRITORIES								
Guam	42 (0.8)	230 (1.0)	37 (0.8)	241 (1.2)	15 (0.7)	258 (2.6)	19 (0.4)	243 (1.6)
Virgin Islands	43 (0.9)	214 (0.9)	55 (0.9)	217 (0.7)	30 (0.7)	221 (0.8)	36 (0.6)	221 (1.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

STUDENT COURSE TAKING AT GRADE 12 IN THE NATION

The twelfth graders were asked about their course taking in algebra, calculus, geometry, and statistics/probability in grades 9 through 12. The results showed a substantial increase in average proficiency with each course taken in the sequence from no algebra, pre-algebra, Algebra I, Algebra II, Algebra III/pre-calculus, and calculus. However, as shown in TABLE 11, which provides the percentages of students taking these courses by demographic subgroup, students in subgroups with lower average mathematics proficiency showed considerable attrition in the course-taking pipeline.

In general, few high-school seniors had taken Algebra III/pre-calculus, and even fewer reported going on to calculus. However, nearly one-fourth of the Asian/Pacific Islander twelfth graders had taken Algebra III/pre-calculus or both Algebra III/pre-calculus and calculus, as well as 18 percent of the students attending schools in advantaged urban communities, 18 percent of the students in the Northeast, 19 percent of those having at least one parent who had graduated from college, and 19 percent of those in academic high-school programs. In contrast, 6 percent of the Black twelfth graders and 8 percent of the Hispanic twelfth graders had taken Algebra III/pre-calculus courses. Similarly, very few students whose parents were less well-educated had taken Algebra III/pre-calculus, and virtually none of the students in general or vocational/technical high school programs reported taking these more advanced courses. On the other hand, for Algebra III/pre-calculus and calculus, there were no gender differences in either course taking or average proficiency.

Regarding other high-school mathematics courses, there was also a strong relationship between students' geometry proficiency and whether they had studied geometry and trigonometry. However, 28 percent of the high-school seniors had not studied a year of geometry, 55 percent had studied geometry but not trigonometry, and only 17 percent had additional course work in trigonometry. For geometry, course-taking patterns by subgroup tended to parallel those for algebra, except fewer females were likely to go on to trigonometry. Only about 12 percent of the high-school students reported even a semester of course work in statistics and probability. In statistics and probability, there were few differences in course-taking patterns by subgroup, except students in the Northeast were more likely to have taken a semester of course work than students in the other three regions of the country.

TABLE 11 Algebra and Calculus Course Taking: Grade 12

	Have Not Studied Algebra	Only Taken Pre-Algebra	Only Taken Algebra I	Taken Algebra II but not beyond	Taken Algebra III or Pre-Calculus but not Calculus	Taken Calculus
	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students
Nation	9 (0.7)	8 (0.5)	27 (1.0)	43 (1.3)	9 (0.7)	4 (0.4)
White	8 (0.8)	8 (0.6)	26 (1.2)	45 (2.2)	10 (0.8)	4 (0.4)
Black	10 (1.3)	9 (1.2)	34 (2.0)	41 (2.2)	5 (1.0)	1 (0.4)
Hispanic	14 (1.9)	12 (1.5)	30 (2.1)	36 (2.5)	5 (1.0)	3 (0.8)
Asian/Pacific Islander	5 (1.3)	8 (3.8)	23 (3.8)	41 (4.7)	17 (3.6)	7 (3.2)
Advantaged Urban !	4 (1.2)	8 (1.6)	22 (2.4)	48 (2.2)	12 (1.9)	6 (1.6)
Disadvantaged Urban	9 (1.6)	10 (1.8)	34 (3.4)	39 (2.5)	5 (1.0)	3 (0.9)
Extreme Rural !	13 (2.4)	8 (2.6)	25 (2.5)	45 (3.4)	7 (2.3)	2 (0.8)
Other	8 (0.7)	8 (0.6)	27 (1.2)	43 (1.7)	10 (0.9)	4 (0.4)
Public Schools	9 (0.8)	9 (0.6)	28 (1.1)	42 (1.4)	8 (0.8)	3 (0.4)
Private Schools	2 (0.7)	4 (1.1)	23 (2.1)	50 (2.9)	16 (1.9)	5 (1.1)
Male	10 (0.9)	8 (0.6)	27 (1.1)	41 (1.4)	9 (0.8)	4 (0.5)
Female	7 (0.7)	9 (0.7)	28 (1.4)	45 (1.4)	9 (0.7)	3 (0.4)
Northeast	8 (1.1)	6 (0.7)	27 (2.3)	41 (3.4)	12 (1.5)	6 (1.0)
Southeast	10 (1.6)	6 (0.7)	26 (2.2)	49 (2.8)	7 (1.2)	2 (0.3)
Central	9 (1.8)	11 (1.0)	29 (1.9)	39 (1.9)	9 (1.4)	3 (0.5)
West	7 (0.9)	10 (1.3)	27 (1.7)	44 (2.0)	8 (1.3)	3 (0.7)
Did Not Finish H.S.	20 (2.1)	14 (1.9)	34 (2.3)	28 (3.1)	3 (1.0)	1 (0.2)
Graduated H.S.	13 (1.5)	11 (1.2)	32 (1.7)	37 (2.1)	6 (0.7)	1 (0.3)
Some Ed. After H.S.	6 (0.8)	9 (1.1)	27 (1.7)	46 (2.0)	9 (1.0)	3 (0.5)
Graduated College	5 (0.7)	5 ([illegible])	24 (1.3)	48 (1.6)	13 (1.0)	6 (0.7)
Academic	2 (0.3)	3 (0.4)	22 (1.4)	54 (1.7)	14 (0.9)	5 (0.6)
General	16 (1.5)	15 (1.3)	35 (1.6)	30 (1.3)	3 (0.6)	1 (0.3)
Vocational/Technical	25 (2.1)	16 (2.1)	39 (3.2)	19 (2.3)	1 (0.4)	0 (0.3)

Courses taken were defined as those subjects studied for at least one year. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent due to rounding. !Interpret with caution--the nature of the sample does not allow accurate determination of the variability of the results for these population subgroups.

SUMMARY OF MATHEMATICS CURRICULUM AND COURSE TAKING ACROSS THE GRADES

In summary, the curriculum results--reported largely by teachers--depict a curriculum in which less than half the fourth graders were receiving heavy instructional emphasis in any of the five content areas. The most emphasis was in numbers and operations, followed by measurement, geometry, and data analysis (primarily reading graphs and tables). Few were introduced to the concepts underlying algebra. Almost all of the fourth graders were given heavy instructional emphasis in learning facts and concepts, and substantial proportions were given heavy emphasis in learning procedures. Much smaller percentages were given heavy instructional emphasis in reasoning and communicating in mathematics, although the emphasis in skill areas did not differ across the ability levels of students' classes.

At grade 8, students reported being in one of three courses, with more than half in eighth-grade mathematics and the remainder in pre-algebra or algebra courses. This data agreed with teachers' reports, which indicated that approximately half the students were receiving heavy instructional emphasis in numbers and operations and the other half were receiving heavy emphasis in algebra. Eighth graders were still being given much more instructional emphasis in facts and procedures than they were in mathematics reasoning and communication, and teachers reported differing amounts of emphases in these areas by the ability level of the class. Substantial percentages of eighth-graders in low-ability classes were being given no instructional emphasis in these areas highlighted in the research as necessary for effective mathematics teaching. Although there were variations, the curricular patterns shown for eighth graders across the nation attending public and private schools prevailed across the participating states for eighth-grade students attending public schools.

Nine percent of the high-school seniors reported never having taken algebra, and 43 percent reported persevering only through Algebra II before discontinuing their algebra coursework. Only 13 percent reported taking Algebra III/pre-calculus, and only 4 percent of these also taking calculus. The majority (55 percent) had taken geometry, but only 12 percent had studied even a semester of statistics.

Course-taking patterns, beginning with the differentiation of students in the eighth grade, were quite distinct by demographic subgroup, with proportionately more Asian/Pacific Islander students, those in advantaged urban schools, and those with more well-educated parents tending to continue in the mathematics pipeline. Black and Hispanic students, those attending schools in disadvantaged urban communities, and those with less well-educated parents displayed a disproportionately high rate of attrition. There appeared to be few gender differences in course-taking patterns.

MATHEMATICS INSTRUCTION AT GRADES 4 AND 8 IN THE NATION AND AT GRADE 8 IN THE STATES

Teachers reported that most students were working problems textbooks or worksheets on a daily basis and that more innovative activities were used less frequently. Small-group work and use of mathematics tools, such as geometric shapes and rulers were not widespread, nor was the use of calculators -- even by the eighth grade, where arithmetic should be well in hand.

Most students were never asked to write reports or do mathematics projects, and hardly any regularly used a computer in mathematics class.

These findings provide considerable contrast with the recommendations for revitalizing mathematics instruction described by educators and researchers.[14] According to their recommendations, effective mathematics instruction would include helping all students learn to think mathematically through group and individual projects that stress the application of mathematics, and incorporate the use of calculators and computers to engage students and facilitate their efforts with more complex problems and solutions.

ABILITY GROUPING FOR MATHEMATICS INSTRUCTION

- Although fourth graders were not typically grouped by ability as a matter of school policy, their teachers reported that more than half were in classes with students of similar ability, most probably as a result of external factors such as the socioeconomic standing of the community. At grade 8, more than two-thirds of the students were grouped as a matter of policy, since students were placed into differential mathematics curricula.

- In almost all participating states, with the exception of Montana, Nebraska, North Dakota, and the Virgin Islands, at least half of the eighth graders attending public schools were assigned to mathematics

---

[14] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1991).

Professional Standards for Teaching Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1991).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

Everybody Counts: A Report to the Nation on the Future of Mathematics Education, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

classes by some form of ability grouping. Connecticut, Hawaii, Maryland, Oregon, Rhode Island, and Guam grouped more than 85 percent of their eighth graders by ability.

- At grade 12, 58 percent of the students reported being enrolled in an academic high-school program, 34 percent in a general program, and 8 percent in a vocational/technical program. For those high-school seniors in an academic high-school program, less than three-fourths reported taking Algebra II.

INSTRUCTIONAL MATERIALS

- Teachers reported asking most students to work problems from textbooks on a daily basis (64 percent of the fourth graders and 71 percent of the eighth graders) and asking many students to work problems from worksheets at least several times a week (62 percent of the fourth graders and 38 percent of the eighth graders). The use of worksheets in eighth-grade classrooms was much more prevalent for low-ability than high-ability classes.

- Teachers reported that approximately half or more of the students worked in small groups at least once a week (63 percent of the fourth graders and 49 percent of the eighth graders), but students tended to report less small-group work -- 33 percent of the fourth graders and 28 percent of the eighth graders reported working in small groups on a weekly basis. Only 34 percent of the twelfth graders taking mathematics reported working in small groups at least once a week.

- Teachers reported using mathematics tools such as geometric shapes or rulers with approximately half the fourth graders and 28 percent of the eighth graders on a weekly basis. Here students were in better agreement with their teachers, with 43 percent of the fourth graders, 30 percent of the eighth graders, and 27 percent of the twelfth graders who were taking mathematics reporting that they used such tools on a weekly basis.

- In contrast to the heavy reliance on textbooks and worksheets, 70 percent of the eighth graders and twelfth graders who were taking mathematics reported that they never wrote reports or did mathematics projects. Teachers were less willing to report total absence of these activities but did report that 43 percent of the eighth graders were never asked to engage in these activities in mathematics class.

- The pattern of substantial reliance on textbooks and worksheets and limited use of some of the more innovative strategies recommended in the mathematics-reform literature also tended to prevail across the states participating in NAEP's 1990 Trial State Assessment.

TESTING IN MATHEMATICS CLASSES

- Teachers reported that 48 percent of the fourth graders and 60 percent of the eighth graders were given teacher-generated tests about once a week or even more frequently. They also reported occasional use of state- or district-mandated tests and administering other published tests.

- Fifty-two percent of the fourth graders, 71 percent of the eighth graders, and 70 percent of the twelfth graders taking mathematics reported being tested about once a week or even more frequently.

- Mathematics instruction in the participating states also appeared to be characterized by considerable testing. For example, in Alabama, Louisiana, New Hampshire, and Rhode Island, teachers reported administering teacher-generated tests to more than two-thirds of their eighth-grade students about once a week. In general, those students tested the most frequently tended to have lower average proficiency.

RESOURCES IN MATHEMATICS CLASSES

- According to their teachers, only 13 percent of the fourth-grade students and 19 percent of the eighth-grade students were in classrooms with all the necessary resources. Thirty-eight percent of the fourth graders and 28 percent of the eighth graders were in classrooms where teachers reported receiving only some or none of the necessary resources. For schools in disadvantaged urban communities, these figures were 48 percent and 40 percent, respectively, for fourth and eighth graders.

- In no single state participating in the 1990 Trial State Assessment Program, were more than one-third of the public-school eighth graders in classrooms where teachers reported receiving all the necessary resources. The students in the most poorly supplied classrooms tended to have lower average proficiency than their counterparts in classrooms where teachers reported receiving more resources.

CALCULATORS AND COMPUTERS IN MATHEMATICS CLASSROOMS

- According to their teachers, only 3 percent of the fourth graders and 19 percent of the eighth graders were permitted unrestricted use of calculators in mathematics class.

- For all but three state participants (the District of Columbia, Oregon, and Wyoming), fewer than one-third of the eighth graders attending public schools were permitted unrestricted use of calculators. In every participating Southeastern state, fewer than 15 percent of the students were permitted unrestricted use of calculators although states from other regions also reported similar policies. Within the states, the data consistently showed that eighth graders who were permitted use of calculators had higher average mathematics proficiency.

- Calculator use appears relatively infrequent in fourth-grade classrooms. According to their teachers, only 6 percent of the fourth graders were asked to use a calculator several times a week and 47 percent were never asked to do so. Sixty-two percent of the fourth graders reported never using a calculator for mathematics.

- At grade 8, teachers reported that 30 percent of the students used a calculator at least several times a week, while 22 percent never did. Thirty-nine percent of the eighth graders reported never using a calculator in mathematics class, as did 14 percent of the twelfth graders taking mathematics.

- Across the states, calculator use varied dramatically for eighth graders attending public schools. At the high end of the continuum were Iowa, Minnesota, Montana, Nebraska, North Dakota, Oregon, Wisconsin, and Wyoming, with the majority of both teachers and students reporting frequent calculator use. Students in these states also performed relatively well. The low-use states appeared to be concentrated in the Southeast, with another cluster in the Northeast.

- Although more than half of the fourth graders demonstrated some degree of success in using the four-function calculator provided for use with portions of the assessment, the eighth and twelfth graders had more difficulty with the scientific calculator that they were provided. Forty-four percent of the eighth graders and 30 percent of the twelfth graders demonstrated knowledge of both when and how to use a calculator.

- Except in the two territories, student success in calculator usage did not vary much across states--from 40 percent in the high-performance group in Hawaii to 56 percent in North Dakota.

- Computer use in mathr"atics classes was even more infrequent than calculator use. Most hers reported that computers were difficult to access. However, in contrast to results for calculators, computers seemed to be used more frequently in the fourth grade than in the higher grades. Teachers reported that 49 percent of the fourth graders used a computer in mathematics class at least once a week, although they also reported that 26 percent never did. At grade 8, teachers reported that only 18 percent of the students used a computer at least once a week and that the majority (52 percent) never did.

- From students' perspective, 50 percent of the fourth graders, 69 percent of the eighth graders, and 66 percent of the twelfth graders taking mathematics reported never using a computer in mathematics class.

- For the states participating in the Trial State Assessment Program, teachers reported low availability of computers in publ'c-school eighth-grade mathematics classrooms. The majority of the eighth graders never used a computer in mathematics class in many of the states.

STUDENTS' MATHEMATICS TEACHERS

- Students' mathematics teachers appeared to be experienced, reporting 14 years average teaching experience in mathematics at both grades 4 and 8.

- Four-fifths of the fourth graders were taught mathematics by White teachers and by female teachers. At grade 8, 91 percent were taught by White teachers, but only about half were taught by female teachers (58 percent).

- Sixty-four percent of the fourth graders were taught by teachers with the highest certification, although 83 percent were taught by teachers certified in education rather than mathematics. Sixty-five percent of the eighth graders were taught by teachers with the highest certification; 78 percent were taught by teachers certified in mathematics.

- Sixty-four percent of the fourth graders were taught mathematics by teachers with a bachelor's degree and 36 percent by teachers with a master's or specialist's degree. At grade 8, 55 percent of the students were taught by teachers with a bachelor's degree, 44 percent by teachers

295-027 0 - 91 - 3 QL 3

with a master's or specialist's degree, and 1 percent by teachers with a doctorate or professional degree.

- The vast majority of fourth graders (83 percent) were taught by teachers who had majored in education. In contrast, 39 percent of the eighth graders had teachers who were mathematics majors, 38 percent had teachers who were education majors, and 23 percent had mathematics teachers with some other major.

- Fourth graders had teachers who reported limited course work in mathematics. For example, 41 percent reported no course work in number systems and numeration, 62 percent no course work in geometry, 82 percent no course work in advanced algebra, and 53 percent no course work in probability and statistics.

- The teachers of eighth graders reported more course work, but still about one-fifth reported no course work in number systems and numeration or in geometry. Thirty percent reported no course work in advanced algebra, and 15 percent reported no course work in probability and statistics.

- Teachers of 31 percent of the fourth graders and 13 percent of the eighth graders reported no time spent on in-service education in mathematics or the teaching of mathematics during the last year before the assessment.

- Across the states participating in the Trial Assessment Program, there was tremendous variation in teachers' preparation and training, although the patterns tended to be similar to those for eighth graders nationally. Within states, there was a tendency for the better-performing students to have teachers with more depth and breadth of course work in mathematics, as well as more in-service education in mathematics.

STUDENTS' PERCEPTIONS OF MATHEMATICS

- In general, most students at all three grades had positive perceptions of mathematics, and positive perceptions were related to higher mathematics proficiency. Although two-thirds of the fourth graders agreed that they liked mathematics, only slightly more than half of the eighth or twelfth graders did.

- Sixty-two percent of the fourth graders, 63 percent of the eighth graders, and 57 percent of the twelfth graders either agreed or strongly agreed that they were good in mathematics. However, nearly one-fifth of the students at all three grades were either neutral or agreed that "Mathematics is more for boys than for girls."

- The vast majority at all three grades strongly agreed or agreed that mathematics was useful in solving everyday problems and that mathematics is used by almost all people in their jobs.

- In general, public-school eighth graders across the individual states followed the national pattern and reported positive perceptions of mathematics. Within each state, a higher degree of positive agreement was associated with higher proficiency, but this relationship did not hold across states, because more students in some of the lower-performing states and fewer students in some of the higher-performing states reported positive attitudes.

In summary, school mathematics across the nation at grades 4, 8, and 12, and in the public schools in the states at grade 8 appeared to be characterized by classrooms grouped by ability, where students were working on problems from textbooks and worksheets with considerable regularity. Many students also appeared to be tested on a weekly basis.

Teachers reported that resources were in short supply and that computers were difficult to access. Both teachers and students agreed that small-group work, use of mathematics teaching tools, and use of calculators were not widespread, and that students were rarely asked to write reports or do mathematics projects.

Considering the recommendations for reform suggesting pervasive changes in the delivery of mathematics instruction, this portrait suggests a challenge in moving mathematics instruction into alignment with current expectations, let alone expectations for the year 2000.

Foreword

HISTORY OF NAEP AND THE TRIAL STATE ASSESSMENT PROGRAM

The National Assessment of Educational Progress (NAEP) is a congressionally mandated survey of the educational achievement of American students and of changes in that achievement across time. For more than 20 years, NAEP has been monitoring the educational progress of the nation, collecting information on student attainment in a variety of curriculum areas. To provide a context for the achievement results, NAEP also collects demographic, curricular, and instructional background information from students, teachers, and school administrators.

Also known as The Nation's Report Card, NAEP has successfully collected educational information and produced hundreds of reports, with the philosophy of providing accurate and useful results to educators and policymakers, while placing as little data collection burden as possible on students and those directly responsible for their instruction. Most recently, NAEP has been assessing nationally representative samples of fourth-, eighth-, and twelfth-grade students in reading, mathematics, science, writing, U.S. history, and geography.

This report contains the results of the 1990 national mathematics assessment of nationally representative samples of students in grades 4, 8, and 12. It also, for the first time in the history of NAEP, contains state-level results. Based on materials from the eighth-grade mathematics assessment administered to representative samples of students in each participating state, these results are available for public-school students at grade 8 in the 40 states and jurisdictions that participated in NAEP's 1990 Trial State Assessment Program.

These participants include:

Alabama	Iowa	Ohio
Arizona	Kentucky	Oklahoma
Arkansas	Louisiana	Oregon
California	Maryland	Pennsylvania
Colorado	Michigan	Rhode Island
Connecticut	Minnesota	Texas
Delaware	Montana	Virginia
District of Columbia	Nebraska	West Virginia
Florida	New Hampshire	Wisconsin
Georgia	New Jersey	Wyoming
Hawaii	New Mexico	
Idaho	New York	
Illinois	North Carolina	Guam
Indiana	North Dakota	Virgin Islands

In 1987, a national study group was convened by the Secretary of Education to suggest improvements in how the United States assesses what students across the country know and can do.[15] Noting that "nearly all important decisions in education are made at the state and local levels, and accountability for performance is vested at those levels," the study group recommended more help from NAEP in monitoring each state's educational status and progress on the road to reform.

In the spring of 1988, Congress added a new dimension to NAEP by authorizing, on a trial basis, voluntary participation in state-level assessments in 1990 and 1992. Designed to provide results that can be compared across the nation and participating states, the trial state assessments include eighth-grade mathematics in 1990 and 1992 as well as fourth-grade mathematics and reading in 1992.

In authorizing the legislation for the NAEP Trial State Assessment Program, Congress called for an independent evaluation of the feasibility and validity of the assessments and the fairness and accuracy of the data they

[15] Lamar Alexander and H. Thomas James, *The Nation's Report Card* (Cambridge, MA: National Academy of Education, 1987).

produce. Thus, the various steps included in NAEP's 1990 Trial State Assessment Program have been evaluated by an independent panel appointed by the National Academy of Education.[16]

THE SCOPE OF NAEP'S 1990 MATHEMATICS ASSESSMENT

Because the advent of the Trial State Assessment Program signaled a new era for NAEP, great care was taken to solicit widespread involvement and advice about the development and conduct of the 1990 mathematics assessment. As a result many new materials, including most of the assessment questions, were created and many new procedures were designed. The mathematics objectives framework underlying the assessment was developed under the auspices of the Council of Chief State School Officers (CCSSO) through a special NAEP Planning Project sponsored by the National Center for Education Statistics (NCES) and the National Science Foundation.[17] Although influenced by previous NAEP objectives and especially by the *Curriculum and Evaluation Standards for School Mathematics,* developed by the National Council of Teachers of Mathematics,[18] this project involved widespread participation and review, including an objectives committee of mathematics educators; a steering committee with 18 members representing policymakers, practitioners, and citizens at large; distribution to the mathematics supervisors in the education agencies of all 50 states for review by state committees; reviews by mathematics scholars and NCES staff; and endorsement by the National Assessment Governing Board (NAGB).

NAEP's 1990 mathematics assessment of fourth, eighth, and twelfth graders included a broad range of questions that required students to use scientific calculators, provide responses using protractor/rulers, and solve problems in a constructed-response format. These questions asked students to generate short responses; sketch, measure, and identify geometric figures; represent algebraic equations graphically; or give brief explanations to support

---

[16] Panel on the Evaluation of the NAEP Trial State Assessment Project, *April 1991 Interim Report on the Evaluation of the NAEP Trial State Assessment* (Palo Alto, CA: National Academy of Education, 1991).

[17] *Mathematics Objectives, 1990 Assessment* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1988).

[18] *Curriculum and Evaluation Standards for School Mathematics* (Reston VA: National Council of Teachers of Mathematics, 1989).

solutions to problems. To supplement the achievement results, students, teachers, and school administrators were asked to complete questionnaires about their background and instruction in mathematics.

For the 1990 Trial State Assessment, the eighth-grade portion of this assessment, including the questionnaires, was replicated in each participating state. In addition, for the nation at all three grades, NAEP conducted a special study of students' estimation skills and problem-solving skills using a tape recording that paced students through the booklets of test questions.

The mathematics questions and background questionnaires were developed by staff and consultants at Educational Testing Service (ETS) with the guidance of an Item Development Committee comprised of distinguished mathematics educators and a Background Questionnaire Committee composed of educators and policy analysts. In accordance with the *ETS Standards for Quality and Fairness*, the materials were reviewed internally and by the development committees for clarity and grade-level appropriateness, importance and accuracy of mathematics content, measurement considerations, and potential sensitivity or bias to any subpopulation.[19] They were further reviewed by the National Center for Education Statistics, the National Assessment Governing Board, and the Office of Management and Budget. All materials used in the Trial State Assessments also were reviewed by state agency personnel (both mathematics and testing experts).

As with all NAEP assessments, the schools and students participating in the 1990 mathematics assessments were selected through rigorous stratified random sampling procedures designed to yield reliable results. Nearly 26,000 fourth, eighth, and twelfth graders in 1,300 public and private schools across the country participated in the national assessment. For each state participating in the Trial State Assessment, approximately 2,500 eighth graders were sampled from approximately 100 public schools. Thus, a total of more than 100,000 eighth graders attending approximately 4,000 public schools participated in the Trial State Assessment.

All NAEP data are collected by trained administrators. Data for the national assessment were collected by a field staff managed by Westat, Inc. However, in accordance with the NAEP legislation, data collection for the Trial State Assessment Program was the responsibility of each participating state.

---

[19] *ETS Standards for Quality and Fairness* (Princeton, NJ: Educational Testing Service, 1987).

Uniformity of procedures across states was achieved through training and quality control monitoring by Westat, Inc. Westat staff trained about 4,000 state administrators using a video presentation accompanied by a scripted trainer's guide and practice exercises. Quality control was provided by monitoring half the sessions in each state on an unannounced basis.

The materials, including approximately two million open-ended responses, were scored by National Computer Systems, and the results were analyzed by Educational Testing Service. As would be expected, numerous quality control steps were undertaken to ensure the accuracy of the results.

To increase understanding of the Trial State Assessment procedures and provide for input from the states into the process on a regular basis, NCES and its NAEP contractors established the Trial State Assessment NETWORK. Through NETWORK meetings, state education personnel were funded to meet regularly with staff members from NCES, the contractors, NAGB, and CCSSO to review Trial State Assessment procedures.

ORIENTATION TO THIS REPORT

This report contains the richest set of data ever assembled about mathematics achievement and education in the United States. It is presented in two major sections. The first part contains results from the national mathematics assessments of public- and private-school students in grades 4, 8, and 12, as well as the results obtained from questionnaires completed by their teachers and school administrators.

Part One of this report contains ten chapters. Chapters One through Five present the mathematics proficiency results for the nation and a variety of population subgroups. Chapters Six through Ten describe the questionnaire results, including use of instructional materials, implementation of calculators and computers, amount of instructional time and emphasis, students' perceptions of mathematics, and the background and training of mathematics teachers.

Part Two of this report contains similar information for eighth graders attending public schools in each of the 40 states and jurisdictions that participated in the 1990 Trial State Assessment. Part Two also provides national and regional information for eighth graders, but there are some basic differences between the national results presented in Part One and Part Two that should be kept in mind.

Whereas the national assessment at grades 4, 8, and 12 included representative samples of students in both public and private schools, the Trial State Assessment Program was conducted only in public schools. Also, while the national assessment was conducted from January to mid-May, to minimize disruptions and avoid conflicts with spring testing programs, the state assessments were conducted during February. To provide a more appropriate basis for comparison, the national and regional data presented in Part Two of this report represent only a subset of the grade 8 data presented in Part One. The results in Part Two are based only on the public-school students who participated in the first half -- the January to mid-March portion -- of the national assessment. Because of this, the national and regional data in Part Two will be different from that in Part One.

CONTEXT FOR THE REPORT

In September 1989, the President and governors met at the historic education summit in Charlottesville, Virginia. One product of the summit was a set of national education goals designed to better position our country for active participation in the world's affairs in the 21st century. These six goals focus on ensuring that children start school ready to learn, raising high-school graduation rates, increasing levels of educational achievement in challenging subject matter, promoting mathematics and science achievement as well as literacy and lifelong learning, and freeing schools of drugs and violence. More specifically, one of the country's education goals calls for children in grades 4, 8, and 12 to demonstrate competency in challenging mathematics subject matter, and another calls for the United States to be first in the world in mathematics and science achievement by the year 2000.

This report contains a comprehensive source of information about mathematics learning and instruction across the country and in the participating states. It provides information useful in describing where we currently stand as a nation in relation to our overarching educational goals for mathematics achievement. This aspect of the 1990 mathematics assessment will be enhanced later this fall when the National Assessment Governing Board releases the results of its project to set achievement levels, designating advanced, proficient, and basic performance.

The results also provide information about the distribution of educational practices and outcomes across the nation and within each participating state and territory. For example, there is data on the prevalence of various teaching activities, and the relationships between particular instructional policies and achievement can be used to examine the instructional contexts for particular groups of students.

The information from the national assessment and the Trial State Assessment Program can be used to confirm judgments, to challenge assumptions, and to examine the degree and effectiveness of educational reform. It cannot be assimilated in one sitting, nor does it provide easy answers or the only information about the most promising routes to educational improvement. The numerous tables, however, do provide much material for analysis by those concerned about improving mathematics education in our nation.

PART I

NAEP's 1990 National Mathematics Results
Grades 4, 8, and 12

Chapter 1

Overall Mathematics Proficiency for the Nation

BACKGROUND

The matrix underlying the mathematics assessment includes five broad content areas and three levels of mathematical ability. The five content areas are numbers and operations; measurement; geometry; data analysis, statistics, and probability; and algebra and functions. The ability levels include conceptual understanding, procedural knowledge, and problem solving. In formulating the definitions for these dimensions of mathematics proficiency, an effort was made to encourage desirable curriculum development. To help create objectives that would lead to improved instruction, those involved in describing the categories in the matrix drew upon the draft of the *Curriculum and Evaluation Standards for School Mathematics* developed by the National Council of Teachers of Mathematics (NCTM).[20]

For the nation, students' mathematics proficiency in the dimensions described by the framework was measured using a variety of multiple-choice and constructed-response questions, including some administered by a paced audiotape. Also, students were provided with calculators, protractors, and rulers for some of the questions.

The national assessment involved representative samples of more than 26,000 students at grades 4, 8, and 12 in approximately 1,300 schools across the country. The assessment results were analyzed to determine the percentages of students responding correctly to each question and were summarized, using item response theory (IRT) scaling procedures, across the sets of questions measuring each of the five content areas. The scaled results for each of the five content areas across the three grade levels were combined to create a composite mathematics proficiency scale, which provides a way to compare overall achievement across grades and demographic subpopulations

[20] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

and to relate performance to a variety of home, school, and instructional factors.[21] Ranging from 0 to 500, NAEP's overall mathematics proficiency scale based on the five content areas was anchored at four levels -- 200, 250, 300, and 350 -- to provide descriptions of what students know and can do at various points along the scale that differentiate them from students performing at lower levels. In theory, NAEP could have defined proficiency levels above 350 or below 200; however, so few students in the assessment performed at the extreme ends of the scale that it was not useful to do so.

LEVELS OF OVERALL MATHEMATICS PROFICIENCY FOR THE NATION

TABLE 1.1 presents the average mathematics proficiency for fourth, eighth, and twelfth graders and the percentages of students in each grade performing at or above the four anchor levels. The descriptions summarizing performance at the four levels are found in FIGURE 1.1. To develop the descriptions, NAEP used the assessment results to delineate sets of questions typical of what students know and can do at the anchor intervals on the scale -- sets of items that students at one level were more likely to answer correctly than were students at the next lower level.[22]

The four sets of anchor items -- each containing 35 to 50 questions -- were studied by a panel of mathematics educators, who carefully considered and articulated the types of knowledge, skills, and reasoning abilities demonstrated by correct responses. As part of the anchoring process, the panelists also discussed the relationship between the type of mathematics content at each successive anchor level and the typical school mathematics curriculum as it currently exists. Because the NAEP scale encompasses mathematics content typically covered across the elementary and secondary school curricula, it would be unlikely (but not impossible) for many fourth-grade students to have performed in the higher range of the scale.

[21]More detailed information on the NAEP scaling procedures can be found in Appendix C, including the weightings by content area used to create the overall scale.

[22]In identifying anchor items, students at Level 200 were defined as those whose estimated proficiency was between 187.5 and 212.5, students at 250 were defined as those with estimated proficiency between 237.5 and 262.5, those at 300 had estimated proficiencies between 287.5 and 312.5, and those at 350 between 337.5 and 362.5.

TABLE 1.1 Overall Average Proficiency and Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale at Grades 4, 8, and 12

		Grade 4	Grade 8	Grade 12
Average Proficiency		216 (0.7)	265 (1.0)	295 (1.1)
Level	Description	Percentage of Students at or Above		
200	Simple Additive Reasoning and Problem Solving with Whole Numbers	72 (1.1)	98 (0.4)	100 (0.0)
250	Simple Multiplicative Reasoning and Two-Step Problem Solving	11 (0.6)	67 (1.1)	91 (0.6)
300	Reasoning and Problem Solving Involving Fractions, Decimals, Percents, Elementary Geometry and Simple Algebra	0 (0.0)	14 (1.1)	46 (1.4)
350	Reasoning and Problem Solving Involving Geometry, Algebra, and Beginning Statistics and Probability	0 (0.0)	0 (0.1)	5 (0.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. Although no fourth-grade students achieved at or above Level 300, a few eighth-grade students (0.3 percent) did perform at or above Level 350. However, percentages less than 0.5 percent are rounded to 0 percent.

As would be expected, twelfth graders had higher average proficiency than did eighth graders, who in turn performed better than fourth graders. Eighth graders performed, on average, 50 points higher on the scale than did fourth graders. The twelfth graders, however, on average, performed only 30 points higher on the scale than did the eighth graders.

The percentages of students at each grade attaining the four anchor levels on the NAEP scale provide a way of interpreting what these differences in average performance mean in terms of students' understanding of mathematics.

At grade 4, 72 percent of the students performed at Level 200, demonstrating the ability to use additive reasoning with whole numbers. Eleven percent of these students appeared to have extended their understanding to include multiplicative reasoning with whole numbers (Level 250). Probably because material covered at Level 300 does not typically occur in the curriculum until about the seventh grade, no fourth graders reached this level, which indicates a consistent grasp of fractions, decimals, percents, and simple algebra.

Figure 1.1

Description of Mathematics Proficiency at Four Anchor Levels on the NAEP Scale

Level 200 -- Simple Additive Reasoning and Problem Solving with Whole Numbers

Students at this level have some degree of understanding of simple quantitative relationships involving whole numbers. They can solve simple addition and subtraction problems with and without regrouping. Using a calculator, they can extend these abilities to multiplication and division problems. These students can identify solutions to one-step word problems and select the greatest four-digit number from a list.

In measurement, these students can read a ruler as well as common weight and graduated scales. They also can make volume comparisons based on visualization and determine the value of coins. In geometry, these students can recognize simple figures. In data analysis, they are able to read simple bar graphs. In the algebra dimension, these students can recognize translations of word problems to numerical sentences and extend simple pattern sequences.

Level 250 -- Simple Multiplicative Reasoning and Two-Step Problem Solving

Students at this level have extended their understanding of quantitative reasoning with whole numbers from additive to multiplicative settings. They can solve routine one-step multiplication and division problems involving remainders and two-step addition and subtraction problems involving money. Using a calculator, they can identify solutions to other elementary two-step word problems. In these basic problem-solving situations, they can identify missing or extraneous information and have some knowledge of when to use computational estimation. They have a rudimentary understanding of such concepts as whole number place value, "even," factor," and "multiple."

In measurement, these students can use a ruler to measure objects, convert units within a system when the conversions require multiplication, and recognize a numerical expression solving a measurement word problem. In geometry, they demonstrate an initial understanding of basic terms and properties, such as parallelism and symmetry. In data analysis, they can complete a bar graph, sketch a circle graph, and use information from graphs to solve simple problems. They are beginning to understand the relationship between proportion and probability. In algebra, they are beginning to deal informally with a variable through numerical substitution in the evaluation of simple expressions.

Level 300 -- Reasoning and Problem-Solving Involving Fractions, Decimals, Percents, Elementary Geometric Properties, and Simple Algebraic Manipulations

Students at this level are able to represent, interpret, and perform simple operations with fractions and decimal numbers. They are able to locate fractions and decimals on number lines, simplify fractions, and recognize the equivalence between common fractions and decimals, including pictorial representations. They can interpret the meaning of percents less than and greater than 100 and apply the concepts of percentages to solve simple problems. These students demonstrate some evidence of using mathematical notation to interpret expressions, including those with exponents and negative integers.

In measurement, these students can find the perimeters and areas of rectangles, recognize relationships among common units of measure, and use proportional relationships to solve routine problems involving similar triangles and scale drawings. In geometry, they have some mastery of the definitions and properties of geometric figures and solids.

In data analysis, these students can calculate averages; select and interpret data from tabular displays, pictographs, and line graphs; compute relative frequency distributions; and have a beginning understanding of sample bias. In algebra, they can graph points in the Cartesian plane and perform simple algebraic manipulations such as simplifying an expression by collecting like terms, identifying the solution to open linear sentences and inequalities by substitution, and checking and graphing an interval representing a compound inequality when it is described in words. They can determine and apply a rule for simple functional relations and extend a numerical pattern.

Level 350 -- Reasoning and Problem Solving Involving Geometric Relationships, Algebraic Equations, and Beginning Statistics and Probability

Students at this level have extended their knowledge of number and algebraic understanding to include some properties of exponents. They can recognize scientific notation on a calculator and make the transition between scientific notation and decimal notation. In measurement, they can apply their knowledge of area and perimeter of rectangles and triangles to solve problems. They can find the circumferences of circles and the surface areas of solid figures. In geometry, they can apply the Pythagorean theorem to solve problems involving indirect measurement. These students also can apply their knowledge of the properties of geometric figures to solve problems, such as determining the slope of a line.

In data analysis, these students can compute means from frequency tables and determine the probability of a simple event In algebra, they can identify an equation describing a linear relation provided in a table and solve literal equations and a system of two linear equations. They are developing an understanding of linear functions and their graphs, as well as functional notation, including the composition of functions. They can determine the nth term of a sequence and give counter examples to disprove an algebraic generalization.

Virtually all the eighth graders performed at or above Level 200, but only two-thirds of these students performed at or above Level 250, indicating success in using all four numerical operations with whole numbers. Fourteen percent demonstrated some mathematical understanding beyond whole numbers, but none in this group showed breadth in their understanding.

Most twelfth graders (91 percent) performed at or above Level 250, indicating some facility in problem solving with whole numbers. However, less than half (46 percent) demonstrated consistent success with problems involving fractions, decimals, percents, and simple algebra. Only 5 percent demonstrated a breadth of mathematical understanding that included problem solving involving geometric relationships, algebraic equations, and elementary statistics.

The subsequent sections of this chapter describe student performance at the four anchor levels on the scale and present examples from the sets of items used to describe performance at each level. Because some questions will be used in future assessments to measure trends in performance across time, not all of the anchor items can be included in this report. However, selected examples are discussed in this section and the additional disclosed anchor items are contained in Appendix D, which also provides more detailed information about the anchoring process. Questions appearing in this report are only examples and are in no way intended to cover all that students ought to know about mathematics.

LEVEL 200
Simple Additive Reasoning and Problem Solving with Whole Numbers

1990		
Percentage of Students at or Above Level 200		
Grade 4	Grade 8	Grade 12
72%	98%	100%

Seventy-two percent of the fourth-grade students performed at or above Level 200, as did virtually all of the eighth and twelfth graders. As part of the scale anchoring process, the panelists noted that the Level 200 questions appeared to relate to mathematical experiences and content typically covered in early elementary school, generally by the end of the third grade. Thus, it might be expected that more than 72 percent of the fourth graders would have attained this level of mathematics proficiency. Nevertheless, the average proficiency for fourth graders was 216 or somewhat above Level 200, suggesting that their performance on the NAEP assessment was relatively consistent with what is generally taught in schools.

It must be emphasized, however, that curriculum can vary dramatically from school to school. Further, as discussed by the panelists, emphasized throughout the literature recommending reforms in school mathematics, and confirmed by the findings in this report, what is currently being taught in mathematics classrooms tends to differ sharply from the vision of an ideal curriculum for the primary grades.[23]

As described in FIGURE 1.1 and illustrated by the following examples, performance at Level 200 is typified by a range of questions that suggest an initial understanding of simple quantitative relationships. For discussion purposes, the example items presented in this chapter and in the appendix are accompanied by the results for students at the grade levels assessed, including both the percentages of success for students performing at particular anchor levels as well as the overall percentages of success for all the students, regardless of their level of performance on the scale. The results at each anchor level differ from the overall percentage of success for the total population, and both differ from the percentages of students reaching particular levels on the scale. For example, as shown in the first sample question, 79 percent of the fourth graders at Level 200 and 82 percent in the total population of fourth graders were able to answer a subtraction problem with regrouping.[24]

Additional questions at Level 200 suggested that students performing at or above this level were able to solve simple one-step word problems like

---

[23] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1991).

Professional Standards for Teaching Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1991).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematics Sciences Education Board and National Research Council, National Academy Press, 1990).

Everybody Counts: A Report to the Nation on the Future of Mathematics Education, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

[24] For example questions, (--) denotes no students at that grade at that anchor level. For the constructed-response questions, variations of the answers shown were also accepted as correct. Also, information about calculator use was reported separately and did not affect the scoring of individual questions (see Chapter Seven).

determining "how many stamps Joe had in all" and were able to read basic measurements, as exemplified by the balance scale question. Similarly, these students' ability to make some volume comparisons is illustrated by the "balls in the box" question, which was answered correctly by about two-thirds of the students at Level 200 and 73 percent overall. Finally, many students at Level 200 also were able to recognize simple geometric figures, read simple bar graphs, recognize translations of word problems in numerical sentences, and extend simple pattern sequences.

Example: Level 200

Grade 4: 82% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
79	97	100	–

$$\begin{array}{r} 64 \\ -\ 27 \\ \hline \end{array}$$

Answer: 37

Example: Level 200

Grade 4: 89% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
86	98	100	–

Joe has 35 stamps in his collection. He buys 42 more. How many does he have in all?

A 7

B 35

C 42

D 77

E 87

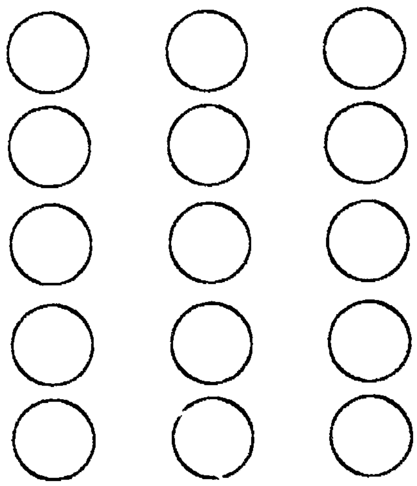
F I don't know.

Example: Level 200

Grade 4: 80% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
75	95	100	--



Write a multiplication sentence to find the number of circles.

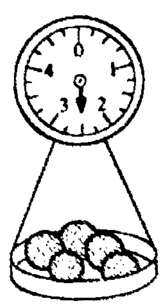
3 × 5 = 15

Example: Level 200

Grade 4: 76% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
67	96	93	--



The scale shown above measures weight in pounds. What is the total weight of the oranges in the picture?

(A) $2\frac{1}{2}$ pounds

B $3\frac{1}{2}$ pounds

C 5 pounds

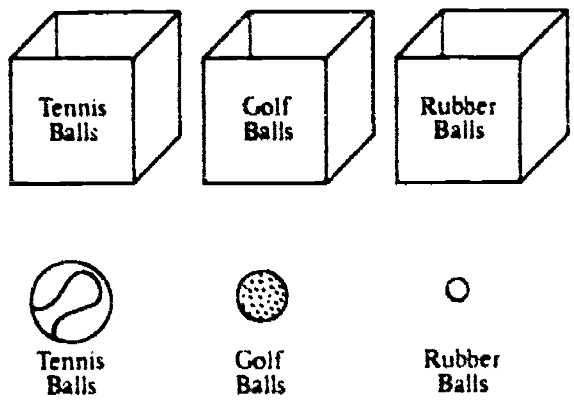
D 10 pounds

Example: Level 200

Grade 4: 73% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
65	91	100	–



Linda had three large boxes all the same size and three different kinds of balls as shown above. If she fills each box with the kind of balls shown, which box will have the fewest balls in it?

(A) The box with the tennis balls

B The box with the golf balls

C The box with the rubber balls

D You can't tell.

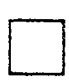
Example: Level 200

Grade 4: 76% Correct Overall

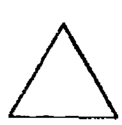
Percent Correct for Anchor Levels

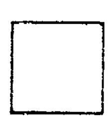
200	250	300	350
70	91	100	–

A pattern of shapes is to be repeated many times. The figure above shows one completed pattern and the beginning of the next. What shape comes next?

(A) 

B 

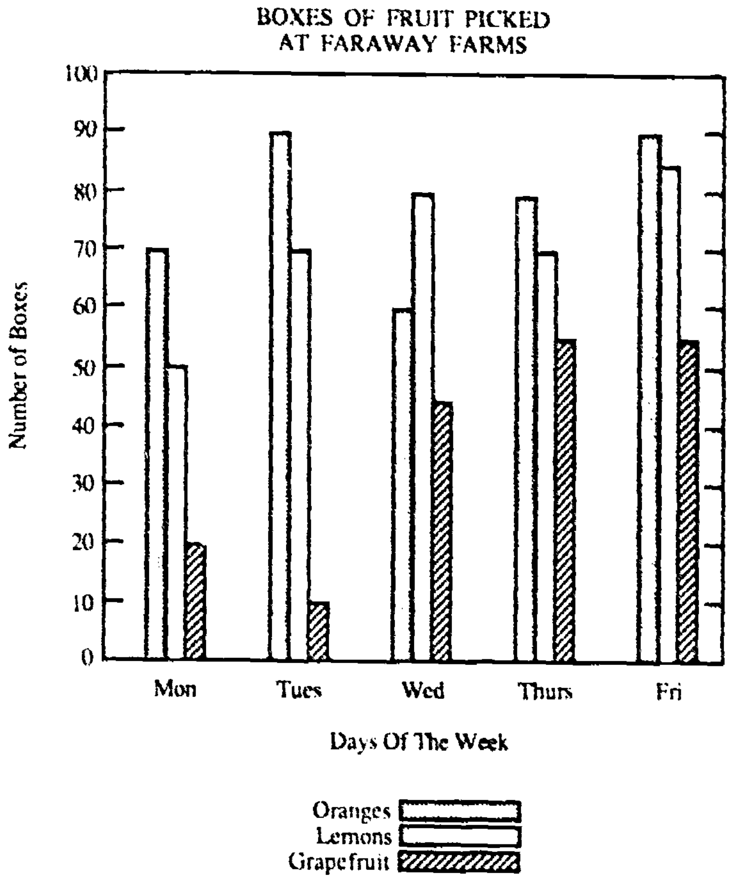
C 

D 

Did you use the calculator on this question?

Yes (No)

Example: Level 200



How many boxes of oranges were picked on Thursday?

A 55

B 60

C 70

D 80

E 90

F I don't know.

Grade 4: 80% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
[illegible]	91	100	--

Grade 8: 89% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
76	87	96	100

LEVEL 250
Simple Multiplicative Reasoning and Beginning Two-Step Problem Solving

1990		
Percentage of Students at or Above Level 250		
Grade 4	Grade 8	Grade 12
11%	67%	91%

Students at Level 250 appeared to have extended their understanding of quantitative reasoning from additive to multiplicative settings and were able to solve some two-step problems. Eleven percent of the fourth graders, two-thirds of the eighth graders, and 91 percent of the twelfth graders performed at or above this level. At grade 8, the average proficiency -- 265 -- was somewhat above this level.

However, at Level 250, expectations based on experiences with the existing curriculum and student assessment performance begin to diverge. The anchor panel participants viewed the material encompassed by the Level 250 anchor items to be more typical of upper elementary-school curriculum than middle-school curriculum--perhaps something akin to topics often covered by the end of the fifth grade. Thus, most of the eighth graders might have been expected to have reached Level 250.

Approximately three-fourths of the students at Level 250 answered the first three example items shown in this section correctly, compared to only approximately one-third of the students at Level 200. Thus, students performing at Level 250 appear to have had more success in solving problems involving multiplication and money than did students performing at Level 200. However, these three questions also exemplify that, even with this additional understanding, students' problem-solving skills at Level 250 were still confined to elementary settings. Students at Level 250 also showed some growth in measurement, geometry, data analysis, and algebra. For example, they went beyond simply reading a ruler to using one to make measurements and beyond reading graphs to completing them. One example item illustrates students' ability to convert units of measure, and another, assessed their understanding of the term parallel. In the second to last example, students were asked to use the data in a table to sketch a circle graph. The final example measured informal acquaintance with simple algebraic expressions.

Example: Level 250

Grade 4: 56% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
42	78	100	--

Mr. Garcia bought 5 dozen eggs at $0.89 per dozen. What was the total cost of the eggs?

A $ 4.05

B $ 4.45

C $ 5.89

D $10.68

Example: Level 250

Grade 8: 77% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
37	71	95	100

Kathleen is packing baseballs into boxes. Each box holds 6 baseballs. She has 24 balls. Which number sentence will help her find out how many boxes she will need?

A $24 - 6 = \square$

B $24 \div 6 = \square$

C $24 + 6 = \square$

D $24 \times 6 = \square$

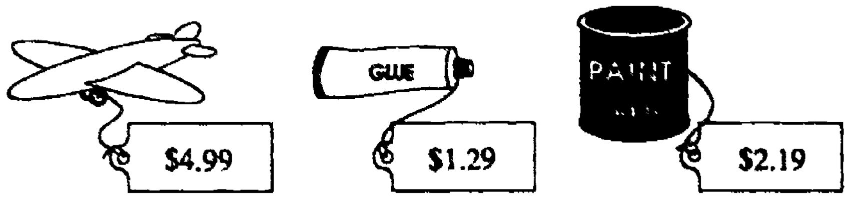
E I don't know.

Example: Level 250

Grade 4: 49% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
28	75	92	--



Chen bought one model plane, one tube of glue, and one can of paint. The cost of each item is shown in the figure above. There was no sales tax. How much change should he have gotten back from $10?

A $1.50

B $1.53

C $1.63

D $1.73

Did you use the calculator on this question?

Yes No

Example: Level 250

Grade 4: 32% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
10	66	100	--

A measurement of 60 inches is equal to how many feet?
(12 inches = 1 foot)

Answer: 5

Did you use the calculator on this question?

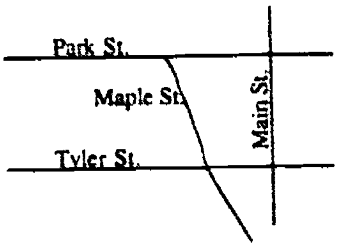
Yes No

Example: Level 250

Grade 4: 49% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
34	73	100	--



According to the map in the figure above, which streets appear to be parallel to each other?

A Park and Main

B Tyler and Maple

C Park and Tyler

D Main and Tyler

Example: Level 250

Grade 8: 73% Correct Overall

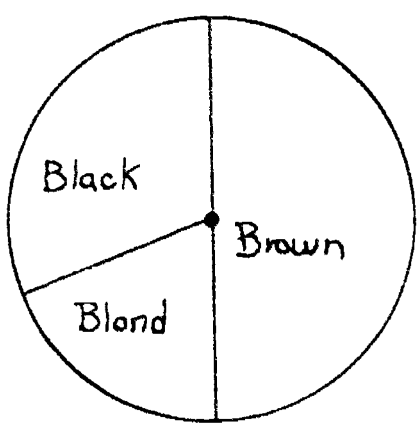
Percent Correct for Anchor Levels

200	250	300	350
21	68	92	92

HAIR COLOR SURVEY RESULTS

Color of Hair	Percentage
Blond	17
Brown	50
Black	33
Totals	100

The table above shows the results of a survey of hair color. On the circle below, make a circle graph to illustrate the data in the table. Label each part of the circle graph with the correct hair color.



Did you use the calculator on this question?

Yes No

Example: Level 250

Grade 8: 76% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
28	69	95	98

What is the value of $n + 5$ when $n = 3$?

Answer: 8

LEVEL 300
Reasoning and Problem Solving Involving Fractions, Decimals, Percents, Elementary Geometric Properties, and Simple Algebraic Manipulations

1990		
Percentage of Students at or Above Level 300		
Grade 4	Grade 8	Grade 12
0%	14%	46%

Students performing at Level 300 showed knowledge of a broader range of mathematical concepts and procedures. For example, they could operate with rational numbers, find areas and perimeters, were developing some working familiarity with geometric terms, and could perform simple manipulations involving algebraic expressions.

However, some of these concepts, such as fractions, decimals, and percents, are often introduced as early as the fourth or fifth grade. The measurement and geometry concepts, and even the simple algebra concepts, would be introduced for most students by the end of the middle-school curriculum. The majority of the content covered by the anchor questions at Level 300 would typically have been covered by the seventh grade. Yet only 14 percent of the eighth graders and less than half the high school seniors performed at or above this level. The average proficiency at grade 12 -- 295 -- was slightly below Level 300.

As illustrated by the following examples, the types of questions anchoring performance at this level should be relatively straightforward for any high-school graduate entering the work force or higher education. Further, the results for the individual items are of interest since they reflect performance on aspects of the middle-school curriculum. As previously indicated, only 14 percent of the eighth graders reached Level 300, indicating that they have a solid grasp of the material, and each of the questions was answered correctly by only about half the total population of students at grade 8. Twelfth graders performed somewhat better on these items, with 63 to 75 percent overall responding correctly. However, conversely, this also shows that approximately one-third to one-fourth of the twelfth graders did not correctly answer questions based on content found in the middle-school curriculum.

Example: Level 300

If $\frac{2}{25} = \frac{n}{500}$, then $n =$

A 10

B 20

C 30

D 40

E 50

Grade 8: 49% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
13	31	76	98

Grade 12: 63% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
53	26	70	94

Example: Level 300

Grade 8: 46% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
18	35	69	100

Kate bought a book for $14.95, a record for $5.85, and a tape for $9.70. If the sales tax on these items is 6 percent and all 3 items are taxable, what is the total amount she must pay for the 3 items, including tax?

A $32.33

B $32.06

C $30.56

D $30.50

E $ 1.83

Did you use the calculator on this question?

Yes No

Example: Level 300

Grade 12: 63% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
--	33	65	95

"Five percent of the labor force is now unemployed."

The above sentence states that, on the average, the number of workers now without employment is five out of how many workers?

Answer: 100

Example: Level 300

Grade 8: 59% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
17	46	86	99

In the model town that a class is building, a car 15 feet long is represented by a scale model 3 inches long. If the same scale is used, a house 35 feet high would be represented by a scale model how many inches high?

A $\frac{45}{35}$

B 3

C 5

D 7

E $\frac{35}{3}$

Did you use the calculator on this question?

Yes No

Example: Level 300

Grade 8: 60% Correct Overall

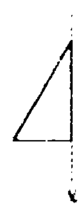
Percent Correct for Anchor Levels

200	250	300	350
33	49	77	90

Grade 12: 75% Correct Overall

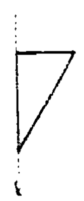
Percent Correct for Anchor Levels

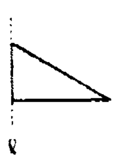
200	250	300	350
--	46	79	95

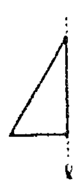


Which of the following shows the result of flipping the above triangle over the line ℓ?

A


B


C


D


E


295-027 0 - 91 - 4 QL 3

Example: Level 300

Grade 8: 58% Correct Overall

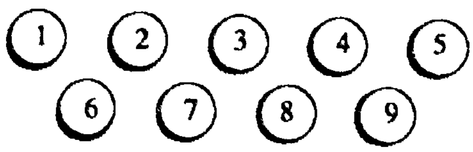
Percent Correct for Anchor Levels

200	250	300	350
30	46	78	100

Grade 12: 71% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
25	43	75	95



The nine chips shown above are placed in a sack and then mixed up. Madeline draws one chip from this sack. What is the probability that Madeline draws a chip with an even number?

A $\frac{1}{9}$

B $\frac{2}{9}$

C $\frac{4}{9}$

D $\frac{1}{2}$

E $\frac{4}{5}$

Example: Level 300

Grade 8: 47% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
09	31	75	98

The cost to rent a motorbike is given by the following formula

Cost = ($3 × number of hours) + $2

Fill in the table below.

Time in Hours	Cost in Dollars
1	5
4	14
5	17

Did you use the calculator on this question?

Yes No

Example: Level 300

Grade 8: 50% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
14	33	80	95

(2,5), (4,9), (6,13)

Which of the following describes what to do to the first number in each ordered pair shown above to obtain the corresponding second number?

A Add 3

B Subtract 3

C Multiply by 2

D Multiply by 2 and subtract 1

E Multiply by 2 and add 1

Did you use the calculator on this question?

Yes No

LEVEL 350
Reasoning and Problem Solving Involving Geometric Relationships, Algebraic Equations, and Beginning Statistics and Probability

1990		
Percentage of Students at or Above Level 350		
Grade 4	Grade 8	Grade 12
0%	0%	5%

The few students attaining Level 350 -- 5 percent of the high-school seniors and a handful (0.3 percent) of the eighth graders -- have progressed beyond their classmates at Level 300 to demonstrate some understanding of specialized mathematical content and the ability to apply fundamental concepts. Yet the majority of this material would generally be covered in Algebra I and geometry courses, if not before. While the NAEP results show that many high-school students do not complete the sequence of courses, including geometry, where this material is offered in more depth, they also show that most students have taken some form of algebra -- sometimes as early as the eighth grade (see Chapter Three). Further, many of the Level 350 questions simply require more complex application of the Level 300 material for example, using information about the relationship between area and perimeter or solving slightly more complex pattern sequences and equations.

The results for each of the individual example items, which were administered at grade 12 are informative. Each question was answered correctly by fewer than half the high-school seniors. For several questions, the percentage of correct responses was particularly low. The poor performance on these questions illustrates why only 5 percent of the high-school seniors performed with consistent success on content covered at Level 350. Further, approximately 10 to 14 percent of the students had already dropped out of school before their senior year and did not participate in the assessment.[25]

Example: Level 350

Grade 12: 30% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
06	12	16	86

The figure above shows the display on a scientific calculator. The value of the displayed number is between which of the following pairs of numbers?

A 0.04 and 0.05

B 0.4 and 0.5

C 4.0 and 5.0

D 40.0 and 50.0

E 400.0 and 500.0

Did you use the calculator on this question?

Yes No

[25]*The Condition of Education 1990: Volume I*, Lawrence T. Ogle and Nabeel Alsalam, editors (Washington, DC: National Center for Education Statistics, U.S. Government Printing Office, 1990).

Example: Level 350

Grade 12: 45% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
--	12	43	96

The perimeter of a square is 24 centimeters. What is the area of that square?

A 36 square cm

B 48 square cm

C 96 square cm

D 576 square cm

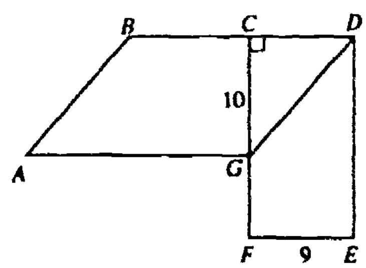
E I don't know.

Example: Level 350

Grade 12: 21% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
--	--	07	78



In the figure above, $ABDG$ is a parallelogram and $CDEF$ is a rectangle. If $EF = 9$ and $CG = 10$, what is AB to the nearest hundredth?

Answer: 13.45

Did you use the calculator on this question?

Yes No

Example: Level 350

Grade 12: 39% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
--	06	35	86

What is the greatest number of squares with 9-inch sides that can be cut from a rectangular piece of cloth 18 inches by 36 inches?

Answer: 8

Example: Level 350

Grade 12: 44% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
--	13	44	81

If $d = 110$ and $a = 20$ in the formula $d = \frac{a}{2}(2t - 1)$, then $t =$

A $\frac{15}{22}$

B $\frac{15}{8}$

C 5

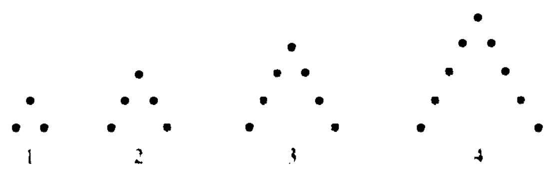
D $\frac{111}{20}$

E 6

Did you use the calculator on this question?

Yes No

Example: Level 350



If this pattern of dot figures is continued, how many dots will be in the 100th figure?

A 100

B 101

C 199

D 200

(E) 201

Grade 8: 34% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
13	19	53	88

Grade 12: 49% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
--	22	48	90

Explain how you found your answer.

Answer: n = the number of the figure. There are n dots on each of the 2 sides of the figure, plus 1 dot on top. Therefore, (n × 2) + 1 lets you predict how many dots there will be in the 100th figure:
(100 × 2) + 1 = 201

Grade 8: 15% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
01	04	28	74

Grade 12: 27% Correct Overall

Percent Correct for Anchor Levels

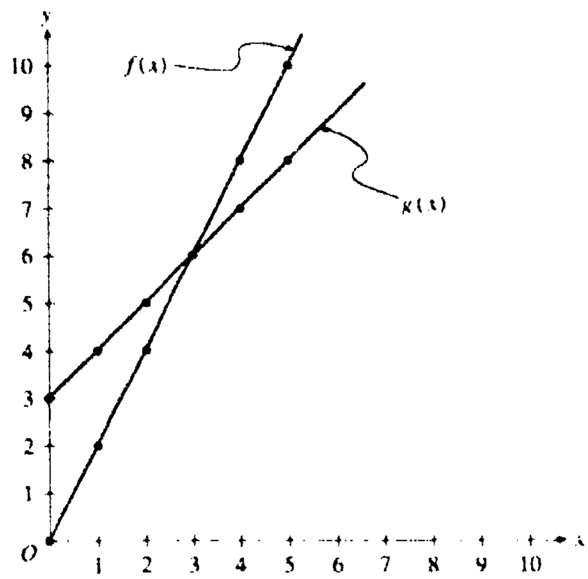
200	250	300	350
--	03	22	74

Example: Level 350

Grade 12: 48% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
--	31	47	87



What is the value of $g(1)$?

A 2

B 4

C 5

D 6

E 8

PERCENTILES OF OVERALL MATHEMATICS PROFICIENCY FOR THE NATION

As illustrated by the percentages of students at each grade reaching different anchor levels on the mathematics proficiency scale, performance within each of the three grades assessed varied tremendously. The percentile distributions shown in TABLE 1.2 illustrate the extent of this variation. For example, the range between the 5th and 95th percentile of performance within each grade exceeded the range across the grades at any one percentile.

TABLE 1.2 Percentiles of Overall Mathematics Proficiency at Grades 4, 8, and 12

Grade	Average Proficiency						
	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
4	168 (1.1)	179 (1.4)	197 (1.2)	217 (0.8)	235 (0.6)	251 (0.9)	261 (0.9)
8	211 (1.7)	223 (1.0)	242 (1.0)	266 (1.1)	288 (1.5)	307 (1.2)	317 (1.7)
12	241 (1.5)	251 (1.0)	271 (1.2)	296 (1.3)	320 (1.2)	339 (1.3)	349 (1.4)

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

The lowest performing 25 percent of the fourth graders had proficiencies below 197 and therefore did not reach Level 200 (essentially material covered in the primary grades). Without simple additive reasoning skills, these fourth graders might be considered at risk for lack of success in mathematics as they progress through school. In contrast, the top 5 percent of the fourth graders had proficiency levels above 261, which compares favorably with the median proficiency level for eighth graders -- 266.

The results for eighth graders also show a wide range of achievement. With proficiencies below 242, the lowest performing 25 percent seemed to be having difficulty with content presented in the elementary-school curriculum. The top 10 percent had proficiencies above 307 (essentially Level 300), where achievement appeared to be commensurate with topics generally introduced around the seventh grade.

The range in achievement present at grades 4 and 8 was also evident at grade 12. However, with a median performance of 296 (again, essentially Level 300), half the twelfth graders did not demonstrate a grasp of mathematics that included fractions, decimals, percents, and simple algebra. The top 25 percent had proficiencies above 320, but this was just slightly above the top 5 percent of the eighth graders, who had proficiencies above 317. The bottom 10 percent of the high-school seniors had proficiencies below 251, which compares to somewhere between the 75th and 90th percentiles of the fourth graders and indicates that most of these low-performing twelfth graders have not yet fully grasped whole number arithmetic. Again, only the top 5 percent had proficiencies above 349 (virtually Level 350), indicating readiness for the study of advanced mathematics.

SUMMARY

While 72 percent of the fourth graders seemed to have grasped additive reasoning with whole numbers -- material typically covered by third grade -- only 67 percent of the eighth graders appeared to have mastered the multiplicative arithmetic and two-step problem solving typically covered by the fifth grade. Only 14 percent demonstrated success with materials more generally covered in the middle-school curriculum, including fractions, decimals, percents, and simple algebra. Further, less than half the high-school seniors seemed to have mastered these topics. Only 5 percent of the high-school seniors attained a level of performance characterized by algebra and geometry--when most have had some coursework in these subjects--and the problem is further exacerbated because these results do not account for the percentage of students who drop out of school.

The data indicate that while fourth graders appeared relatively successful with material covered at the third grade level, a gap emerged at grade 8, where only two-thirds had a grasp of typical fifth-grade content. For the high-school seniors, the gap widened. Less than half appeared to have a firm grasp of seventh-grade content. Moreover, not only is students' performance lagging behind the current curriculum, but the current curriculum is not considered sufficient for today's needs, as highlighted in reports from business and industry, and documented by international comparison studies.[26]

[26]National Alliance of Business, *The Business Roundtable Participation Guide: A Primer for Business on Education* (New York, NY: National Alliance of Business, 1990).

Hudson Institute, *Workforce 2000: Work and Workers for the 21st Century* (Indianapolis, IN: 1987).

James W. Stigler, Shin-Ying Lee, and Harold W. Stevenson, *Mathematical Knowledge of Japanese, Chinese, and American School Children* (Reston, VA: National Council of Teachers of Mathematics, 1990).

Archie E. Lapointe, Nancy A. Mead, and Gary W. Phillips, *A World of Differences, An International Assessment of Mathematics and Science* (Princeton, NJ: Educational Testing Service, 1989).

Curtis McKnight, et al., *The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective, A National Report on the Second International Mathematics Study* (Champaign, IL: International Association for the Evaluation of Educational Achievement, Stipes Publishing Company, 1987).

Chapter 2

Overall Mathematics Proficiency Results for Population Subgroups

OVERVIEW

Numerous calls for reform in mathematics education echo the need to stress mathematics for *all* students.[27] Yet assessment results consistently show lower achievement for subpopulations of students who are less advantaged than their classmates, including some minorities, females, and children from single-parent families. The NAEP data cannot establish cause-and-effect relationships between variables such as race/ethnicity or gender on one hand and academic performance on the other; however, the results do provide information about important social, economic, home, and school indicators of educational achievement. Countless studies have found differences in mathematics achievement to be systematically related to race/ethnicity, gender, and socioeconomic background. Despite efforts to reduce these differences, the results of the 1990 NAEP mathematics assessment suggest that substantial gaps in achievement levels still pervade American classrooms.

It should be noted, however, that average proficiency results can mask large variations in performance among students in any given grade or subpopulation. Thus, for example, while White students tended to perform better than Hispanic students on average, both groups of students included those with high proficiency and those with low proficiency.[28]

PERFORMANCE BY RACE/ETHNICITY

The mathematics proficiency results for students belonging to different racial/ethnic groups are presented in TABLE 2.1.

---

[27] *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

[28] See Appendix E for overall proficiency by percentiles for population subgroups.

TABLE 2.1 Average Proficiency and Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Race/Ethnicity

	Percent of Students	Average Proficiency	Percentage of Students at or Above			
			Level 200	Level 250	Level 300	Level 350
Grade 4						
White	70 (0.1)	223 (0.7)	81 (1.2)	14 (0.9)	0 (0.0)	0 (0.0)
Black	15 (0.1)	194 (1.3)	41 (2.1)	1 (0.4)	0 (0.0)	0 (0.0)
Hispanic	11 (0.1)	201 (1.4)	52 (2.5)	3 (1.8)	0 (0.0)	0 (0.0)
Asian/Pacific Islander	2 (0.3)	228 (2.8)	85 (3.3)	23 (4.6)	0 (0.0)	0 (0.0)
American Indian	2 (0.3)	211 (2.5)	66 (5.1)	3 (2.1)	0 (0.0)	0 (0.0)
Grade 8						
White	71 (0.2)	272 (1.2)	99 (0.3)	77 (1.2)	18 (1.4)	0 (0.1)
Black	15 (0.1)	241 (1.6)	92 (1.6)	36 (2.5)	3 (0.8)	0 (0.0)
Hispanic	10 (0.1)	248 (1.6)	95 (1.1)	47 (3.2)	4 (1.2)	0 (0.0)
Asian/Pacific Islander	3 (0.4)	285 (4.1)	99 (1.1)	86 (3.1)	32 (4.9)	2 (2.1)
American Indian !	1 (0.4)	248 (3.4)	97 (5.0)	47 (8.5)	4 (1.9)	0 (0.0)
Grade 12						
White	74 (0.4)	301 (1.2)	100 (0.0)	95 (0.6)	52 (1.6)	6 (0.6)
Black	14 (0.3)	270 (1.3)	100 (0.0)	74 (2.0)	16 (1.6)	0 (0.3)
Hispanic	8 (0.3)	278 (2.4)	100 (0.6)	79 (2.9)	25 (3.4)	1 (0.5)
Asian/Pacific Islander	3 (0.2)	315 (4.0)	100 (0.0)	97 (1.6)	70 (3.5)	13 (4.0)
American Indian !	1 (0.3)	290 (5.4)	99 (2.3)	92 (4.7)	39 (9.0)	0 (0.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages less than 0.5 percent are rounded to 0 percent, and some White eighth graders (0.2 percent) and some Black twelfth graders (0.2 percent) reached Level 350. !Interpret with caution--the nature of the sample does not allow accurate determination of the variability of the results for this subgroup.

Although the sample sizes for Asian/Pacific Islander and American Indian students are quite small (as indicated by the small percentages of students in those classifications), for the overall mathematics performance data, results are provided for all five racial/ethnic groups analyzed separately by NAEP: White, Black, Hispanic, Asian/Pacific Islander, and American Indian.[29]

An examination of the results for all three grades reveals a relatively consistent pattern. Asian/Pacific Islander students exhibited the highest level of performance, followed by White, American Indian, Hispanic, and Black students, in descending order. This pattern tends to hold for both average proficiency (with the exception of little difference between Asian/Pacific Islander and White students at grade 4 and between American Indian and

[29] Definitions of the various NAEP population subgroup classifications can be found in Appendix C.

Hispanic students at grade 8) and for the percentages of students performing at or above the anchor levels across the scale.

An interesting phenomenon, however, emerges at the highest anchor levels achieved at each grade. Much larger percentages of Asian/Pacific Islander students than White students reached the highest levels. In turn, comparatively more White students than American Indian, Hispanic, or Black students reached these levels. Within each grade, there were also vast differences between the highest and lowest average performance by racial/ethnic group. These discrepancies were also reflected in the percentages of students attaining various anchor levels. For example, 86 percent of the Asian/Pacific Islander eighth graders performed at or above Level 250, compared to 36 percent of the Black eighth graders. Similarly, 70 percent of the Asian/Pacific Islander twelfth graders performed at Level 300, compared to 16 percent of the Black twelfth graders.

PERFORMANCE BY GENDER

TABLE 2.2 presents the mathematics proficiency results by gender for the nation as a whole, and TABLE 2.3 presents results by gender for White, Black, and Hispanic students. The performance patterns by gender for White, Black, and Hispanic students generally match the gender results for the nation as a whole. At grades 4 and 8, there was essentially no difference in performance between males and females. However, a minor but persistent advantage for males can be detected at the anchor levels. This advantage increased at grade 12, particularly at the higher end of the scale. This finding is consistent with other research studies showing larger gender differences favoring males when above-average performance is considered.[30] Additionally, the developing gender gap during high school was particularly pronounced for Black and

[30]Gilah C. Leder, "*Gender Differences in Mathematics: An Overview*" in *Mathematics and Gender*, Elizabeth Fennema and Gilah C. Leder, editors (New York, NY: Teachers College Press, 1990).

Hispanic twelfth graders, which coincides with disproportionately high attrition rates for Black and Hispanic students in high school and college, and for the low enrollment of women in graduate mathematics.[31]

TABLE 2.2 Average Proficiency and Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Gender

	Percent of Students	Average Proficiency	Percentage of Students at or Above			
			Level 200	Level 250	Level 300	Level 350
Grade 4						
Male	52 (0.6)	217 (0.8)	73 (1.3)	12 (0.8)	0 (0.0)	0 (0.0)
Female	48 (0.6)	215 (0.8)	71 (1.3)	10 (0.7)	0 (0.0)	0 (0.0)
Grade 8						
Male	50 (0.7)	266 (1.3)	98 (0.5)	67 (1.5)	16 (1.3)	0 (0.2)
Female	50 (0.7)	264 (1.1)	98 (0.5)	68 (1.4)	13 (1.3)	0 (0.1)
Grade 12						
Male	49 (0.7)	298 (1.3)	100 (0.0)	92 (0.8)	48 (1.7)	6 (0.9)
Female	51 (0.7)	293 (1.1)	100 (0.1)	89 (1.7)	43 (1.5)	3 (0.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages less than 0.5 percent are rounded to 0 percent, and a few eighth-grade males (0.3 percent) and females (0.1 percent) attained Level 350.

[31] *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

Moving Beyond Myths: Revitalizing Undergraduate Mathematics (Washington, DC: National Research Council, National Academy Press, 1991).

TABLE 2.3 Average Proficiency and Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Race/Ethnicity and Gender

	Percent of Students	Average Proficiency	Percentage of Students at or Above			
			Level 200	Level 250	Level 300	Level 350
Grade 4						
White						
Male	36 (0.5)	224 (1.0)	82 (1.6)	15 (1.1)	0 (0.0)	0 (0.0)
Female	34 (0.5)	222 (0.8)	81 (1.3)	13 (1.0)	0 (0.0)	0 (0.0)
Black						
Male	7 (0.2)	194 (1.7)	42 (2.4)	2 (0.6)	0 (0.0)	0 (0.0)
Female	8 (0.2)	194 (1.6)	39 (3.1)	1 (0.6)	0 (0.0)	0 (0.0)
Hispanic						
Male	6 (0.2)	201 (1.8)	53 (3.2)	4 (1.2)	0 (0.0)	0 (0.0)
Female	5 (0.2)	199 (2.0)	50 (3.7)	3 (0.9)	0 (0.0)	0 (0.0)
Grade 8						
White						
Male	35 (0.6)	273 (1.5)	99 (0.4)	76 (1.5)	20 (1.7)	0 (0.3)
Female	35 (0.6)	271 (1.2)	99 (0.3)	78 (1.5)	16 (1.7)	0 (0.1)
Black						
Male	7 (0.3)	242 (1.9)	93 (2.0)	37 (2.9)	3 (1.6)	0 (0.0)
Female	8 (0.3)	240 (1.9)	91 (2.2)	35 (3.1)	2 (1.1)	0 (0.0)
Hispanic						
Male	5 (0.2)	247 (1.9)	95 (1.3)	45 (4.0)	4 (1.6)	0 (0.0)
Female	5 (0.2)	248 (1.8)	95 (1.3)	48 (3.6)	4 (1.3)	0 (0.0)
Grade 12						
White						
Male	36 (0.6)	303 (1.5)	100 (0.0)	95 (0.9)	54 (1.9)	8 (1.1)
Female	38 (0.6)	299 (1.2)	100 (0.0)	94 (0.8)	50 (1.7)	4 (0.5)
Black						
Male	7 (0.3)	273 (1.7)	100 (0.0)	76 (2.6)	20 (2.4)	0 (0.7)
Female	7 (0.3)	268 (1.4)	100 (0.0)	72 (2.3)	13 (1.8)	0 (0.0)
Hispanic						
Male	4 (0.2)	282 (2.4)	100 (0.0)	84 (3.1)	28 (3.6)	2 (0.7)
Female	4 (0.3)	274 (3.3)	99 (1.2)	74 (3.5)	22 (4.5)	1 (0.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. Percentages may not total 100 percent due to rounding. At grade 8, a few White males (0.3 percent) and White females (0.1 percent) attained Level 350. At grade 12, a few Black males (0.4 percent) attained Level 350. However, percentages less than 0.5 percent are rounded to 0 percent.

PERFORMANCE BY TYPE OF COMMUNITY

NAEP information on the relationship between students' mathematics proficiency and the types of communities in which they attend school presents an opportunity to monitor the link between socioeconomic circumstances and educational performance. TABLE 2.4 shows the mathematics proficiency for students attending school in three extreme community types -- advantaged urban, disadvantaged urban, and extreme rural -- compared to students attending schools in other types of communities.

TABLE 2.4 Average Proficiency and Percentage of Students at or Above Four Anchor Levels by Type of Community

	Percent of Students	Average Proficiency	Percentage of Students at or Above			
			Level 200	Level 250	Level 300	Level 350
Grade 4						
Advantaged Urban	12 (1.9)	231 (2.2)	89 (2.3)	23 (2.6)	0 (0.0)	0 (0.0)
Disadvantaged Urban	9 (1.2)	200 (2.7)	50 (4.2)	3 (1.0)	0 (0.0)	0 (0.0)
Extreme Rural	11 (1.4)	218 (2.3)	78 (3.3)	9 (2.3)	0 (0.0)	0 (0.0)
Other	68 (2.7)	215 (0.9)	71 (1.5)	10 (0.7)	0 (0.0)	0 (0.0)
Grade 8						
Advantaged Urban !	11 (2.2)	283 (4.0)	100 (0.4)	86 (3.0)	29 (6.8)	1 (0.6)
Disadvantaged Urban	10 (1.8)	252 (2.5)	96 (0.9)	51 (3.7)	8 (1.1)	0 (0.2)
Extreme Rural	11 (2.2)	261 (2.6)	98 (1.5)	62 (3.7)	11 (1.7)	0 (0.0)
Other	68 (3.0)	265 (1.2)	98 (0.6)	69 (1.6)	13 (0.9)	0 (0.1)
Grade 12						
Advantaged Urban !	9 (2.2)	308 (3.2)	100 (0.0)	95 (1.9)	63 (4.3)	10 (1.8)
Disadvantaged Urban	12 (2.4)	283 (4.4)	100 (0.5)	82 (4.2)	31 (4.6)	3 (1.2)
Extreme Rural !	12 (3.1)	290 (3.2)	100 (0.0)	89 (1.9)	39 (4.1)	3 (1.2)
Other	67 (3.7)	297 (1.1)	100 (0.0)	92 (0.8)	47 (1.3)	5 (0.7)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. A few eighth-grade students in disadvantaged urban and other community types (0.1 and 0.2 percent, respectively) reached Level 350, although no students in extreme rural communities attained that level. Percentages less than 0.5 percent, however, are rounded to 0 percent.
!Interpret with caution--the nature of the sample does not allow accurate determination of the variability of the results for these subgroups.

As numerous educational studies showing a positive relationship between socioeconomic status and achievement have suggested, students attending schools in advantaged urban communities had the highest mathematics proficiency, and those attending schools in disadvantaged urban communities had the lowest mathematics proficiency. Those in extreme rural communities tended to perform similarly to students in other types of communities, although a pattern of slightly lower average achievement is noticeable at grade 12.

PERFORMANCE BY REGION

TABLE 2.5 presents the results for students from each of the four regions of the country. As reflected in the average proficiency results for all three grades, students in the Southeast tended to perform less well than did students in the other regions, and this pattern held for the percentages of students performing at or above anchor levels -- even at the lower scale levels. This pattern was evident at grade 4, and persisted in grades 8 and 12. For example, 62 percent of the fourth graders from the Southeast performed at or above Level 200, compared to approximately three-quarters of the fourth graders in the other three regions of the country. Eleven to 17 percent fewer eighth graders in the Southeast attained Level 250 than did students in the other regions. For twelfth graders, 16 to 23 percent fewer students in the Southeast attained Level 300 than did students in the other regions of the country.

TABLE 2.5 Average Proficiency and Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Region

	Percent of Students	Average Proficiency	Percentage of Students at or Above			
			Level 200	Level 250	Level 300	Level 350
Grade 4						
Northeast	22 (0.8)	219 (1.7)	76 (2.3)	13 (1.3)	0 (0.0)	0 (0.0)
Southeast	24 (0.8)	209 (1.6)	62 (2.6)	7 (1.1)	0 (0.0)	0 (0.0)
Central	26 (0.6)	218 (1.3)	76 (1.7)	10 (1.0)	0 (0.0)	0 (0.0)
West	28 (0.6)	218 (1.8)	74 (2.5)	13 (1.4)	0 (0.0)	0 (0.0)
Grade 8						
Northeast	21 (1.0)	270 (2.6)	99 (0.4)	74 (3.2)	18 (2.1)	0 (0.3)
Southeast	24 (0.9)	256 (1.7)	96 (1.4)	57 (2.6)	9 (1.1)	0 (0.0)
Central	25 (0.7)	269 (1.6)	99 (0.6)	73 (1.8)	15 (1.8)	0 (0.2)
West	30 (0.7)	265 (2.7)	98 (0.6)	68 (2.6)	15 (2.4)	0 (0.2)
Grade 12						
Northeast	24 (0.9)	302 (2.1)	100 (0.0)	93 (1.1)	54 (2.7)	6 (1.1)
Southeast	21 (0.7)	284 (2.2)	100 (0.0)	84 (1.5)	31 (3.5)	2 (0.4)
Central	27 (0.5)	298 (2.0)	100 (0.1)	92 (1.1)	48 (2.6)	5 (1.2)
West	29 (0.8)	296 (2.2)	100 (0.2)	91 (1.5)	47 (2.7)	5 (1.3)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent due to rounding. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. Although no eighth-grade students in the Southeast attained Level 350, some did attain that level in the Northeast, Central, and Western regions (0.4, 0.2, and 0.3 percent, respectively). However, percentages less than 0.5 percent are rounded to 0 percent.

PERFORMANCE BY TYPE OF SCHOOL

In 1990, NAEP modified its national sampling design to provide separate analyses for students attending private schools. Although the sample sizes are small when private schools are subclassified further, the overall mathematics results by type of school shown in TABLE 2.6 are presented separately for students attending public schools, Catholic schools, and other (non-Catholic) private schools. At grade 4, students attending other private schools outperformed students in Catholic schools, who in turn performed better than students attending public schools. At grade 8, the difference in average proficiency between students attending Catholic schools and those attending other private schools was negligible, although students in both those types of private schools still outperformed students in public schools. At grade 12, there was no difference between mathematics proficiency in Catholic schools and other private schools, and the difference between that level of performance and average proficiency in public schools was greatly reduced.

TABLE 2.6 Average Proficiency and Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Type of School

	Percent of Students	Average Proficiency	Percentage of Students at or Above			
			Level 200	Level 250	Level 300	Level 350
Grade 4						
Public Schools	88 (1.2)	214 (0.9)	70 (1.3)	10 (0.8)	0 (0.0)	0 (0.0)
Catholic Schools	8 (1.1)	224 (2.0)	83 (2.6)	16 (2.2)	0 (0.0)	0 (0.0)
Other Private Schools	4 (0.8)	231 (2.8)	89 (3.8)	22 (3 4)	0 (0.0)	0 (0.0)
Grade 8						
Public Schools	89 (1.3)	264 (1.2)	97 (0.5)	66 (1.3)	13(1.3)	0 (0.1)
Catholic Schools	7 (1.1)	278 (2.6)	100 (0.2)	84 (2.6)	22(3.4)	0 (0.2)
Other Private Schools	4 (0.7)	274 (2.4)	100 (0.5)	80 (3.8)	18(2.9)	0 (0.0)
Grade 12						
Public Schools	90 (1.3)	295 (1.1)	100 (0.1)	90 (0.7)	45(1.4)	5 (0.6)
Catholic Schools	6 (1.1)	302 (3.0)	100 (0.0)	96 (1.2)	54(4.5)	4 (1.0)
Other Private Schools	4 (0.8)	301 (3.1)	100 (0.0)	97 (1.1)	51(4.8)	4 (1.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two r' adard errors of the estimate for the sample. When the proportion of students is 0 percent, the standard error is inestimable. Although percentages less than 0.5 percent are rounded to 0 percent, a few eighth-grade public-school students (0.2 percent) and Catholic-school students (0.1 percent) reached Level 350.

PERFORMANCE BY PARENTS' HIGHEST LEVEL OF EDUCATION

In addition to collecting information about basic demographic characteristics, NAEP asked students to provide data about a variety of home background factors that can play a prominent role in influencing educational achievement.

TABLE 2.7 presents the 1990 mathematics assessment results by the highest level of education reported for either parent. At all three grades, students whose parents had some education beyond high school performed better than those whose parents had no education beyond high school. Similarly, those students with at least one parent graduating high school outperformed students with neither parent completing high school. At grades 8 and 12, students whose parents graduated from college had the highest mathematics proficiency. Although this pattern did not hold at grade 4, it should be noted that 35 percent of the fourth graders reported that they did not know the education level of either parent.

TABLE 2.7 Average Proficiency and Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Parents' Highest Level of Education

	Percent of Students	Average Proficiency	Percentage of Students at or Above			
			Level 200	Level 250	Level 300	Level 350
Grade 4						
Did Not Finish High School	5 (0.3)	205 (2.0)	59 (3.6)	3 (1.2)	0 (0.0)	0 (0.0)
Graduated High School	15 (0.7)	211 (1.2)	67 (1.6)	5 (0.8)	0 (0.0)	0 (0.0)
Some Education After High School	8 (0.4)	227 (1.6)	85 (1.6)	19 (2.2)	0 (0.0)	0 (0.0)
Graduated College	36 (1.0)	223 (0.9)	79 (1.1)	17 (1.1)	0 (0.0)	0 (0.0)
Grade 8						
Did Not Finish High School	9 (0.6)	246 (1.4)	96 (1.6)	41 (2.6)	3 (1.2)	0 (0.0)
Graduated High School	25 (0.9)	256 (0.9)	97 (0.5)	57 (1.7)	6 (1.0)	0 (0.0)
Some Education After High School	18 (0.6)	270 (1.0)	99 (0.5)	77 (1.5)	15 (1.1)	0 (0.2)
Graduated College	40 (1.5)	277 (1.5)	99 (0.4)	81 (1.5)	24 (1.9)	0 (0.2)
Grade 12						
Did Not Finish High School	8 (0.6)	272 (1.4)	100 (0.0)	77 (2.0)	16 (2.3)	1 (0.4)
Graduated High School	24 (1.0)	282 (1.2)	100 (0.1)	85 (1.5)	28 (1.4)	1 (0.4)
Some Education After High School	25 (0.8)	297 (0.9)	100 (0.0)	93 (0.8)	48 (1.7)	3 (0.6)
Graduated College	41 (1.2)	308 (1.3)	100 (0.0)	96 (0.6)	61 (2.0)	9 (1.1)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is 0 percent, the standard error is inestimable. The percentages for parents' highest level of education do not add to 100 percent because 35 percent of the fourth graders, 8 percent of the eighth graders, and 2 percent of the twelfth graders responded "I don't know." The average proficiencies for these students were 210 (0.9), 243 (1.9), and 268 (3.5), respectively. A few eighth-grade students in the "some education after high school" and "graduated college" classifications did attain Level 350 (0.1 and 0.4 percent, respectively). However, percentages less than 0.5 percent are rounded to 0 percent.

PERFORMANCE BY ADDITIONAL FACTORS RELATED TO ACADEMIC EMPHASIS IN THE HOME

TABLE 2.8 presents average mathematics proficiency results according to a number of home factors that have been related to academic achievement. At all three grades, students who had access to a greater number of reading and resource materials at home had higher average mathematics proficiency than did students with access to fewer materials, as did those who reported reading more pages each day for school and homework. Similarly, average mathematics proficiency tended to be higher for eighth and twelfth graders who reported doing homework on a daily basis. Students who reported that they were absent three days or more in the month preceding the assessment had lower proficiency than did their classmates with better attendance.

TABLE 2.8 Average Mathematics Proficiency by Additional Factors Related to the Home

	Grade 4		Grade 8		Grade 12	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Types of Reading Materials In the Home						
Zero to two types	29 (0.9)	206 (0.9)	19 (0.8)	247 (1.1)	14 (0.8)	280 (1.7)
Three types	36 (0.7)	216 (0.7)	30 (0.6)	261 (1.0)	26 (0.6)	291 (1.2)
Four types	35 (0.8)	224 (1.0)	51 (1.1)	275 (1.3)	60 (0.8)	301 (1.1)
Daily Amount of Time Spent on Homework All Subjects						
None assigned	21 (1.4)	219 (1.5)	6 (0.5)	248 (2.1)	12 (0.9)	276 (1.5)
Did not do it	4 (0.3)	201 (2.3)	7 (0.5)	255 (2.0)	8 (0.4)	293 (1.8)
One-half hour or less	34 (1.2)	218 (0.9)	19 (0.7)	265 (1.4)	21 (0.6)	298 (1.2)
One hour	25 (0.7)	218 (1.2)	42 (0.7)	267 (1.0)	32 (0.7)	296 (1.3)
Two hours	17 (0.7)	210 (1.2)	18 (0.8)	271 (1.7)	18 (0.6)	300 (1.2)
More than two hours	--	--	8 (0.5)	267 (2.9)	10 (0.5)	304 (2.2)
Daily Pages Read for School and Homework All Subjects						
Five or fewer pages	24 (0.9)	206 (1.2)	34 (1.0)	258 (1.0)	33 (1.2)	285 (1.0)
Six to 10 pages	22 (0.7)	216 (1.0)	27 (0.7)	266 (1.2)	24 (0.7)	293 (1.2)
More than 10 pages	54 (1.2)	220 (0.7)	38 (1.1)	272 (1.3)	43 (1.3)	305 (1.3)
Days of School Missed Last Month						
None	--	--	46 (0.9)	268 (1.4)	28 (0.9)	301 (1.4)
One or two days	--	--	32 (0.7)	269 (1.1)	39 (0.9)	299 (1.2)
Three days or more	--	--	22 (0.7)	254 (1.0)	33 (1.0)	287 (1.2)
Parents Living in Home						
Both parents	77 (0.7)	219 (0.7)	77 (0.6)	270 (1.1)	76 (0.7)	300 (1.1)
Single parent	19 (0.6)	207 (1.0)	20 (0.7)	257 (1.1)	20 (0.6)	288 (1.5)
Neither parent	4 (0.3)	197 (2.5)	3 (0.2)	240 (2.7)	5 (0.3)	283 (2.5)
Daily Hours of Television Viewing						
Zero to one hour	19 (0.6)	218 (1.3)	14 (0.6)	273 (2.2)	33 (1.0)	306 (1.2)
Two hours	19 (0.6)	223 (1.1)	22 (0.7)	272 (1.3)	27 (0.7)	299 (1.3)
Three hours	18 (0.7)	222 (1.0)	23 (0.7)	268 (1.1)	19 (0.6)	290 (1.3)
Four to Five hours	19 (0.5)	217 (1.0)	28 (0.7)	262 (1.2)	15 (0.6)	281 (1.3)
Six hours or more	25 (1.1)	204 (1.1)	14 (0.7)	247 (1.1)	5 (0.3)	270 (1.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent due to rounding. (--) Indicates question not asked at that grade.

It may be particularly difficult for some single parents to provide both the economic and educational support that foster higher educational achievement. This difficulty is supported by NAEP's mathematics proficiency results. At all three grades, students living with both parents had higher average proficiency than did students living with one parent, who in turn tended to have higher proficiency than students living apart from both parents.

Finally, there is the issue of the large amount of time that students spend watching television each day in contrast to the amount of time they could be spending in more educationally beneficial activities. At all three grades, students who reported watching six hours or more of television per day had substantially lower average mathematics proficiency than did their classmates who watched less television. Additionally, at grades 8 and 12, the less television viewing, the higher the average mathematics proficiency. Even though fourth graders who reported watching zero to one hour of television a day had lower proficiency than those who reported two or three hours each day, the general pattern still prevails.

PERFORMANCE BY TYPE OF HIGH-SCHOOL PROGRAM AND PLANS AFTER HIGH SCHOOL

At grade 12, students' high-school programs appeared to be directly related to their average mathematics proficiency. As shown in TABLE 2.9, those enrolled in academic programs had substantially higher average proficiency than did those enrolled in either general or vocational/technical programs. Further, those enrolled in general programs outperformed those enrolled in vocational/technical programs.

TABLE 2.9 Average Mathematics Proficiency at Grade 12 by High-School Program and Plans After High School

Type of High-School Program			Plans After High School		
	Percent of Students	Average Proficiency		Percent of Students	Average Proficiency
Academic	58 (1.3)	309 (1.1)	Working	14 (0.7)	275 (1.3)
General	34 (1.3)	278 (1.2)	Two-Year College	24 (0.7)	280 (1.1)
Vocational/Technical	8 (0.6)	270 (1.7)	Four-Year College	55 (1.4)	311 (1.1)
			Other	8 (0.5)	280 (1.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the estimate for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent due to rounding.

Consistent with the findings for type of high-school program, high-school seniors planning to attend a four-year college had considerably higher average mathematics proficiency than those with other plans after graduation did. Yet their average proficiency was only slightly above Level 300, which indicates a grasp of material generally introduced by the seventh grade (decimals, fractions, percents, and simple algebra). As a result of this low level of performance by the college bound, even despite some Algebra III and calculus course taking, many students enter college unready to begin standard college mathematics courses. As a consequence of this lack of preparation and an increase in the use of mathematics in other disciplines, college enrollments in mathematics have increased dramatically since 1970, primarily in high-school level algebra and geometry courses.[32]

The twelfth graders planning to enter the work force directly after graduation had very low average mathematics proficiency mid-way between Levels 250 and 300, showing competency with content typically covered from grades five through seven. The mismatch between workplace needs and

---

[32] *Moving Beyond Myths: Revitalizing Undergraduate Mathematics* (Washington, DC: National Research Council, National Academy Press, 1991)

students' capabilities is well documented in general and is of particular concern for those students trying to enter the work force with limited skills.[33]

PERFORMANCE BY AVERAGE MATHEMATICS PROFICIENCY OF STUDENTS' SCHOOLS

To examine the relationship between level of school performance and level of student performance, NAEP sorted schools by their students' average performance on the mathematics assessment, identifying the top one-third and the bottom one-third of the schools. TABLE 2.10 shows the average mathematics proficiency for students in the top and the bottom one-third of schools.

TABLE 2.10 Average Proficiency and Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale for the Top One-Third of the Schools and the Bottom One-Third of the Schools

	Percent of Students	Average Proficiency	Percentage of Students at or Above			
			Level 200	Level 250	Level 300	Level 350
Grade 4						
Top One-Third Schools	34 (2.6)	232 (0.8)	90 (1.1)	22 (1.4)	0 (0.0)	0 (0.0)
Bottom One-Third Schools	29 (2.4)	198 (1.2)	46 (2.0)	3 (0.6)	0 (0.0)	0 (0.0)
Grade 8						
Top One-Third Schools	29 (3.8)	284 (1.3)	100 (0.2)	88 (1.3)	29 (2.3)	1 (0.3)
Bottom One-Third Schools	33 (2.8)	246 (1.3)	94 (1.3)	44 (1.8)	4 (0.5)	0 (0.0)
Grade 12						
Top One-Third Schools	35 (3.9)	312 (1.0)	100 (0.0)	97 (0.6)	66 (1.5)	10 (1.1)
Bottom One-Third Schools	25 (2.9)	273 (1.1)	100 (0.2)	77 (1.7)	18 (1.2)	1 (0.3)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable.

[33]National Alliance of Business, *The Business Roundtable Participation Guide: A Primer for Business on Education* (New York, NY: 1990).

Workforce 2000: Work and Workers for the 21st Century (Indianapolis, IN: Hudson Institute, 1987).

As would be expected from how the groups were formed, students in the top one-third performing public and private schools had higher mathematics proficiency than did those attending the lower-performing schools. However, the performance in the top one-third of the schools suggests that it is difficult for schools to raise mathematics achievement to levels even commensurate with the existing curriculum, let alone to levels more reflective of today's needs. In these better-performing schools, only two-thirds of the high-school seniors attained Level 300 (seventh-grade content), and only 10 percent reached Level 350.

Further, the results for students in the bottom one-third of schools were considerably lower than those for students in the top one-third. Within each grade, the disparity in average achievement between the students in the nation's better- and poorer-performing schools was of a magnitude similar to the difference in average performance between eighth and twelfth graders. In fact, eighth graders in the top one-third of the schools had higher average proficiency than twelfth graders in the bottom one-third of the schools.

Compared to 90 percent of the fourth graders in the top schools, fewer than half the fourth graders in the bottom one-third of the schools attained Level 200, indicating the majority of these students had difficulty with the simplest mathematical concepts. Similarly, at grade 8, fewer than half the students attending the bottom one-third of the schools appeared to have a firm grasp of what knowledgeable mathematics educators characterized as typically fifth-grade problem solving. Even at grade 12, only about three-fourths of the students had attained this sparse amount of mathematics understanding. In these low-performing schools, only 18 percent of the students in grade 12 reached an understanding of mathematics that included operating with decimals, fractions, percents, and simple algebra -- content typically covered by the end of the seventh grade.

TABLE 2.11 presents data about the percentages of students from demographic subgroups in the higher- and lower-performing schools. As would have been anticipated based on the average proficiency results for students belonging to various population subgroups, about one-third to one-half of the White and Asian/Pacific Islander students in all three grades attended schools in the top one-third of mathematics performance, as did students in the Northeast and Central regions. Also, nearly half of the students with at least one parent who graduated from college attended higher-performing schools, as did the overwhelming majority of students from advantaged urban communities.

In contrast, two-thirds of the Black students and nearly half of the Hispanic students at all three grades attended lower-performing schools, as did about half to two-thirds of the students attending schools in disadvantaged urban communities. The large proportion of students in disadvantaged urban communities attending lower-performing schools coincides with other studies on the effect of poverty on learning.[34]

---

[34]Sheldon Danzinger, *Education, Earnings, and Poverty*, Research Report No. 89-154, Population Studies Center, University of Michigan, 1989.

Floretta D. McKenzie, "Education Strategies for the '90s" in *The State of Black America* (New York, NY: National Urban League, Inc., 1991).

Sheldon Danzinger and Jonathan Stern, *The Causes and Consequences of Child Poverty in the United States* (Florence, Italy: UNICEF International Child, 1990).

TABLE 2.11 Percentage of Students within Selected Demographic Subgroups in the Top One-Third of the Schools and the Bottom One-Third of the Schools

	Percentage of Students by Race/Ethnicity					Percentage of Students by Type of Community			
	White	Black	Hispanic	Asian/ Pacific Islander	American Indian	Advantaged Urban	Dis-advantaged Urban	Extreme Rural	Other
Grade 4									
Top One-Third	42 (3.2)	7 (1.8)	20 (2.8)	36 (4.9)	24 (4.5)	63 (9.4)	10 (4.9)	21 (7.3)	34 (3.5)
Bottom One-Third	17 (2.4)	68 (4.6)	47 (3.8)	29 (4.8)	32 (4.3)	9 (6.1)	66 (7.1)	11 (7.2)	30 (3.4)
Grade 8									
Top One-Third	34 (4.5)	13 (2.8)	14 (3.5)	43 (7.8)	22 (7.6)!	80 (10.9)	7 (6.0)	12 (5.8)	27 (4.2)
Bottom One-Third	24 (3.1)	68 (4.6)	43 (6.2)	20 (5.6)	50 (20.8)!	7 (6.2)	68 (7.6)	41 (10.0)	31 (2.1)
Grade 12									
Top One-Third	40 (4.6)	13 (2.4)	23 (4.6)	46 (5.4)	23 (9.1)!	70 (8.2)	12 (6.5)	31 (9.9)	35 (4.1)
Bottom One-Third	15 (3.1)	68 (4.0)	44 (7.4)	21 (8.2)	26 (9.7)!	14 (6.6)	56 (11.9)	31 (11.6)	20 (3.2)

TABLE 2.11 continued

	Percentage of Students by Region				Percentage of Students by Parents' Education			
	Northeast	Southeast	Central	West	Did Not Finish High School	Graduated High School	Some Education After High School	Graduated College
Grade 4								
Top One-Third	46 (6.0)	10 (3.9)	43 (5.4)	35 (6.1)	15 (2.4)	27 (3.6)	35 (3.5)	44 (3.0)
Bottom One-Third	24 (3.5)	42 (2.6)	21 (3.3)	29 (4.9)	37 (4.5)	31 (4.0)	25 (2.6)	23 (2.0)
Grade 8								
Top One-Third	44 (9.9)	12 (3.1)	40 (7.2)	24 (9.1)	12 (2.3)	20 (3.1)	29 (3.8)	42 (5.3)
Bottom One-Third	23 (8.1)	60 (5.5)	24 (5.6)	26 (4.5)	54 (4.2)	41 (3.7)	30 (2.7)	22 (2.6)
Grade 12								
Top One-Third	54 (6.9)	12 (2.3)	36(11.2)	35 (6.2)	16 (2.7)	28 (4.0)	32 (4.1)	46 (4.6)
Bottom One-Third	16 (5.1)	57(10.4)	10 (2.8)	23 (5.3)	50 (5.8)	32 (3.9)	24 (2.9)	16 (2.2)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. !Interpret with caution--the nature of the sample does not allow accurate determination of the variability of this estimated mean proficiency.

SUMMARY

The NAEP results for population subgroups create an educational achievement tapestry of enormous complexity and variation. In reports such as *Everybody Counts*, the major thrust is equality of opportunity in mathematics education for all students.[35] However, the performance gaps were substantial between higher- and lower-performing groups, with the former including Asian/Pacific Islander and White students, those attending schools in advantaged urban areas, those with well-educated parents, and those with stable home environments and expectations to attend college. The latter groups included Black and Hispanic students, those attending schools in disadvantaged urban areas, those whose parents were poorly educated, children from homes without two parents, and children who watched excessive amounts of television and were unlikely to read for school or to complete their homework.

Of those high-school seniors from the best performing groups, including Asian/Pacific Islanders, those attending schools in advantaged urban areas, and those attending the top one-third of the schools as determined by overall average mathematics proficiency, only 10 to 12 percent reached Level 350, indicating a readiness for advanced mathematics study.

At the twelfth grade, fewer than one-fifth of the Black students or those students with neither parent having graduated from high school reached Level 300 on the NAEP scale. The findings were similar for these students attending

[35] *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

schools in the bottom one-third of the nation in terms of mathematics proficiency. Less than 20 percent of these high-school seniors, who appeared to be concentrated in disadvantaged urban areas, demonstrated a grasp of mathematical content typically covered by the seventh grade.[36]

[36] David H. Swinton, "The Economic Status of African Americans: Permanent Poverty and Inequality" in *The State of Black America* (New York, NY: National Urban League, Inc., 1991).

Bill Honig, *Last Chance For Our Children: How You Can Help Save Our Schools* (Menlo Park, CA: Addison-Wesley Publishing Company, 1985).

Results 2000: Progress in Meeting Urban Education Goals (Washington, DC: The Council of the Great City Schools, 1990).

David T. Ellwood, *Poor Support* (New York, NY: Basic Books, Inc., 1988).

Chapter 3

Mathematics Proficiency by Content Area for the Nation and Subpopulations

BACKGROUND AND DESCRIPTION OF THE MATHEMATICS CONTENT AREAS

In contrast to the previous chapters, which contain results on overall mathematics achievement for the nation and subpopulations, this chapter presents results separately for each of the content areas. In accordance with the mathematics framework underlying the assessment, results are presented for the following five content area scales: numbers and operations; measurement; geometry; data analysis, statistics, and probability; and algebra and functions. In addition, as a result of the special paced-audiotape portion of the assessment conducted for the nation at grades 4, 8, and 12, results are presented for a sixth content area scale, estimation.[37] The estimation questions included a broad array of situations, ranging from measurement, monetary value, and time estimates to the results of various numerical operations. For these questions, the pacing format made any direct calculations of answers difficult. The information from the estimation study is intended to supplement that obtained from the numbers and operations and the measurement questions administered using the more traditional paper and pencil or calculator approaches. Brief descriptions of the six content areas are presented in FIGURE 3.1.

[37]To create each of the six content areas scales, the distribution for the population represented by all students in the assessment was set to have a mean of 250.5, with a standard deviation of 50.

295-027 0 - 91 - 5 QL 3

FIGURE 3.1
Description of Content Areas

Numbers and Operations

This content area focuses on students' understanding of numbers (whole numbers, fractions, decimals, integers) and their application to real-world situations, as well as computational and estimation situations. Understanding numerical relationships as expressed in ratios, proportions, and percents is emphasized. Students' abilities in estimation, mental computation, use of calculators, generalization of numerical patterns, and verification of results are also included.

Estimation

Estimation involving whole numbers, fractions, and decimals pervades most of the content areas in mathematics. Presented using a paced-audiotape procedure, questions assess students' abilities to make estimates appropriate to a wide variety of situations. Estimates take into consideration such factors as knowing when to estimate and whether to overestimate or underestimate in a particular problem.

Measurement

This content area focuses on students' ability to describe real-world objects using numbers. Students are asked to identify attributes, select appropriate units, apply measurement concepts, and communicate measurement-related ideas to others. Questions are included that require an ability to read instruments using metric, customary, or nonstandard units, with emphasis on precision and accuracy. Questions requiring estimation, measurements, and applications of measurements of length, time, money, temperature, mass/weight, area, volume capacity, and angles are also included under this content area.

Geometry

This content area focuses on students' knowledge of geometric figures and relationships and on their skills in working with this knowledge. These skills are important at all levels of schooling as well as in practical applications. Students need to be able to model and visualize geometric figures in one, two, and three dimensions and to communicate geometric ideas. In addition, students should be able to use informal reasoning to establish geometric relationships.

Data Analysis, Statistics, and Probability

This content area focuses on data representation and analysis across all disciplines and reflects the important and prevalence of these activities in our society. Statistical knowledge and the ability to interpret data are necessary skills in the contemporary world. Questions emphasize appropriate methods for gathering data, the visual exploration of data, and the development and evaluation of arguments based on data analysis.

Algebra and Functions

This content area is broad in scope, covering algebraic and functional concepts in more informal, exploratory ways for the eighth-grade Trial State Assessment. Proficiency in this concept area requires both manipulative facility and conceptual understanding; it involves the ability to use algebra as a means of representation and algebraic processing as a problem-solving tool. Functions are viewed not only in terms of algebraic formulas, but also in terms of verbal descriptions, tables of values, and graphs.

Although results are not reported separately for the mathematical abilities dimension of the assessment framework, each content area included conceptual understanding, procedural knowledge, and problem solving. These are briefly described in FIGURE 3.2.[38]

FIGURE 3.2
Description of Mathematical Abilities

The following three categories of mathematical abilities are not to be construed as hierarchical. For example, problem solving involves interactions between conceptual knowledge and procedural skills, but what is considered complex problem solving at one grade level may be considered conceptual understanding or procedural knowledge at another.

Conceptual Understanding

Students demonstrate conceptual understanding in mathematics when they provide evidence that they can recognize, label, and generate examples and counterexamples of concepts; can use and interrelate models, diagrams, and varied representations of concepts; can identify and apply principles; know and can apply facts and definitions; can compare, contrast, and integrate related concepts and principles; can recognize, interpret, and apply the signs, symbols, and terms used to represent concepts; and can interpret the assumptions and relations involving concepts in mathematical settings. Such understandings are essential to performing procedures in a meaningful way and applying them in problem-solving situations.

Procedural Knowledge

Students demonstrate procedural knowledge in mathematics when they provide evidence of their ability to select and apply appropriate procedures correctly, verify and justify the correctness of a procedure using concrete models or symbolic methods, and extend or modify procedures to deal with factors inherent in problem settings. Procedural knowledge includes the various numerical algorithms in mathematics that have been created as tools to meet specific needs in an efficient manner. It also encompasses the abilities to read and produce graphs and tables, execute geometric constructions, and perform noncomputational skills such as rounding and ordering.

Problem Solving

In problem solving, students are required to use their reasoning and analytic abilities when they encounter new situations. Problem solving includes the ability to recognized and formulate problems; determine the sufficiency and consistency of data; use strategies, data, models and relevant mathematics; generate, extend, and modify procedures; use reasoning (i.e., spatial, inductive, deductive, statistical, and proportional); and judge the reasonableness and correctness of solutions.

[38]See Appendix C for weighting of items according to the content area by mathematical ability framework.

AVERAGE PROFICIENCY IN MATHEMATICS BY CONTENT AREAS

The average proficiency results for the six content areas are presented in FIGURE 3.3, which summarizes the relative differences in performance at grades 4, 8, and 12 for each area. Reflecting the curriculum in elementary schools, the 1990 assessment contained too few questions at grade 4 about data analysis, statistics, and probability to create a scale including performance at that grade level.

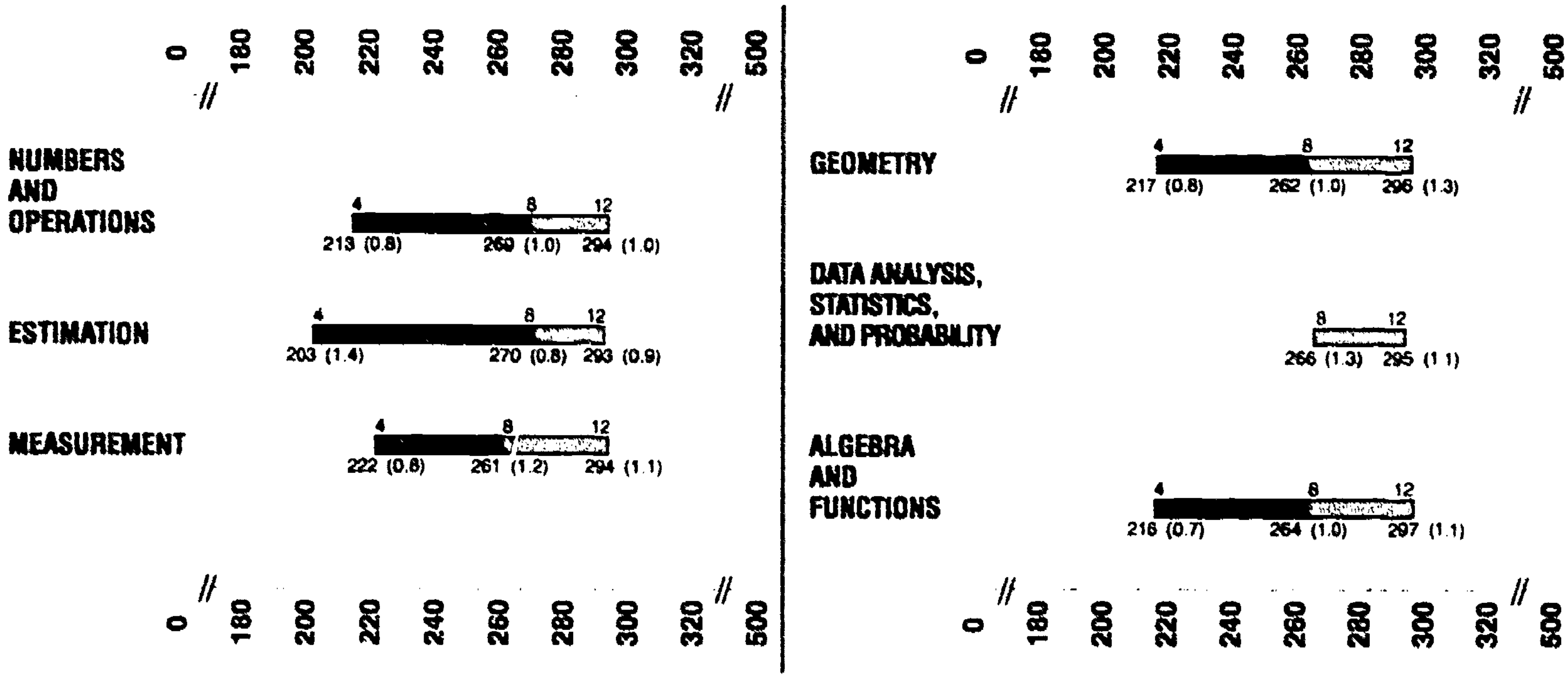
The average proficiency results for the six content areas reveal several patterns. For all six areas, average proficiency at grade 12 exceeded that at grade 8, and for the five areas common to grades 4 and 8, average proficiency at grade 8 exceeded that at grade 4.[39] Performance in the three grades, however, did differ from content area to content area.

At grade 4, students' proficiency was relatively lower in estimation and numbers and operations and highest in measurement. At grade 8, average proficiency was relatively higher in numbers and operations and estimation. These findings reflect the current school mathematics curriculum, which emphasizes arithmetic knowledge and procedures in the earlier years of schooling. At grade 12, proficiency was quite similar from content area to content area. However, in each content area, twelfth graders performed more similarly to eighth graders than eighth graders did to fourth graders, suggesting that as presently configured, the mathematics curriculum facilitates more learning in the lower grades.

[39] Different scaling methods may lead to different-sized units at different points on the scales. However, the results in the report are based on using the same particular scaling methods for all grades and content areas -- methods that have been consistently used for all NAEP assessments.

FIGURE 3.3

Average Proficiency in Mathematics Content Areas at Grades 4, 8, and 12



The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

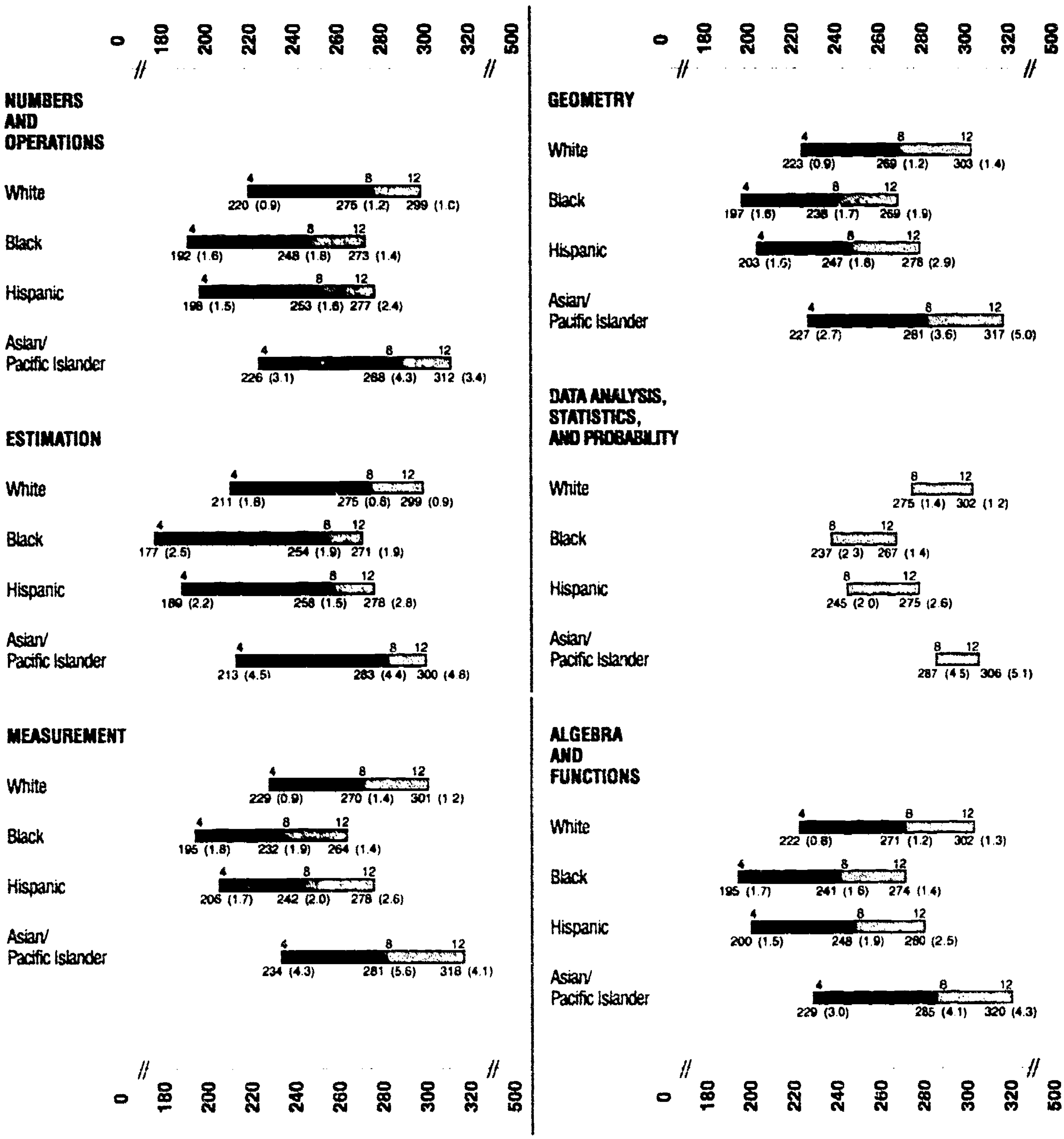
AVERAGE PROFICIENCY IN MATHEMATICS CONTENT AREAS BY RACE/ETHNICITY

Average content area proficiencies for White, Black, Hispanic, and Asian/Pacific Islander students are shown in FIGURE 3.4. In general, Asian/Pacific Islander and White students outperformed their Hispanic and Black counterparts, although the magnitude of these differences shifted slightly across content areas and from one grade to another. At grade 4, there were few differences in average performance between Asian/Pacific Islander and White students, although these two groups had higher average proficiencies than did Hispanic and Black students across all five content areas. Hispanic and Black fourth graders had similar proficiency levels in numbers and operations and in algebra and functions, but in the content areas of measurement, geometry, and estimation, Hispanic students outperformed their Black classmates.

At grade 8, Asian/Pacific Islander students' average proficiency tended to exceed that of White students, and White students maintained their advantage compared to Black and Hispanic eighth graders. Hispanic eighth graders generally had higher levels of performance than Black eighth graders did. However, across the content areas, the performance of Asian/Pacific Islander and White eighth graders tended to be comparable to that of Black and Hispanic twelfth graders, with Asian/Pacific Islander eighth graders generally having the highest proficiency levels, particularly in numbers and operations and data analysis, statistics, and probability. At grade 12, as compared to grade 8, increases in performance were similar across racial/ethnic groups, and the relative standings of the groups remained much the same. Asian/Pacific Islander students had the highest average proficiency in all but the estimation and data analysis, statistics, and probability content areas, where their performance did not differ from that of White students. Hispanic twelfth graders showed evidence of outperforming Black twelfth graders, particularly in the area of measurement.

FIGURE 3.4

Average Proficiency in Mathematics Content Areas by Race/Ethnicity at Grades 4, 8, and 12



The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

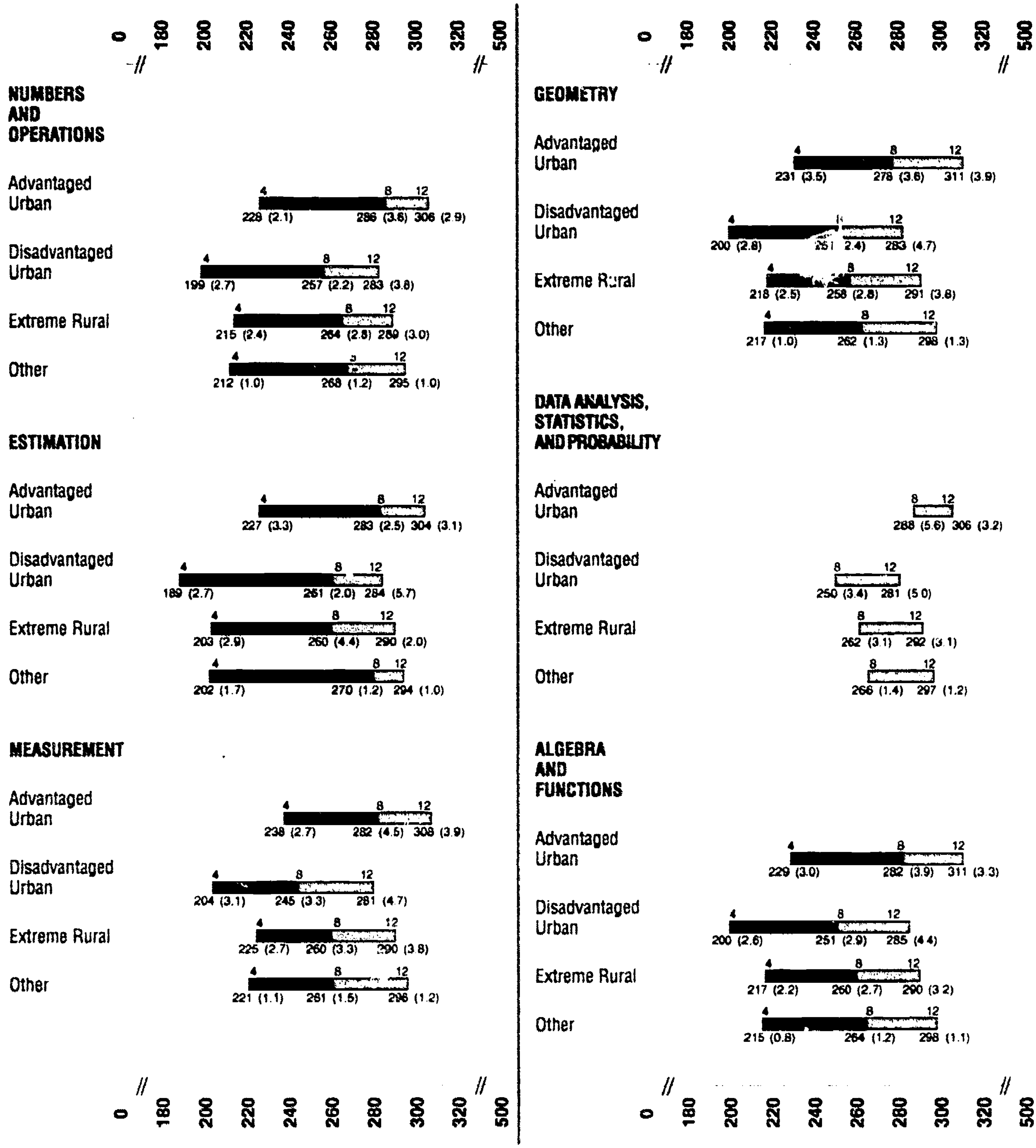
AVERAGE PROFICIENCY IN MATHEMATICS CONTENT AREAS BY TYPE OF COMMUNITY

FIGURE 3.5 presents the average proficiencies for students attending schools in advantaged urban, disadvantaged urban, and extreme rural communities as compared to those attending schools in other types of communities. Across all three grades and all six content areas, students attending schools in advantaged urban areas had the highest average proficiencies, and those attending schools in disadvantaged urban areas had the lowest. At grade 4, there were substantial differences between these two groups. The relative standings did not change much at grades 8 or 12.

The average proficiencies of students attending schools in extreme rural communities were quite similar to those of students in schools in the other community types, with both groups of students performing in between the levels of students in advantaged and disadvantaged urban schools. This pattern was evident at grade 4 and essentially held at grade 8, except in estimation, where students from schools in communities classified as "other" had higher achievement than students from extreme rural schools. At grade 12, there were somewhat narrower achievement gaps between the community types, and the students from "other" communities tended toward better performance than did those from extreme rural communities.

FIGURE 3.5

Average Proficiency in Mathematics Content Areas by Type of Community at Grades 4, 8, and 12



The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

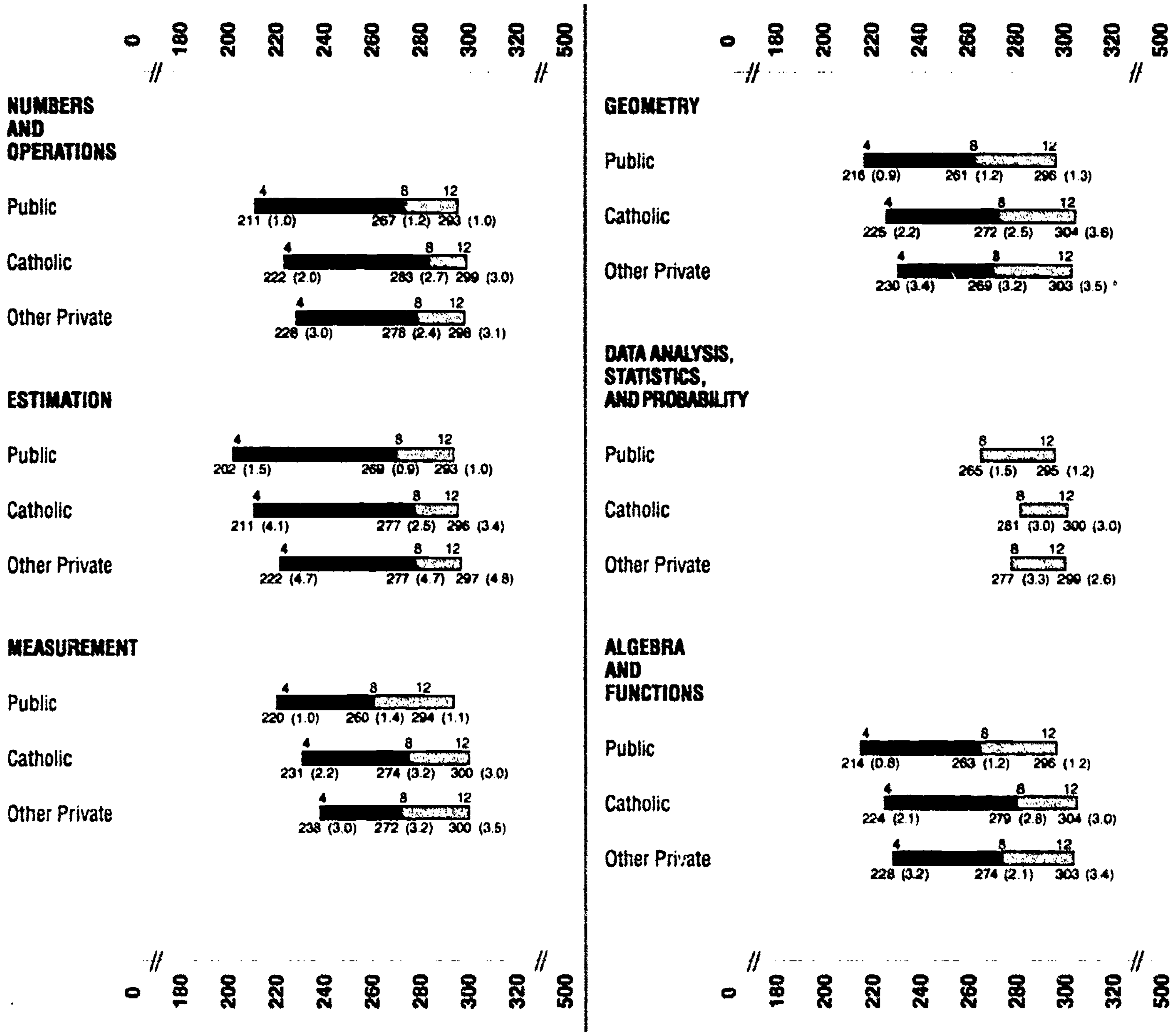
AVERAGE PROFICIENCY IN MATHEMATICS CONTENT AREAS BY TYPE OF SCHOOL

Average proficiency levels across the content areas for students attending public, Catholic, and other (non-Catholic) private schools are shown in FIGURE 3.6. Although some differences in performance were noted across the content areas at grades 4 and 8, at the twelfth grade there was little difference in average proficiency across the school types.

At grades 4 and 8, there was little difference in achievement between students attending Catholic or other private schools; however, both groups outperformed those attending public schools. At grade 12, Catholic- and other private-school students had virtually identical proficiency levels across the content areas, and public-school students' performance was almost the same, although some evidence of the comparatively lower performance pattern shown by these students at the earlier grades can still be detected.

FIGURE 3.6

Average Proficiency in Mathematics Content Areas by Type of School at Grades 4, 8, and 12



The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

AVERAGE PROFICIENCY IN MATHEMATICS CONTENT AREAS BY GENDER

As presented in FIGURE 3.7, the gender analysis of student achievement in the mathematical content areas shows two consistent patterns. First, at all three grades assessed, males tended to have higher average proficiency levels than did females in both estimation and measurement. Second, at grade 12, males had higher levels of mathematical proficiency than females in every content area except algebra and functions.

Because a number of studies show that males tend to achieve higher than females do on measures of spatial skills, researchers have speculated that the gender differences in mathematics achievement may be related in part to differences in spatial skills.[40] The NAEP results for estimation and measurement seem to support this theory, although the gender differences were less prevalent in geometry, where the performance of males as compared to females was virtually identical, except at grade 12. In the area of estimation, females lagged behind males at grade 4, performed similarly to males at grade 8, and then fell back behind again at grade 12. In measurement, females started out behind males in the fourth grade, and the relative performance standing between the genders did not appear to change at grades 8 and 12.

Males, however, tended to show comparatively more improvement from grades 8 to 12 than females, resulting in their advantage by high-school graduation in all areas except algebra. These findings also support a number of studies indicating that at the end of secondary school, males have learned more and different mathematics than have females.[41]

---

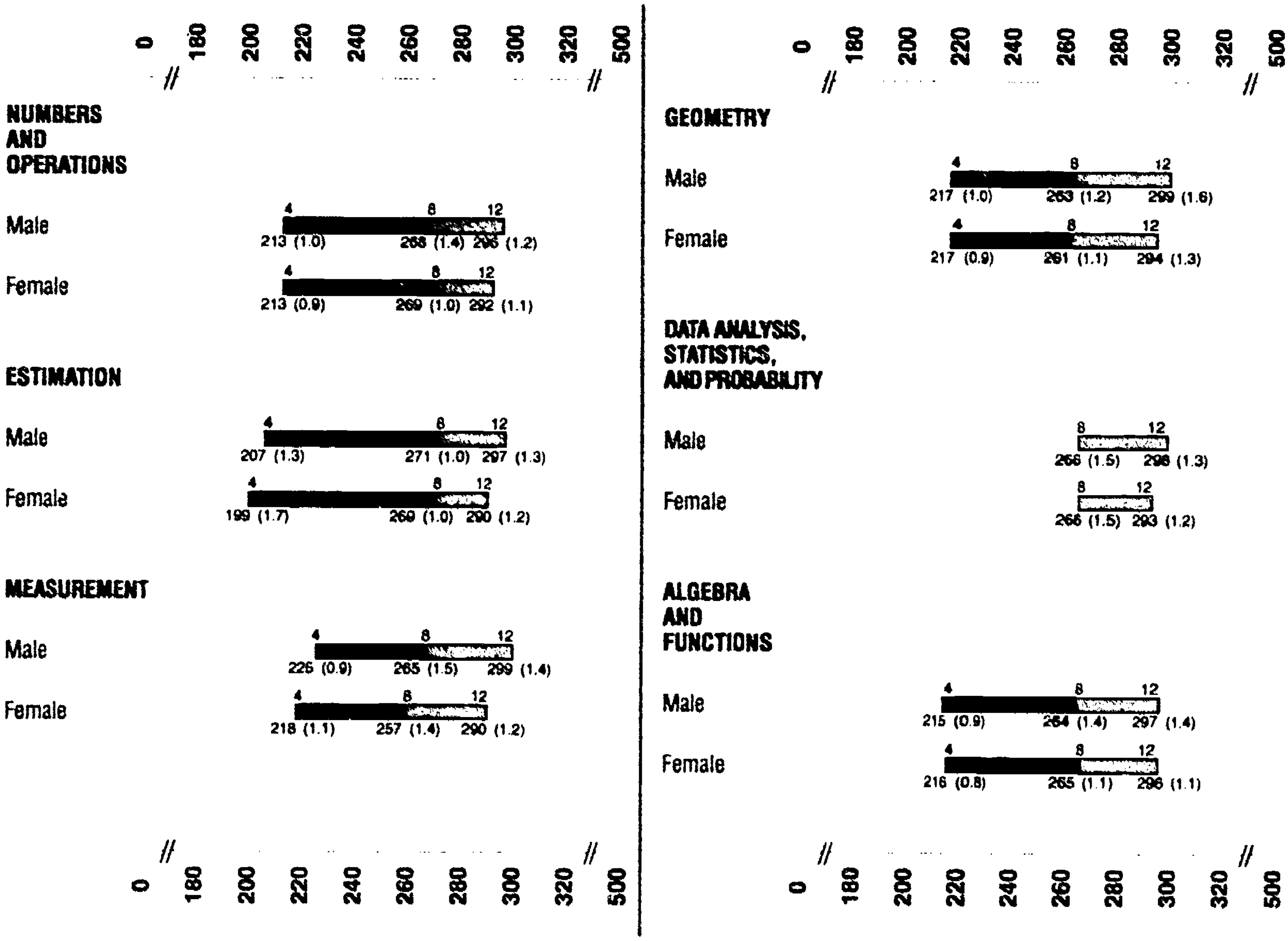
[40] Lindsay A. Tartre, "Spatial Skills, Gender, and Mathematics" in *Mathematics and Gender*, Elizabeth Fennema and Gilah C. Leder, editors (New York, NY: Teachers College Press, 1990).

Elizabeth Fennema, "Justice, Equity, and Mathematics Education" in *Mathematics and Gender*, Elizabeth Fennema and Gilah C. Leder, editors (New York, NY: Teachers College Press, 1990).

[41] Lindsay A. Tartre, "Spatial Skills, Gender, and Mathematics" in *Mathematics and Gender*, Elizabeth Fennema and Gilah C. Leder, editors (New York, NY: Teachers College Press, 1990).

FIGURE 3.7

Average Proficiency in Mathematics Content Areas by Gender at Grades 4, 8, and 12



The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

AVERAGE PROFICIENCY IN MATHEMATICS CONTENT AREAS BY REGION OF THE COUNTRY

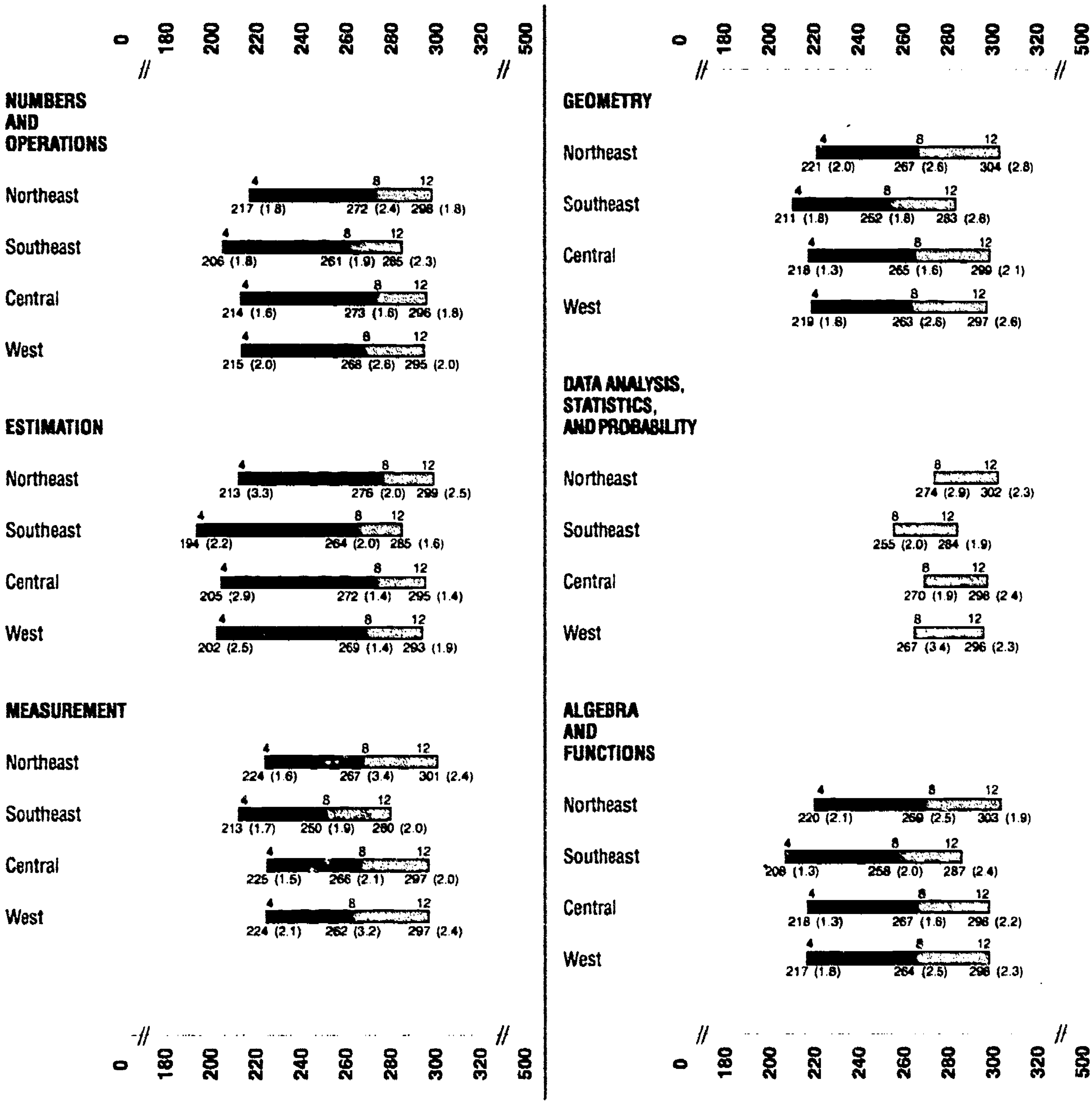
FIGURE 3.8 summarizes proficiency levels across content areas for the four geographic regions -- Northeast, Southeast, Central, and West. Most striking is the relatively low performance of students in the Southeast, compared to students in the other three regions in the country. In each content area, Southeastern fourth graders had the lowest average proficiency. This relative standing did not change at grades 8 and 12. Across all three grades, students in the Northeast showed a general pattern of outperforming their counterparts in the other three regions, especially in the area of estimation.

AVERAGE PROFICIENCY IN MATHEMATICS CONTENT AREAS BY PARENTS' HIGHEST EDUCATION LEVEL

The relationship between parents' education and mathematics proficiency across the content areas is shown in FIGURE 3.9. The strong, positive relationship between well-educated parents and higher mathematics proficiency was apparent across all content areas and appeared to be stronger at grades 8 and 12. However, approximately one-third of the fourth graders did not know the education level of either parent.

FIGURE 3.8

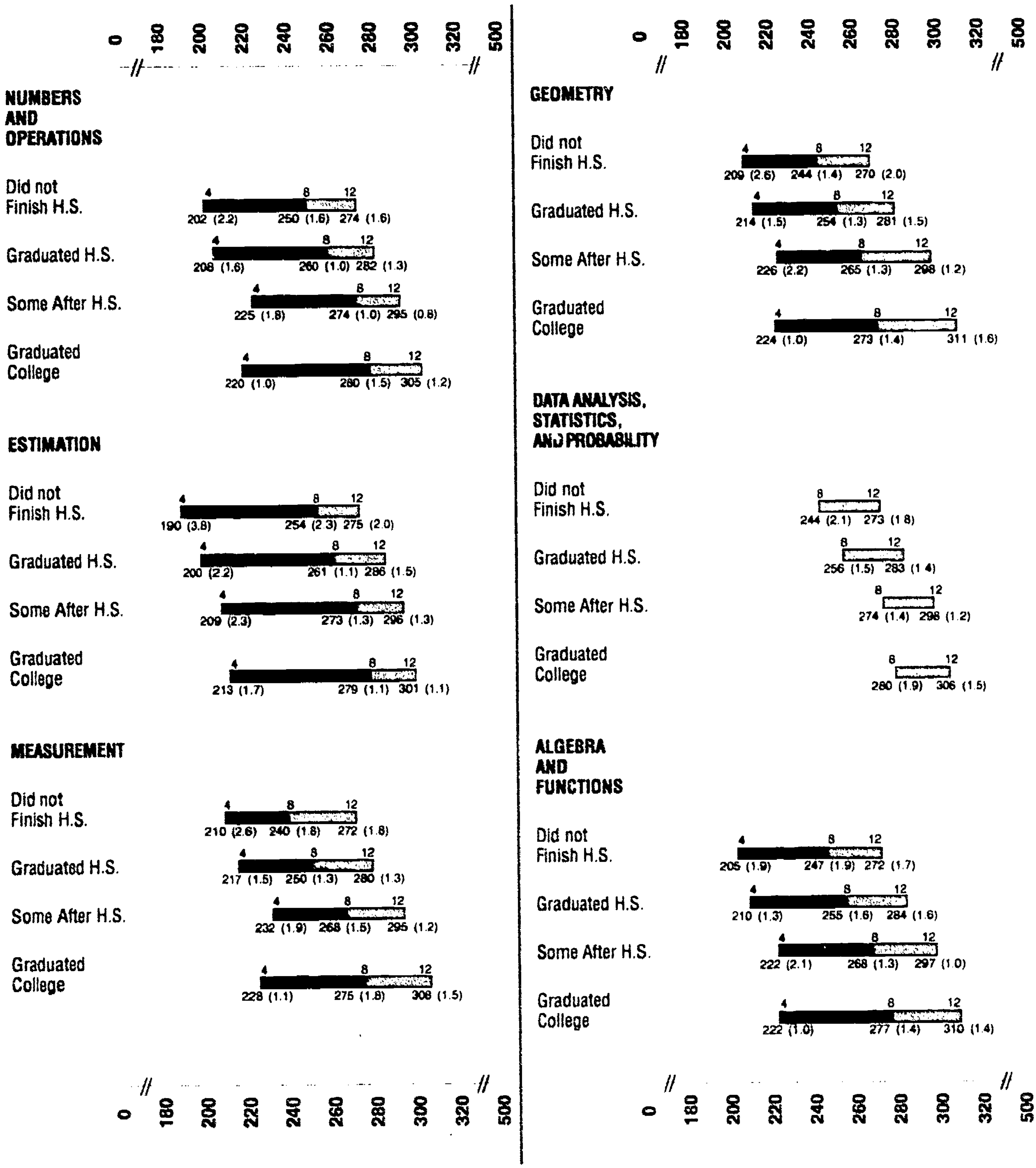
Average Proficiency in Mathematics Content Areas by Region at Grades 4, 8, and 12



The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

FIGURE 3.9

Average Proficiency in Mathematics Content Areas
by Parents' Highest Education Level at Grades 4, 8, and 12



The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

SUMMARY

Nationally, it appears that learning numbers and operations and estimation skills is emphasized in the earlier years of schooling. For the other mathematics content areas examined by NAEP -- measurement; geometry; data analysis, statistics, and probability; and algebra and functions -- the increases in proficiency were somewhat more equivalent from grades 4 to 8 as compared to grades 8 to 12. In general, at the twelfth grade, there appeared to be little difference in performance across the six content areas.

The performance for subpopulations of students reflected the overall patterns of mathematics achievement, with Asian/Pacific Islander and White students having considerably higher average mathematical proficiency in all content areas than Black and Hispanic students did. The same was true of students attending schools in advantaged urban areas as compared to those attending schools in disadvantaged urban areas. Private-school students, both those attending Catholic schools and other private schools, appeared to have an advantage at the lower grades, but this dwindled for high-school seniors.

Males had higher proficiency levels than females did in estimation and measurement across all three grades. At the twelfth grade, they outperformed females in every content area except algebra and functions. Students from the Northeast appeared to have stronger estimation skills than those in other regions, while students from the Southeast performed the most poorly in all content areas. Across all six content areas, the more well educated the students' parents, the higher the average proficiency levels.

Chapter 4

Course-Taking Patterns in the Mathematics Content Areas for the Nation and Population Subgroups

INTRODUCTION

According to the Second International Mathematics Study (SIMS), the percentage of U.S. students enrolled in advanced mathematics courses was at best average in comparison to other countries.[42] Because of the strong positive relationship between course taking and achievement and because a large proportion of our nation's students -- as many as half each year during high school -- drop out of the mathematics pipeline, it will be difficult to improve the overall national profile of mathematics achievement without increasing course enrollments.[43] Efforts for reform in this direction have led to increased course-work requirements for high-school graduation in a number of states, yet as the results in this chapter show, relatively few students in our country pursue challenging mathematics course work in meeting these new requirements.

Eighth graders were asked about the type of mathematics they were taking, and high-school students were asked about their course work in a number of content areas, including algebra, geometry, trigonometry, calculus, and statistics. The results of this inquiry are presented in this chapter, with associated mathematics content proficiency levels for the students reporting various amounts of course work. Twelfth graders were also asked about the sum of their high-school mathematics course work from grades 9 through 12. As shown in TABLE 4.1, these data provide an overview both of the well-documented relationship between proficiency and course taking, as well as the limited enrollments in high-school mathematics courses.

[42] Curtis McKnight, et al., *The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective, A National Report on the Second International Mathematics Study* (Champaign, IL: International Association for the Evaluation of Educational Achievement, Stipes Publishing Company, 1987).

[43] *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

TABLE 4.1 High-School Seniors' Reports on the Number of Semesters of High-School Mathematics Courses Taken in Grades 9 through 12

	Zero to Three Semesters		Four to Five Semesters		Six to Seven Semesters		Eight Semesters or More	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Nation	18 (0.9)	269 (1.1)	18 (0.7)	284 (1.4)	25 (0.9)	300 (1.1)	39 (1.2)	320 (1.1)
White	17 (1.0)	272 (1.5)	17 (0.7)	289 (1.5)	27 (1.0)	303 (1.2)	40 (1.4)	323 (1.2)
Black	26 (1.9)	256 (2.0)	28 (2.3)	266 (2.3)	20 (2.4)	279 (2.8)	26 (2.5)	296 (2.1)
Hispanic	24 (2.7)	260 (3.5)	23 (2.9)	276 (5.9)	23 (2.5)	288 (3.4)	31 (3.0)	304 (3.9)
Asian/Pacific Islander	8 (2.0)	278 (8.0)	10 (3.6)	304 (3.6)	15 (2.8)	315 (5.2)	67 (5.2)	331 (2.7)
Advantaged Urban !	10 (2.2)	276 (5.0)	13 (1.9)	292 (5.2)	28 (3.6)	309 (3.7)	48 (4.2)	330 (2.2)
Disadv. Urban !	21 (2.7)	262 (2.8)	18 (1.6)	275 (3.7)	27 (2.5)	290 (5.7)	35 (3.1)	309 (3.6)
Extreme Rural !	26 (3.3)	268 (3.5)	19 (1.9)	281 (2.3)	22 (2.4)	296 (2.9)	33 (4.1)	321 (3.6)
Other	17 (1.0)	269 (1.4)	19 (0.8)	285 (1.8)	25 (1.2)	301 (1.2)	39 (1.5)	320 (1.3)
Male	18 (1.3)	272 (1.8)	18 (0.9)	285 (1.6)	20 (1.0)	301 (1.6)	44 (1.5)	323 (1.4)
Female	18 (1.0)	266 (1.1)	19 (1.0)	283 (2.0)	30 (1.3)	299 (1.1)	34 (1.4)	317 (1.4)
Northeast	15 (1.9)	271 (3.0)	16 (1.3)	286 (4.0)	18 (1.7)	300 (2.3)	51 (2.6)	322 (1.7)
Southeast	25 (1.8)	264 (1.7)	22 (1.6)	278 (2.8)	20 (1.5)	[illegible] (1.9)	34 (2.3)	310 (2.1)
Central	20 (2.0)	268 (2.0)	20 (1.2)	287 (2.8)	25 (2.1)	305 (2.3)	35 (2.4)	323 (2.3)
West	13 (1.3)	272 (2.3)	16 (1.2)	284 (2.9)	35 (1.5)	300 (1.8)	36 (2.2)	323 (2.7)
Public Schools	19 (0.9)	268 (1.1)	19 (0.7)	283 (1.4)	26 (1.0)	300 (1.2)	37 (1.3)	321 (1.3)
Private Schools	11 (1.5)	273 (2.0)	14 (1.7)	290 (3.0)	22 (2.6)	296 (1.9)	53 (3.1)	316 (2.4)
Did Not Finish H.S.	34 (2.8)	261 (2.1)	26 (2.7)	273 (3.1)	17 (2.0)	282 (2.8)	24 (3.1)	301 (4.1)
Graduated H.S.	27 (1.9)	263 (1.6)	23 (1.2)	277 (2.3)	25 (1.4)	293 (1.8)	25 (1.6)	308 (2.5)
Some Ed. After H.S.	17 (1.2)	274 (2.2)	19 (1.4)	288 (2.0)	28 (1.6)	299 (1.4)	37 (1.5)	318 (1.3)
Graduated College	11 (1.0)	275 (1.7)	14 (0.8)	292 (2.2)	26 (1.2)	306 (1.4)	49 (1.6)	326 (1.4)
Academic	9 (0.6)	280 (2.3)	14 (0.7)	294 (2.0)	27 (1.2)	306 (1.2)	50 (1.4)	325 (1.2)
General	30 (1.9)	264 (1.3)	24 (1.4)	274 (1.5)	23 (1.5)	290 (1.8)	22 (1.4)	303 (2.1)
Vocational/Technical	44 (2.5)	261 (2.4)	23 (3.3)	277 (5.0)	21 (2.8)	283 (3.9)	13 (2.3)	288 (4.7)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent due to rounding. !Interpret with caution--the nature of the sample does not allow accurate determination of the variability of the results for these subgroups.

Although NAEP data cannot be used to establish cause-and-effect relationships, the direct relationship between amount of course work and mathematics proficiency apparent for the nation and each subgroup may well have its roots in two factors. First, the study of mathematics undoubtedly influences achievement, particularly as the course work becomes more sophisticated, covering concepts unlikely to be encountered in daily activities. Second, better students elect to continue their mathematics study, while their less able counterparts tend to pursue other course work.

Because not enough students persevere in mathematics during their high school years, industry, universities, and the armed forces are burdened by extensive costs for remediation.[44] For example, when asked if they were taking a mathematics class in the second half of their senior year, 42 percent of the twelfth graders reported that they were not. Their average mathematics proficiency was substantially below that of their counterparts enrolled in mathematics course work (269 compared to 289).

Only 39 percent of the high-school seniors reported taking four years of mathematics course work from grades 9 through 12, and the patterns by subgroup reflect the proficiency results. Asian/Pacific Islander students reported the most course work, with White students a distant second, and Hispanic and Black students trailing behind. In a parallel vein, students attending schools in advantaged urban areas reported more course work than did those attending schools in disadvantaged urban areas. Students in private schools (Catholic and other private schools) reported more course work than did those in public schools, although their average mathematics proficiency was no higher and may have been somewhat lower than that of the public-school students.[45]

Males reported more course work than did females, and students in the Northeast reported more semesters of mathematics classes than did students in the other three regions of the country. Those students whose parents had graduated from college reported the most course work, followed by those whose parents had some education after high school. Students whose parents had no education beyond high school or did not graduate from high school reported the least course work. Finally, those students in academic high-school programs reported taking more semesters of mathematics than did their counterparts in general or vocational/technical programs.

[44] *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

[45] The sample sizes for private-school students do not support finer classifications (i.e., Catholic schools separately from other private schools) when the results are further analyzed by variables with several categories.

AVERAGE PROFICIENCY IN ALGEBRA AND FUNCTIONS BY ALGEBRA COURSE TAKING

Despite considerations of tracking and the importance of a balanced curriculum, the system of different mathematics study for various students in our country begins early and is well established by middle school. As shown in TABLE 4.2, eighth graders typically take one of three different types of courses -- eighth-grade mathematics, pre-algebra, or algebra. There is further evidence, supported by the results in this report, that among those students taking eighth-grade mathematics, the less able eighth graders are still in a curriculum consisting primarily of grade-school arithmetic.[46]

[46]Curtis McKnight, et al., *The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective, A National Report on the Second International Mathematics Study* (Champaign, IL: International Association for the Evaluation of Educational Achievement, Stipes Publishing Company, 1987).

TABLE 4.2 Average Overall Mathematics Proficiency by Algebra Course Taking: Grade 8

	Eighth-Grade Mathematics		Pre-Algebra		Algebra	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Nation	58 (1.5)	255 (1.0)	22 (1.3)	274 (1.5)	16 (1.0)	297 (2.2)
White	55 (1.8)	261 (1.2)	23 (1.7)	279 (1.3)	18 (1.3)	301 (2.2)
Black	68 (2.8)	235 (1.8)	21 (2.1)	255 (3.2)	7 (1.3)	265 (6.1)
Hispanic	69 (2.3)	243 (1.7)	17 (1.8)	263 (2.3)	10 (1.3)	274 (4.6)
Asian/Pacific Islander	35 (6.8)	263 (4.6)	24 (5.3)	281 (7.8)	38 (5.3)	310 (4.9)
Advantaged Urban !	48 (5.2)	271 (4.6)	25 (4.4)	287 (2.4)	26 (2.5)	306 (7.0)
Disadvantaged Urban	64 (3.5)	243 (2.6)	17 (2.4)	260 (5.7)	15 (2.0)	285 (3.7)
Extreme Rural	62 (7.6)	253 (3.1)	21 (4.2)	270 (4.7)	13 (4.9)	291 (3.4)
Other	59 (1.7)	254 (1.4)	23 (1.6)	274 (2.4)	15 (1.1)	297 (2.4)
Public Schools	60 (1.6)	253 (1.1)	21 (1.4)	274 (1.4)	15 (1.0)	298 (2.4)
Private Schools	47 (4.2)	270 (2.0)	27 (2.8)	273 (2.5)	23 (2.8)	294 (3.8)
Male	59 (1.5)	255 (1.1)	21 (1.3)	276 (1.6)	16 (1.1)	300 (2.4)
Female	58 (1.8)	254 (1.2)	23 (1.5)	273 (1.6)	16 (1.2)	294 (2.4)
Northeast	59 (3.7)	259 (2.1)	18 (2.7)	279 (3.2)	18 (2.1)	299 (4.0)
Southeast	57 (3.3)	244 (2.5)	29 (3.8)	271 (2.3)	12 (1.9)	294 (3.5)
Central	59 (2.5)	260 (1.7)	22 (2.1)	276 (1.7)	15 (1.8)	296 (3.6)
West	58 (2.6)	255 (2.3)	19 (1.9)	273 (2.2)	19 (2.3)	299 (4.4)
Did Not Finish H. S.	74 (2.7)	241 (1.7)	18 (2.5)	267 (3.8)	3 (0.7)	269 (8.3)
Graduated H. S.	66 (2.2)	250 (1.3)	21 (2.2)	267 (2.0)	9 (1.0)	281 (3.2)
Some Education After H. S.	58 (2.0)	261 (1.2)	24 (1.8)	277 (1.6)	15 (1.3)	298 (2.0)
Graduated College	48 (1.9)	263 (1.5)	24 (1.6)	280 (1.5)	25 (1.5)	303 (2.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages may not total 100 percent because a few students reported taking other mathematics courses. ! Interpret with caution--the nature of the sample does not allow accurate determination of the variability of the results for this population subgroup.

The results reveal that the eighth graders taking the more advanced courses have higher levels of mathematics proficiency. Also, one finds a significantly larger percentage of Asian/Pacific Islander students taking algebra, and a substantially larger proportion of Black and Hispanic students in the eighth-grade mathematics curriculum. This finding supports observations from other studies documenting fewer Black and Hispanic students having the opportunity to learn algebra in the eighth grade.[47] Similarly, fewer students in the

[47] Curtis C. McKnight, et al., *The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective, A National Report on the Second International Mathematics Study* (Champaign, IL: International Association for the Evaluation of Educational Achievement, Stipes Publishing Company, 1987).

Southeast than in the Northeast or West were enrolled in an algebra class at the eighth-grade level. In contrast, more students attending schools in advantaged urban areas were taking algebra in the eighth grade, as were more students in private schools and students whose parents had graduated from college.

TABLE 4.3 summarizes the relationship between proficiency in algebra and functions and students' course-taking patterns in the algebra to calculus sequence in secondary school. Like the eighth-grade data, the twelfth-grade data show that the higher the mathematics proficiency level, the more mathematics taken in the sequence from no algebra, pre-algebra, Algebra I, Algebra II, Algebra III, to calculus. The increase in average proficiency was substantial with each successive course taken. However, substantial attrition, most likely by poorer students, was also evident. The results indicate that although most twelfth graders (all but 17 percent) have at least taken Algebra I and more than half have taken Algebra II, very few have taken more advanced algebra or calculus.

TABLE 4.3 Average Proficiency in Algebra and Functions by Algebra and Calculus Course Taking: Grade 12 (Continues on the next page)

	Have Not Studied Algebra		Only Taken Pre-Algebra		Only Taken Algebra I	
	Percent of Students	Algebra Proficiency	Percent of Students	Algebra Proficiency	Percent of Students	Algebra Proficiency
Nation	9 (0.7)	251 (1.9)	8 (0.5)	265 (1.8)	27 (1.0)	286 (1.8)
White	8 (0.8)	255 (1.9)	8 (0.6)	268 (2.5)	26 (1.2)	291 (1.9)
Black	10 (1.3)	239 (3.3)	9 (1.2)	251 (4.6)	34 (2.0)	266 (2.2)
Hispanic	14 (1.9)	244 (6.4)	12 (1.5)	262 (4.0)	30 (2.1)	275 (4.7)
Asian/Pacific Islander	5 (1.3)	265 (11.7)	8 (3.8)	281 (14.6)	23 (3.8)	317 (6.3)
Advantaged Urban !	4 (1.2)	248 (7.9)	8 (1.6)	277 (4.9)	22 (2.4)	291 (4.1)
Disadvantaged Urban	9 (1.6)	245 (5.9)	10 (1.8)	256 (4.9)	34 (3.4)	272 (4.1)
Extreme Rural !	13 (2.4)	248 (2.3)	8 (2.6)	268 (4.8)	25 (2.5)	282 (3.3)
Other	8 (0.7)	253 (2.3)	8 (0.6)	265 (2.4)	27 (1.2)	289 (2.2)
Public Schools	9 (0.8)	251 (1.9)	9 (0.6)	265 (1.9)	28 (1.1)	285 (1.9)
Private Schools	2 (0.7)	255 (7.1)	4 (1.1)	267 (4.7)	23 (2.1)	292 (3.1)
Male	10 (0.9)	254 (2.5)	8 (0.6)	266 (3.6)	27 (1.1)	285 (2.0)
Female	7 (0.7)	248 (2.7)	9 (0.7)	264 (1.8)	28 (1.4)	286 (1.9)
Northeast	8 (1.1)	254 (3.2)	6 (0.7)	269 (3.5)	27 (2.3)	296 (4.4)
Southeast	10 (1.6)	245 (2.8)	6 (0.7)	256 (3.3)	26 (2.2)	272 (1.8)
Central	9 (1.8)	254 (3.8)	11 (1.0)	269 (3.7)	29 (1.9)	286 (2.5)
West	7 (0.9)	251 (4.7)	10 (1.3)	264 (2.6)	27 (1.7)	286 (3.7)
Did Not Finish H. S.	20 (2.1)	245 (3.6)	14 (1.9)	262 (3.5)	34 (2.3)	271 (2.4)
Graduated H. S.	13 (1.5)	250 (2.2)	11 (1.2)	260 (2.6)	32 (1.7)	279 (2.1)
Some Education After H. S.	6 (0.8)	255 (4.0)	9 (1.1)	265 (2.7)	27 (1.7)	284 (1.8)
Graduated College	5 (0.7)	259 (3.7)	5 (0.5)	274 (3.6)	24 (1.3)	298 (2.6)
Academic	2 (0.3)	262 (5.4)	3 (0.4)	280 (3.6)	22 (1.4)	299 (2.7)
General	16 (1.5)	250 (2.1)	15 (1.3)	262 (2.1)	35 (1.6)	275 (1.5)
Vocational/Technical	25 (2.1)	248 (3.2)	16 (2.1)	258 (3.7)	39 (3.2)	276 (3.1)

TABLE 4.3 (continued)

	Taken Algebra II but Not beyond		Taken Algebra III or Pre-Calculus but Not Calculus		Taken Calculus	
	Percent of Students	Algebra Proficiency	Percent of Students	Algebra Proficiency	Percent of Students	Algebra Proficiency
Nation	43 (1.3)	309 (1.0)	9 (0.7)	327 (1.7)	4 (0.4)	343 (2.7)
White	45 (1.5)	313 (1.1)	10 (0.8)	330 (1.9)	4 (0.4)	346 (2.8)
Black	41 (2.2)	289 (1.7)	5 (1.0)	310 (5.3)	1 (0.4)	308 (19.6)
Hispanic	36 (2.5)	299 (2.7)	5 (1.0)	309 (7.2)	3 (0.8)	320 (10.5)
Asian/Pacific Islander	41 (4.7)	326 (3.9)	17 (3.6)	334 (4.8)	7 (3.2)	348 (6.1)
Advantaged Urban !	48 (2.2)	321 (3.2)	12 (1.9)	336 (3.0)	6 (1.6)	347 (7.8)
Disadvantaged Urban	39 (2.5)	304 (4.8)	5 (1.0)	324 (5.6)	3 (0.9)	338 (12.5)
Extreme Rural !	45 (3.4)	304 (5.1)	7 (2.3)	320 (5.2)	2 (0.8)	333 (8.9)
Other	43 (1.7)	310 (1.0)	10 (0.9)	327 (2.0)	4 (0.4)	343 (2.8)
Public Schools	42 (1.4)	310 (1.1)	8 (0.8)	328 (2.0)	3 (0.4)	343 (2.9)
Private Schools	50 (2.9)	304 (2.0)	16 (1.9)	323 (2.6)	5 (1.1)	339 (4.7)
Male	41 (1.5)	310 (1.3)	9 (0.8)	331 (1.8)	4 (0.5)	340 (3.4)
Female	45 (1.4)	309 (1.1)	9 (0.7)	324 (2.4)	3 (0.4)	346 (3.5)
Northeast	41 (3.4)	311 (1.9)	12 (1.5)	325 (1.9)	6 (1.0)	340 (4.4)
Southeast	49 (2.8)	301 (2.2)	7 (1.2)	320 (4.4)	2 (0.3)	326 (8.2)
Central	39 (1.9)	313 (2.8)	9 (1.4)	332 (3.8)	3 (0.5)	347 (5.3)
West	44 (2.0)	311 (1.5)	8 (1.3)	331 (4.3)	3 (0.7)	350 (4.5)
Did Not Finish H. S.	28 (3.1)	293 (2.8)	3 (1.0)	297 (11.8)	1 (0.2)	336 (13.1)
Graduated H. S.	37 (2.1)	301 (1.7)	6 (0.7)	321 (3.4)	1 (0.3)	314 (10.8)
Some Ed. After H. S.	46 (2.0)	309 (1.3)	9 (1.0)	328 (2.0)	3 (0.5)	340 (4.9)
Graduated College	48 (1.6)	316 (1.2)	13 (1.0)	330 (2.2)	6 (0.7)	348 (2.8)
Academic	54 (1.7)	314 (1.0)	14 (0.9)	330 (1.8)	5 (0.6)	347 (2.5)
General	30 (1.3)	299 (1.8)	3 (0.6)	317 (4.3)	1 (0.3)	311 (9.7)
Vocational/Technical	19 (2.3)	293 (4.7)	1 (0.4)	252 (13.6)	0 (0.3)	291 (15.2)

Courses taken were defined as those studied for at least one year. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent due to rounding. !Interpret with caution--the nature of the sample does not allow accurate determination of the variability of the results for these population subgroups.

These data also reflect some significant differences among population subgroups. For example, nearly one-fourth of the Asian/Pacific Islander twelfth graders, 18 percent of the students attending schools in advantaged urban communities, 18 percent of the students in the Northeast, 19 percent of those having at least one parent who had graduated from college, and 19 percent of those in academic high school programs had taken Algebra III or calculus. In contrast, 6 percent of the Black twelfth graders and 8 percent of the Hispanic twelfth graders had taken these courses. Very few students whose parents were less well educated had taken Algebra III and calculus courses, and virtually none of the students in general or vocational/technical high school programs reported taking these more advanced courses. On the other hand, the results indicate no apparent gender differences in either course taking or average proficiency. These data are consistent with those reported at the Mathematical Sciences Education Board conference, "Making Mathematics Work for Minorities," and in *Everybody Counts*.[48] Pursuing increasingly higher levels of study of algebra and calculus seemed to be more common for students in the Northeast than for students in the other three geographic regions. The results for public as compared to private schools indicate that more students in private schools tended to enroll in advanced mathematics course work, although they did not have higher proficiency levels than their counterparts in public schools.

At grade 12, far fewer students in general and vocational/technical than academic high-school programs reported pursuing the algebra course sequence, and approximately one-third reported only pre-algebra or no study of the subject. Even for high-school seniors in academic programs, fewer than one-fifth had taken courses more advanced than Algebra II.

AVERAGE PROFICIENCY IN GEOMETRY BY GEOMETRY AND TRIGONOMETRY COURSE TAKING

At the secondary level, there was a strong relationship between students' geometry proficiency and whether students had studied geometry and trigonometry (see TABLE 4.4). Twenty-eight percent of the high-school seniors had not studied a year of geometry, 55 percent had studied geometry but not trigonometry, and only 17 percent had additional course work in trigonometry.

[48]*Everybody Counts: A Report to the Nation on the Future of Mathematics Education*, Lynn Steen, editor, (Washington, DC: National Research Council, National Academy Press, 1989).

TABLE 4.4 Average Proficiency in Geometry by Geometry and Trigonometry Course Taking: Grade 12

	Have Not Studied Geometry		Taken Geometry		Taken Geometry and Trigonometry	
	Percent of Students	Geometry Proficiency	Percent of Students	Geometry Proficiency	Percent of Students	Geometry Proficiency
Grade 12	28 (1.4)	259 (1.2)	55 (1.5)	308 (1.1)	17 (1.1)	325 (1.7)
White	27 (1.6)	264 (1.3)	56 (1.8)	313 (1.2)	17 (1.2)	331 (1.7)
Black	33 (2.8)	240 (2.6)	52 (2.8)	281 (2.6)	15 (1.8)	296 (3.6)
Hispanic	41 (2.2)	249 (4.4)	48 (2.5)	296 (3.1)	11 (1.8)	306 (6.2)
Asian/Pacific Islander	13 (3.7)	268 (8.1)	62 (4.0)	324 (3.5)	25 (7.2)	331 (5.9)
Advantaged Urban !	18 (2.6)	265 (4.1)	60 (4.2)	319 (3.2)	22 (2.6)	329 (3.7)
Disadvantaged Urban	31 (2.3)	250 (4.5)	57 (2.0)	295 (4.8)	13 (1.5)	314 (7.6)
Extreme Rural !	36 (3.3)	259 (3.5)	52 (3.1)	305 (2.9)	13 (2.4)	326 (10.1)
Other	28 (1.6)	260 (1.8)	54 (2.0)	309 (1.3)	17 (1.4)	326 (2.1)
Public School	30 (1.4)	258 (1.3)	54 (1.6)	308 (1.2)	16 (1.2)	327 (1.9)
Private School	12 (2.0)	269 (4.1)	63 (2.2)	306 (2.3)	25 (1.8)	315 (2.8)
Male	29 (1.7)	262 (1.5)	52 (1.7)	311 (1.5)	19 (1.2)	329 (3.7)
Female	28 (1.4)	256 (1.8)	58 (1.7)	306 (1.2)	14 (1.1)	323 (2.4)
Northeast	24 (2.2)	263 (3.5)	52 (3.3)	313 (2.0)	25 (2.6)	328 (3.6)
Southeast	32 (3.3)	250 (2.3)	51 (2.6)	294 (2.7)	17 (2.9)	314 (3.8)
Central	31 (3.0)	264 (2.3)	54 (3.1)	312 (1.7)	15 (1.5)	330 (3.2)
West	28 (2.3)	258 (2.2)	61 (2.9)	310 (2.4)	11 (1.6)	326 (2.5)
Not H. S.	56 (3.3)	253 (2.9)	37 (2.8)	290 (3.1)	7 (1.4)	303 (6.7)
Graduated H. S.	41 (1.9)	254 (1.7)	48 (1.7)	297 (1.5)	11 (0.9)	315 (3.9)
After H. S.	25 (1.4)	265 (1.8)	57 (1.7)	307 (1.4)	18 (1.4)	324 (2.7)
Graduated College	17 (1.2)	266 (2.5)	62 (1.9)	317 (1.5)	22 (1.7)	331 (1.6)
Academic	12 (0.9)	270 (2.4)	65 (1.5)	314 (1.4)	24 (1.5)	329 (1.8)
General	49 (2.2)	256 (1.4)	44 (2.2)	295 (1.6)	7 (0.7)	310 (3.6)
Vocational/Technical	66 (3.2)	255 (2.5)	28 (2.6)	292 (3.2)	6 (1.6)	294 (5.2)

Courses taken were defined as those subjects studied at least one year. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent due to rounding. Interpret with caution--the nature of the sample does not allow accurate determination of the variability of the results for these population subgroups.

An analysis of the racial/ethnic group results indicates that considerably fewer Asian/Pacific Islander students withdraw from the mathematics pipeline before they study geometry, compared with students from other racial/ethnic groups. Also, more than half the students with neither parent having graduated from high school reported no study of geometry. In contrast to the findings for algebra, females generally had lower proficiency levels in geometry despite an equal propensity to enroll in geometry courses, although they were less likely than males to go on to trigonometry. These results are consistent with studies showing that males have better spatial skills than females.[49] But they are also consistent with existing evidence that, even though females may have equal opportunity to take mathematics courses, they may not be treated equally in mathematics classrooms.[50] For example, males interact more frequently with teachers than do females, and teachers initiate more contacts with males and respond to their requests more frequently.

Finally, about one-third of the students attending schools in disadvantaged urban or extreme rural communities reported no study of geometry. Thirty percent of the students attending public schools also reported taking no courses in geometry.

AVERAGE PROFICIENCY IN DATA ANALYSIS, STATISTICS, AND PROBABILITY BY STATISTICS COURSE TAKING

The results in TABLE 4.5 show a positive relationship between some course work in statistics and students' performance in data analysis, statistics, and probability. However, only about 12 percent of high-school students report having taken even a semester of statistics by the twelfth grade. Although more students in the Northeast reported studying statistics than did students in any of the other three geographic regions, their average proficiency in data analysis, statistics, and probability did not seem to differ from that of students in the Central and Western regions. Students in the Southeast attained significantly lower proficiency levels in this content area than did students from the other three areas. By and large, however, few students reported any study of statistics, regardless of population subgroup. Even for those students in advantaged urban schools, only 16 percent reported statistics course work.

[49] Lindsay A. Tartre, "Spatial Skills, Gender and Mathematics" in *Mathematics and Gender*, Elizabeth Fennema and Gilah C. Leder, editors (New York: NY: Teachers College Press, 1990).

[50] Elizabeth Fennema, "Justice, Equity, and Mathematics Education" in *Mathematics and Gender*, Elizabeth Fennema and Gilah C. Leder, editors (New York, NY: Teachers College Press, 1990).

TABLE 4.5 Average Proficiency in Data Analysis, Statistics, and Probability by Statistics Course Taking: Grade 12

	Have Not Studied Statistics		Have Studied Some Statistics	
	Percent of Students	Data Analysis Proficiency	Percent of Students	Data Analysis Proficiency
Grade 12	88 (0.9)	294 (1.1)	12 (0.9)	307 (2.2)
White	88 (0.9)	300 (1.2)	12 (0.9)	317 (2.3)
Black	87 (1.7)	267 (1.6)	13 (1.7)	272 (3.9)
Hispanic	88 (2.3)	275 (3.0)	12 (2.3)	277 (6.1)
Asian/Pacific Islander	86 (5.2)	305 (3.6)	14 (5.2)	323 (10.0)
Advantaged Urban !	84 (3.3)	304 (2.7)	16 (3.3)	315 (7.5)
Disadvantaged Urban !	89 (1.3)	279 (4.9)	11 (1.3)	289 (10.2)
Extreme Rural !	86 (2.0)	291 (2.8)	14 (2.0)	304 (5.7)
Other	89 (1.3)	296 (1.3)	11 (1.3)	310 (2.3)
Public Schools	88 (0.8)	293 (1.1)	12 (0.8)	308 (2.2)
Private Schools	85 (2.8)	298 (1.8)	15 (2.8)	303 (5.7)
Male	87 (0.9)	296 (1.3)	13 (0.9)	308 (2.8)
Female	89 (1.0)	292 (1.2)	11 (1.0)	306 (2.3)
Northeast	80 (3.0)	299 (1.8)	20 (3.0)	311 (4.3)
Southeast	92 (0.8)	284 (2.0)	8 (0.8)	287 (5.6)
Central	91 (1.2)	296 (2.0)	9 (1.2)	315 (2.7)
West	90 (1.3)	295 (2.1)	11 (1.3)	306 (4.0)
Did Not Finish H. S.	91 (1.5)	272 (1.9)	9 (1.5)	289 (4.9)
Graduate H. S.	90 (1.1)	283 (1.4)	10 (1.1)	290 (3.5)
Some Education After H. S.	88 (1.2)	297 (1.3)	12 (1.2)	311 (4.2)
Graduate College	86 (1.2)	304 (1.5)	14 (1.0)	318 (2.4)
Academic	85 (1.1)	306 (1.1)	15 (1.1)	317 (2.2)
General	92 (1.0)	280 (1.5)	8 (1.0)	287 (3.4)
Vocational/Technical	92 (1.4)	273 (2.5)	8 (1.4)	272 (7.5)

Statistics study defined as at least one-half year of course work. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Interpret with caution--the nature of the sample does not allow accurate determination of the variability of the results for these population subgroups.

SCHOOLS' REPORTS ON COURSE OFFERINGS

The causes of students' low enrollments in advanced mathematics course work are debated at length. However, these low enrollments are not a result of schools failing to offer such course work. To provide some perspective on school mathematics offerings, NAEP asked eighth graders' school administrators if algebra was offered for high-school placement and asked twelfth graders' school administrators whether or not various courses were offered. The results are presented in TABLE 4.6 by region and type of community. Several patterns emerge, including the finding that most students have access to a variety of mathematics courses, no matter where they live or in what type of community.

An examination of the results reveals that statistics and probability have not been incorporated into the mathematics curriculum on a widespread basis, which contrasts with the emphasis given to statistics by the *NCTM Standards* and other such sets of recommendations.[51] Even in the Northeast, the region where the most students have an opportunity to study statistics, only half the students can take such a course. Across the regions, students in the Southeast have the least opportunity to take advanced mathematics course work, and students in the Northeast the most. Considering students' course-taking patterns, there appears to be little difference between the amount of course work offered in disadvantaged urban schools as compared to advantaged urban schools. Students in extreme rural communities, however, have much less opportunity than their counterparts living in the rest of the country to take advanced mathematics classes.

[51] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

TABLE 4.6 Schools' Reports on Percentages of Students in Schools with Various Course Offerings by Region and Type of Community

	Does your school offer algebra for high school placement? (Percent "Yes")								
		Region				Type of Community			
	Nation	Northeast	Southeast	Central	West	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other
Grade 8	75 (2.8)	83 (4.3)	62 (7.4)	73 (5.1)	81 (5.2)	81 (7.3)	73 (8.[illegible])	55 (11.8)	77 (3.2)

	Are the following taught in your school? (Percent "Yes")								
		Region				Type of Community			
Grade 12	Nation	Northeast	Southeast	Central	West	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other
Algebra I	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)
Algebra II	97 (1.1)	90 (4.8)	100 (0.0)	98 (1.1)	100 (0.3)	100 (0.0)	94 (3.9)	100 (0.0)	97 (1.6)
Geometry	100 (0.2)	100 (0.0)	100 (0.1)	99 (0.9)	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.4)
Trigonometry	95 (1.4)	100 (0.3)	94 (2.7)	94 (3.2)	93 (3.1)	99 (0.9)	95 (2.7)	88 (3.9)	96 (1.8)
Probability/ Statistics	31 (3.6)	51 (8.7)	21 (5.6)	27 (6.6)	27 (7.2)	43 (11.8)	47 (14.1)	19 (9.3)	29 (4.4)
Pre-Calculus	74 (3.2)	79 (6.8)	61 (6.7)	83 (7.1)	71 (5.4)	84 (9.0)	63 (12.1)	57(10.2)	78 (3.4)
Calculus	79 (2.9)	93 (2.7)	71 (4.6)	65 (9.0)	84 (4.0)	93 (3.7)	90 (6.8)	56(10.0)	79 (4.4)
Pre-Calculus and Calculus	58 (3.8)	69 (8.8)	48 (6.4)	53 (9.6)	60 (5.0)	78 (8.9)	58 (11.1)	33(13.1)	59 (5.4)
Neither Pre-Calculus nor Calculus	9 (1.6)	1 (0.5)	20 (2.1)	7 (4.1)	8 (3.4)	2 (1.5)	8 (6.3)	21 (9.1)	7 (1.2)

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of the students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages 99.5 percent or greater have been rounded to 100 percent.

SUMMARY

Course taking is generally a powerful indicator of mathematics achievement. This occurs partially because students who are more proficient tend to take more mathematics classes and, in some cases, because the better students are tracked into more advanced courses. Also, higher-level mathematics is unlikely to be learned except through course work. The NAEP results linking proficiency to course work support this pattern, with eighth graders enrolled in pre-algebra and algebra courses having higher proficiency levels than did those taking eighth-grade mathematics. A similar, nearly linear relationship was observed between algebra and calculus course taking in high school and average proficiency in algebra and functions, with twelfth graders who had taken courses from pre-algebra through calculus showing successively higher achievement. This same pattern held for taking geometry and trigonometry and for the study of statistics -- the more course work in each area, the higher the proficiency.

Despite school administrators' reports of a variety of course offerings, however, few high-school students take advantage of these opportunities. Although 43 percent of the high-school students reported taking mathematics through Algebra II, before electing to stop studying the subject, nearly one-fifth reported taking no algebra or only pre-algebra. Only 13 percent reported having taken Algebra III, pre-calculus, or calculus. Twenty-eight percent reported no geometry study and 88 percent reported never having studied statistics.

Further, the NAEP mathematics course-taking results seem to reflect studies indicating that a spiral of lowered expectations may have resulted in poor performance in mathematics becoming socially acceptable, particularly among some minority groups, economically disadvantaged students, and females during the high-school years.[52] Enrollment in high-school mathematics courses was far lower for Black and Hispanic students. For example, nearly one-quarter of the Asian/Pacific Islander students reported course taking in Algebra III and pre-calculus or also continuing on to study

[52]Floretta D. McKenzie, "Education Strategies for the '90s," in *The State of Black America* (New York, NY: National Urban League, Inc., 1991).

Everybody Counts: A Report to the Nation on the Future of Mathematics Education, (Washington, DC: National Research Council, National Academy Press, 1989).

calculus, compared to only 6 and 8 percent of the Black and Hispanic students, respectively. Similarly, only 13 percent of the Asian/Pacific Islander students reported no geometry study, compared to 33 and 41 percent of the Black and Hispanic students, respectively. Course-taking patterns appeared to be reasonably comparable for males and females, although slightly more males reported having gone beyond geometry to study trigonometry. Further, those students attending schools in disadvantaged urban or extreme rural areas, those with less educated parents, and those in non-academic high-school programs have substantially lower enrollments in high-school mathematics courses than their counterparts.

295-027 0 - 91 - 6 QL 3

Chapter 5

Student Performance on Constructed-Response Questions

INTRODUCTION

As part of NAEP's 1990 mathematics assessment at all three grades, students were asked to write in their answers to a number of questions. The use of constructed-response formats across the content areas provides an opportunity to examine students' work from a different perspective than that provided by multiple-choice questions.

Also, as illustrated in reports prepared by the National Council of Teachers of Mathematics (NCTM) analyzing responses to individual questions, students' answers to particular questions can often provide important information and context for interpreting aggregate information about mathematics proficiency.[53]

This chapter presents an overview of student performance on the constructed-response questions that were incorporated into the assessment in each of the five content areas. It also describes results of some of the questions included in a special study conducted for the nation at grades 4, 8, and 12 to gather additional information on problem solving. These problem-solving items dealt, to a large degree, with practical problems requiring multiple steps. The questions were presented with an accompanying tape recording that was designed to facilitate students' ability to read the questions and to pace themselves through the questions. The pacing let students know they were expected to spend more time than they usually might on these

[53]Thomas P. Carpenter, T. C. Colburn, R. E. Reys, and J. W. Wilson, *Results from the First Mathematics Assessment of the National Assessment of Educational Progress* (Reston, VA: National Council of Teachers of Mathematics, 1978).

Thomas P. Carpenter, M. K. Corbitt, Henry S. Kepner, Mary M. Lindquist, and R. E. Reys, *Results from the Second Mathematics Assessment of the National Assessment of Educational Progress* (Reston, VA: National Council of Teachers of Mathematics, 1981).

Thomas P. Carpenter, W. Mathews, Mary M. Lindquist, and Edward A. Silver, "Achievement in Mathematics: Results from the National Assessment," *Elementary School Journal*, 84, p. 485-497 (1984).

Results from the Fourth Mathematics Assessment of the National Assessment of Educational Progress, Mary M. Lindquist, editor (Reston, VA: National Council of Teachers of Mathematics, 1989).

questions, yet kept them moving in the event they became frustrated with any specific question.

TABLE 5.1 shows the distribution of constructed-response questions across the content areas. Some of the questions were administered at more than one grade, permitting a comparison of performance from grade to grade. With the exception of the special problem-solving questions administered via the paced audiotape, all the grade 8 constructed-response items were included in the Trial State Assessment Program. All student responses to the constructed-response questions were hand scored by professional readers in accordance with guidelines established by NAEP.

TABLE 5.1 Number of Constructed-Response Questions by Content Area

	Numbers and Operations	Measurement	Geometry	Data Analysis	Algebra and Functions	Problem Solving
Grade 4	9	5	7	1	6	13
Grade 8	10	4	8	6	7	7
Grade 12	8	3	5	9	10	13

NUMBERS AND OPERATIONS

Constructed-response questions in the numbers and operations content area were designed to measure students' understanding of numbers through integers and decimals, and their application in real-world settings as well as in computational settings. Students were asked to interpret numerical relationships observed in ratios, proportions, and percentage settings. They were also asked to discern numerical patterns and verify results. Examples of constructed-response numbers and operations items shown in Chapter One include, at Level 200, the subtraction problem 64 - 27 and the array of circles multiplication question representing the product for 5 x 3. At Level 300, the question involving the meaning of 5 percent unemployment helps characterize these items.

Students' performance on the constructed-response numbers and operations questions given at each grade level showed relatively similar performance for males and females. However, Asian/Pacific Islander and

White students performed significantly better than Hispanic and Black students did. The average percentages of correct responses for the constructed-response numbers and operations items are shown in TABLE 5.2.

TABLE 5.2 Average Percentage Correct for Constructed-Resp[illegible] Numbers and Operations Questions by Gender and Race/Ethnicity

	Nation	Gender		Race/Ethnicity			
		Male	Female	White	Black	Hispanic	Asian/Pacific Islander
	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students
Grade 4	61 (0.5)	61 (0.6)	61 (0.7)	65 (0.6)	50 (1.1)	53 (1.2)	70 (1.6)
Grade 8	52 (0.7)	52 (0.9)	52 (0.7)	56 (0.8)	41 (0.9)	42 (1.0)	64 (2.7)
Grade 12	61 (0.7)	62 (1.0)	59 (0.8)	64 (0.8)	46 (1.1)	48 (1.3)	72 (1.9)

Because of differing items and number of items, comparisons of percents should only be made within a given grade level.

A comparison with the average percentages correct provided in the data appendix for the multiple-choice numbers and operations questions indicates that fourth graders had less difficulty on constructed-response questions than they did on multiple-choice ones (51 percent correct, on average). In comparison, eighth graders found open-response questions somewhat more difficult, averaging 61 percent correct on the multiple-choice questions. Similarly, at grade 12, the average across the multiple-choice numbers and operations questions was 65 percent correct.

Of the four items given to both fourth and eighth graders, students at grade 8 performed far better than fourth graders on three of them. On a subtraction question -- 604 - 207, presented in a vertical format -- the percentage correct increased from 62 percent at grade 4 to 84 percent at grade 8. On another question requiring students to discover a given number based on information about the digits in particular place-value positions, the increase in performance was more modest, with 50 percent of the fourth graders and 55 percent of the eighth graders responding correctly. On a third item asking students to shade a fractional portion of a rectangular region, 18 percent of the fourth graders and 63 percent of the eighth graders provided correct answers. The final item required students to locate the position of a given rational number on a number line, given marks on the number line and the locations of three other rational numbers. Performance here increased from 25 percent correct at grade 4 to 59 percent correct at grade 8.

On other constructed-response questions in the area of numbers and operations, fewer than 50 percent of the fourth-grade students responded correctly to either of two questions about fractions. Eighth-grade students failed to attain 50 percent success on four of the 10 items. Two of these were word problems, and the other two dealt with divisibility in number theory and evaluating an expression involving both decimals and exponentiation. Fewer than 50 percent of the twelfth-grade students were successful on two of the eight items. One concerned developing terms in an arithmetic sequence when the general term was provided; the other required analysis of a competitive situation where percentages were used to describe the performance of the groups involved. For this second question, students were then asked to write a paragraph analyzing the results and describing how a winner could be determined.

MEASUREMENT

Questions requiring constructed-responses in the area of measurement varied from determining the length of a segment by reading the markings on a ruler to calculating the volume of a geometric solid based on information concerning its surface area. Fourth graders were given a ruler, and eighth and twelfth graders a protractor/ruler for use on this part of the assessment. An example involving conversions within the traditional system was included among the items shown in Chapter One for Level 250.

One item given at all three grades required reading the measurements associated with the ends of an object on a "broken ruler" and then giving the object's length. The percentages of correct responses were 24 percent at grade 4, 61 percent at grade 8, and 83 percent at grade 12. Two other items were given at both the fourth and eighth grades. One required students to measure the longer side of a given rectangle in centimeters, and performance improved from 46 percent for the fourth graders to 69 percent for eighth graders. On a similar item calling for the measurement of the diagonal of the same rectangle to the nearest centimeter, performance increased from 56 percent correct in the fourth grade to 77 percent correct in the eighth grade, with students at both grades having less difficulty measuring the diagonal than the longer side of the rectangle.

The data on the average percentages of correct answers to the constructed-response measurement items are shown in TABLE 5.3. Again, there was little difference between the performance of male and female students in the fourth grade, but the gap widened at grades 8 and 12, with twelfth-grade males demonstrating higher achievement on these items. Performance by Asian/Pacific Islander and White students was higher than that by Hispanic and Black students, with the Asian/Pacific Islander students performing better than the White students did at the eighth and twelfth grades.

TABLE 5.3 Average Percentage Correct for Constructed-Response Measurement Questions by Gender and Race/Ethnicity

	Nation	Gender		Race/Ethnicity			
		Male	Female	White	Black	Hispanic	Asian/Pacific Islander
	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students
Grade 4	38 (0.7)	38 (0.9)	38 (0.8)	44 (0.8)	19 (1.5)	28 (1.7)	44 (3.3)
Grade 8	59 (0.9)	62 (1.1)	57 (1.0)	65 (1.1)	39 (1.4)	48 (2.2)	71 (3.8)
Grade 12	37 (0.7)	40 (0.9)	34 (0.7)	41 (0.7)	21 (1.1)	29 (1.6)	50 (2.8)

Because of differing items and number of items, comparisons of percents should only be made within a given grade level.

Both fourth and twelfth graders had more difficulty with the constructed-response measurement questions than they did with the multiple-choice questions, averaging 53 and 58 percent correct, respectively. The difference was especially noticeable for Black fourth graders, who averaged 42 percent correct across the multiple-choice items, compared to 19 percent on the constructed-response measurement items. These students had particular difficulty reading the ruler. At grade 8, performance on the constructed-response questions was nearly identical to the multiple-choice performance (61 percent, on average).

Only 33 percent of the fourth graders could correctly complete the conversion of 60 inches = _____feet shown as an example item for Level 250 in Chapter One. At grade 8, the average percentage correct on three of the four items was greater than 50 percent. The one item where students failed to reach this level was in using a protractor to measure an obtuse angle. Only 31 percent of the students were able to respond correctly to this item. The average percentage correct for twelfth graders was considerably less than that for the students at the eighth-grade level, because two of the three items administered at grade 12 were quite difficult for students. One required making conversions between volume and surface area (only 4 percent answered this item correctly), and the other dealt with a sequential pattern in the areas associated with a group of related triangular figures. Twenty-five percent answered this item correctly.

GEOMETRY

The constructed-response items in the geometry content area covered a wide variety of situations, including two questions at grade 8 requiring students to visualize the manipulation of different shaped pieces to fill a geometric region. Some example constructed-response items for geometry were included in Chapter One, such as the question with embedded figures requiring application of the Pythagorean theorem and the question asking for the number of 9 inch squares that could be cut from a cloth that is 18 inches by 36 inches. Both of these items anchored at Level 350.

The average percentages of correct responses for the constructed-response geometry items are presented in TABLE 5.4. Students' performance across the three grades in geometry showed essentially the same pattern as did the two preceding content areas. There was little difference in performance between the gender groups, except at grade 12, where males outperformed females. At each grade, Asian/Pacific Islander and White students performed better than Hispanic and Black students did. However, Black students had lower achievement than Hispanic students. Fourth and twelfth graders had more difficulty with the constructed-response questions than with the multiple-choice geometry questions, averaging 52 and 60 percent correct, respectively. The eighth graders averaged about the same (50 percent overall).

TABLE 5.4 Average Percentage Correct for Constructed-Response Geometry Questions by Gender and Race/Ethnicity

	Nation	Gender		Race/Ethnicity			
		Male	Female	White	Black	Hispanic	Asian/Pacific Islander
	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students
Grade 4	35 (0.5)	35 (0.7)	36 (0.7)	39 (0.7)	23 (0.9)	27 (1.3)	42 (3.5)
Grade 8	53 (0.7)	53 (0.9)	53 (0.9)	58 (0.9)	35 (1.3)	42 (1.5)	64 (3.4)
Grade 12	35 (0.8)	38 (1.2)	32 (0.9)	38 (1.0)	20 (1.2)	27 (1.6)	47 (3.2)

Because of differing items and number of items, comparisons of percents should only be made within a given grade level.

DATA ANALYSIS, STATISTICS, AND PROBABILITY

One constructed-response item from the data analysis, statistics, and probability content area was included among the released items shown in Chapter One -- the circle graph completion item that anchored at Level 250. The question, administered at all three grades, required students to complete a partially finished bar graph given a table of data for the situation. Performance was 51 percent at grade 4, 86 percent at grade 8, and 88 percent at grade 12. Of four questions given to eighth and twelfth graders, one required students to explain in several sentences if a given method of sampling to get a survey response was biased or not and why. Performance on this item increased from 46 percent correct at grade 8 to 70 percent correct at grade 12. However, at both grades, few students were able to compute a mean by taking data from a table of frequencies (12 percent and 29 percent correct, respectively). On another question requiring listing items in a sample space for an experiment, the percentages of success were 11 and 22 percent for the two grades. A similar set of percentages was presented as part of a question asking students to select items in a sample space that indicated a positive outcome to an experiment. Here the percentages of correct answers for eighth and twelfth graders were 17 percent and 31 percent, respectively.

TABLE 5.5 displays the data related to average performance on the cons[illegible]ed-response data analysis items, as well as the performance of subpopulations. Unlike the preceding content areas, fourth-grade females did slightly better than did males on these questions. The outcomes for the racial/ethnic subgroups were similar to those in the other content areas. At all three grades, students performed less well on the constructed-response questions than they did on the multiple-choice data analysis questions, where they averaged 60 percent, 58 percent, and 63 percent correct, respectively.

TABLE 5.5 Average Percentage Correct for Constructed-Response Data Analysis, Statistics, and Probability Questions by Gender and Race/Ethnicity

	Nation	Gender		Race/Ethnicity			
		Male	Female	White	Black	Hispanic	Asian/Pacific Islander
	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students
Grade 4	51 (1.4)	48 (1.6)	54 (1.9)	58 (1.6)	26 (3.0)	37 (2.7)	61 (5.0)
Grade 8	41 (0.7)	40 (0.8)	42 (0.8)	45 (0.8)	27 (1.1)	32 (1.2)	48 (2.5)
Grade 12	49 (0.6)	49 (0.8)	49 (0.7)	53 (0.7)	34 (1.1)	37 (1.8)	51 (2.1)

Because of differing items and number of items, comparisons of percents should only be made within a given grade level.

ALGEBRA AND FUNCTIONS

Some example constructed-response algebra and functions items were included in Chapter One. They include the open sentence 17 X ☐ = 204 completion item at Level 200, the expression evaluation item asking the value of $n + 5$ when $n = 3$, which anchored at Level 250, the motorbike rental chart completion task at Level 300, and the item requiring an explanation of the pattern giving the number of dots in the 100th term in the triangular pattern for $2n + 1$ at Level 350.

Performance on the constructed-response questions from the algebra and functions content area revealed similar patterns to performance on these questions in other content areas. The only item administered at all three grades required students to generate the missing items in a patterned sequence of letters. Performance improved from 34 to 50 to 60 percent responding correctly as the students' grade levels increased. Of two items common to the eighth- and twelfth-grade assessments, the first called for students to shade the segment representing a real number inequality on a real number line. Performance levels for eighth and twelfth graders were 35 and 63 percent correct, respectively. The other question asked eighth and twelfth graders to explain why a particular arithmetic progression described the number of dots in a geometric dot sequence. Performance here also showed an improvement, from 15 to 27 percent correct.

Performance data for the constructed-response algebra and function items shown in TABLE 5.6 reflect little difference between the two gender groups, and performance by students in the four racial/ethnic groups was quite similar to that seen in the other content areas. For the constructed-response questions in this content area, fourth and eighth graders showed similar performance to that on the multiple-choice questions in the content area (55 and 53 percent correct, on average). Twelfth graders had somewhat more difficulty with the constructed-response questions, averaging 48 percent on the data analysis, statistics, and probability questions presented in the multiple-choice format.

TABLE 5.6 Average Percentage Correct for Constructed-Response Algebra and Functions Questions by Gender and Race/Ethnicity

	Nation	Gender		Race/Ethnicity			
		Male	Female	White	Black	Hispanic	Asian/Pacific Islander
	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students
Grade 4	56 (0.5)	56 (0.6)	55 (0.5)	59 (0.6)	44 (0.9)	47 (1.1)	62 (1.4)
Grade 8	48 (0.8)	47 (1.0)	49 (0.8)	52 (0.9)	33 (1.2)	38 (1.2)	58 (2.6)
Grade 12	32 (0.7)	33 (1.1)	32 (0.6)	35 (0.9)	19 (1.1)	23 (1.1)	47 (2.2)

Because of differing items and number of items, comparisons of percents should only be made within a given grade level.

PROBLEM SOLVING

The remaining questions in the constructed-response category were special items assessing students' problem-solving abilities for the nation only. Because they were administered via paced audiotape, they were not used in the Trial State Assessment Program. Thirteen of these items were given at the fourth-grade level, seven at the eighth-grade level, and 13 at the twelfth-grade level. The mathematics content area and ability level classifications of these items varied greatly from one grade to another. TABLE 5.7 contains data on the average percentages of correct responses for each of the three grades. Special care must be taken to avoid comparing these data across grade levels, since both the number and nature of the items differed greatly from one level to another. The data within each grade reflect similar patterns in gender and racial/ethnic group performance as generally observed in each of the content areas.

TABLE 5.7 Average Percentage Correct for Constructed-Response Problem-Solving Questions by Gender and Race/Ethnicity

	Nation	Gender		Race/Ethnicity			
		Male	Female	White	Black	Hispanic	Asian/Pacific Islander
	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students
Grade 4	44 (0.7)	44 (0.9)	43 (0.9)	49 (0.9)	27 (1.0)	34 (1.0)	50 (4.7)
Grade 8	52 (0.8)	51 (1.0)	52 (0.9)	57 (1.0)	33 (1.9)	41 (1.4)	64 (2.8)
Grade 12	30 (0.8)	32 (1.0)	28 (1.0)	33 (0.9)	17 (0.9)	20 (1.4)	37 (4.2)

Because of differing items and number of items, comparisons of percents should only be made within a given grade level.

The following item, given at all three grades, asked students to determine the cost of a meal from a menu. Performance on this basic task was 37 percent correct at grade 4, 66 percent at grade 8, and 77 percent at grade 12.

LUNCH MENU

Soups—Made by Our Chef Daily

Onion Soup	.80
Soup of the day	.70

Grilled Sandwiches

Beefburgers, cooked to order; 1/4 lb of the finest beef available, seasoned to perfection, and served on a lightly buttered bun	2.15
Beefburger with Fries	2.70
Grilled Cheese	1.50
Grilled Ham and Cheese	2.50

Cold Sandwiches

Sliced Turkey	2.30
Turkey Salad	1.75
Chicken Salad	1.75
Tuna Fish Salad	1.90

Beverages

Tea	.65
Cola	.60
Milk	.50

Desserts

Ice Cream (vanilla, chocolate, strawberry)	1.10
Pie (checkerboard)	1.75

According to the menu above, what is the cost of the following order?

Soup of the day.....................
Beefburger with Fries................
Cola...........................

Total: $4.00

A similar item requiring students to process more information is shown below. This item called for students to collect relevant information from a telephone rate table and then complete a price comparison. Only 17 percent of the eighth graders and 31 percent of the twelfth graders provided a correct response.

TELEPHONE CALLING RATES

From Allenville To	Day Rate 8 AM–5 PM Mon–Fri		Evening Rate 5 PM–11 PM Mon–Fri 8 AM–11 PM Sat–Sun		Night Rate 11 PM–8 AM ALL DAYS	
	First Minute	Each Additional Minute	First Minute	Each Additional Minute	First Minute	Each Additional Minute
Burneyford	\$.09	\$.03	\$.07	\$.02	\$.05	\$.02
Camptown	\$.28	\$.09	\$.22	\$.07	\$.17	\$.05
Dorning	\$.37	\$.11	\$.30	\$.09	\$.22	\$.07
Edgeton	\$.42	\$.12	\$.34	\$.10	\$.25	\$.07

The table above provides information about the cost of placing phone calls between certain cities at different times during the day. How much more would it cost to place a 10-minute call from Allenville to Edgeton at 3 pm on Friday than at 3 pm on Saturday?

Answer: 26¢

For the seven problem-solving items administered at both grades 4 and 8, including the earlier menu item, the overall increase was 30 percentage points, from 25 percent correct at grade 4 to 55 percent at grade 8. The biggest differences in performance between grades were shown on the following pair of questions asking students to think through a combinatorial situation and then reflect on their solution. Performance on completing the table correctly increased from 19 percent to 56 percent for a complete answer, and from 25 percent to 64 percent based on partial credit for providing all but one of the combinations. Whereas only 6 percent of fourth graders gave brief explanations for why the difference in number of prizes could not equal one, 24 percent of the eighth graders did.

On the question shown on page 150, also given at grades 4 and 8, students were asked to reason through a relatively complex situation involving the placement of furniture in a room drawn to scale. Twenty-three percent of the fourth graders and 52 percent of the eighth graders provided one of several correct solutions. Partial credit was allowed for only making one mistake in the drawings. The percentages correct were 38 percent and 67 percent, respectively, for the two grades.

At a party 6 prizes were hidden. Anna and Beth each searched for them until all 6 were found.

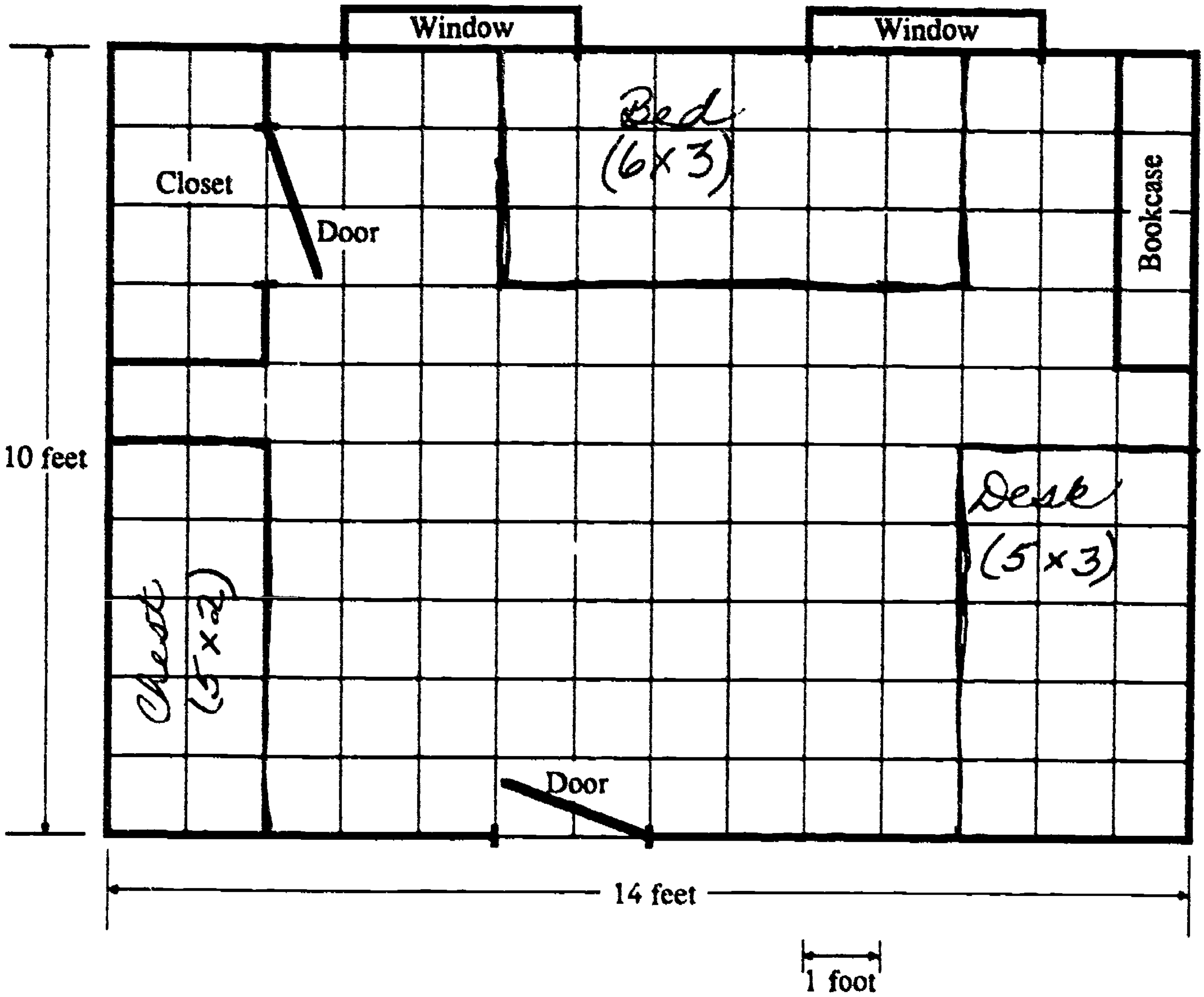
In the table below, list all the different possible numbers of prizes that each girl could have found. One possibility has already been written in the table.

Number of Prizes Found by Anna	Number of Prizes Found by Beth
0	6
1	5
2	4
3	3
4	2
5	1
6	0

Explain why Beth could not have found exactly one more prize than Anna.

Explanation:

Because 6 is an even number. None of the combinations differ by 1.



The diagram above is a scale drawing of John's room. Each side of a block in the diagram represents 1 foot. John has four pieces of furniture that he needs to put in the room. The measurements of the furniture are:

bed	6 feet long,	3 feet wide
desk	5 feet long,	3 feet wide
chest	5 feet long,	2 feet wide
bookcase	4 feet long,	1 foot wide (already in place)

In arranging the furniture, John must follow these rules:

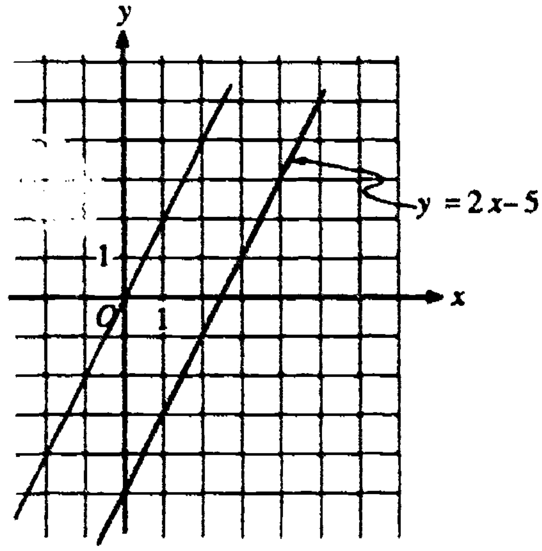
- The doors may not be blocked.
- Each piece of furniture must have at least one side against a wall of the room.
- The chest is too tall to be placed against a window.

The bookcase has already been put in place. On the diagram a scale drawing of the bookcase shows where it has been put. Decide on a way that John could arrange the other three pieces of furniture so that the total arrangement follows all the rules. On the diagram, show that arrangement by drawing in each piece of furniture in its place. Draw each one to scale, using the same scale as was used to make the diagram. Label each piece of furniture.

Overall, performance on these seven items administered to fourth and eighth graders reflected little difference in the performance of males and females: 25 percent of both groups responded correctly at the fourth-grade level, and 55 percent and 54 percent, respectively, provided correct solutions at the eighth-grade level. The average percentages of success for White, Black, Hispanic, and Asian/Pacific Islander students at grade 4 were 30 percent, 10 percent, 15 percent, and 31 percent. At grade 8, the percentages were 59 percent, 37 percent, 44 percent, and 68 percent, respectively. The largest average increase between fourth and eighth grade was the 37 percent difference shown by the Asian/Pacific Islander students. Black and Hispanic students had particular difficulty with these questions.

Twelfth graders found the set of special problem-solving questions particularly difficult. For example, they were asked to answer two questions involving a plane schedule (39 percent and 42 percent correct), describe the figure resulting from rotating an isosceles triangle about its vertical axis of symmetry (32 percent correct), and extrapolate from data describing life expectancies (59 percent correct).

Three additional items asked students to apply their knowledge of algebra. The following problem involved drawing a solution and then providing the accompanying algebraic/symbolic solution. Only 32 percent of the high-school seniors drew the new parallel line on the graph, when a correct response essentially required the ability to find the origin 0 and the existing line on the graph, and an understanding of the term "parallel." Sixteen percent of the twelfth graders answered both parts of this question correctly. Three percent of the students were able to provide the equation of the new line but were unable to draw it correctly.



a. On the axes above, draw a line parallel to $y = 2x - 5$ that goes through the origin O.

b. On the line below, write an equation of the new line.

Equation: $y = 2x$

The other two algebra questions, as shown below, dealt with quadratic equations. Ability to answer such questions is considered necessary to begin the study of calculus or more advanced mathematics successfully. Thirty-six percent of the twelfth graders were able to factor the polynomial $3x^2 - 14x - 5$. When asked to solve the quadratic equation $(x+1)^2 - 3(x+1) = -2$, perhaps a bit more atypical from problems seen in their algebra classes, 11 percent of the students were successful, and 18 percent found at least one of the two roots.

Completely factor the polynomial $3x^2 - 14x - 5$.

Answer: $(3x+1)(x-5)$

Solve for x in the equation below.

$$(x + 1)^2 - 3(x + 1) = -2$$

Answer: $x = 0$; $x = 1$

SUMMARY

Although students tended to exhibit a full range of performance on the constructed-response items, these questions appeared to be somewhat more difficult for students than the set of multiple-choice questions measuring each content area did. Considering that the constructed-response questions often present more complex situations than the multiple-choice questions do, this might have been anticipated. However, many of the constructed-response questions did not require broad extensions from the information presented and were relatively similar to those students have faced on a day-to-day basis in their classroom study of mathematics. The thinking, production, and communication aspects of such questions, deemed so important to student learning in mathematics, may also make such tasks more difficult.

At grade 4, there were no gender differences in performance on the constructed-response questions across the content areas. However, females did outperform males on the special problem-solving questions accompanied by the paced audiotape. At grade 8, there tended to be little difference in performance between males and females, except perhaps in the area of measurement, where males appeared to have the advantage. Twelfth-grade males and females performed similarly on the data analysis and algebra and functions questions; however, males tended to have higher average success in the remaining areas, particularly measurement and geometry.

At all three grades, Asian/Pacific Islander and White students tended to have better success, on average, in each content area than Black and Hispanic students did. However, Asian/Pacific Islander students often outperformed White students, and Hispanic students generally outperformed Black students.

Chapter 6

Instructional Approaches

INTRODUCTION

One of the basic assumptions underlying current educational research is that children actively construct knowledge for themselves through interaction with their culture and environment.[54] They invent a great deal of their own mathematics learning through a broad array of naturally occurring, everyday experiences, including dividing up into teams for games or sports, deciding how much pizza to order for a party, building models, or shopping at the mall. Research also indicates that the current mathematics curriculum fails to capitalize on the rich informal mathematics knowledge and understanding that children bring to instruction, and that school mathematics often seems divorced from such familiar activities.[55] To help anchor mathematics concepts for students, much of the literature on improving mathematics education suggests presenting mathematics in real contexts and encouraging students to work together in groups to solve problems.[56]

This chapter presents information collected from students and teachers about some instructional materials and approaches currently used in mathematics classes. Students at all three grades were asked to respond to a set of background questions about the use of textbooks and worksheets, as well

---

[54] Lauren B. Resnick, *Education and Learning to Think* (Washington, DC: National Academy Press, 1987).

[55] Thomas A. Romberg and Thomas P. Carpenter, "Research on Teaching and Learning Mathematics: Two Disciplines of Scientific Inquiry" in *Handbook of Research on Teaching (Third Edition):* M C. Wittrock, editor (New York, NY: Macmillan, 1986).

[56] *Professional Standards for Teaching Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1991).

Curriculum and Evaluation Standards for School Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1989).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

Magdalene Lampert, "Connecting Mathematical Teaching and Learning" in *Integrating Research on Teaching and Learning Mathematics* (Madison, WI: National Center for Research in Mathematics Science Education, 1988).

as the frequency of small-group work, use of manipulatives, and mathematics projects. Because 42 percent of the high-school seniors reported that they were not taking a mathematics course, the results at grade 12 are presented both for the entire sample and for those who were enrolled in a mathematics course.

NAEP sought to expand the background information about classroom practices at grades 4 and 8 by asking the teachers of the fourth- and eighth-grade students who participated in the assessments to respond to questionnaires. The teachers of the assessed students were identified and asked to provide information about the mathematics instruction provided to those students. This was not done at grade 12 because of the substantial proportion of students no longer enrolled in mathematics courses. As part of the teacher questionnaire, the teachers were asked to comment on the use of textbooks, worksheets, and projects. They were also asked to describe the ability level of the students' mathematics class. Information is also provided on how the use of instructional material and approaches differs by ability level of the class.

Because teachers' reports were linked to students' achievement, the results are presented throughout the discussion of the teacher questionnaire data using students as the unit of analysis, including the percentages of students receiving different types of instruction. Although this perspective may differ somewhat from that obtained from reporting percentages of teachers using various instructional approaches, it is consistent with NAEP's aim of describing the school context for different groups of students.[57]

ABILITY GROUPING

As shown in TABLE 6.1, fourth-grade students are not typically assigned to their classes by ability. However, although teachers reported that only 26 percent of the students were grouped by ability in accordance with school policy, they also described more than half the students as being in classes with students of similar ability (see TABLE 6.2). Factors other than school policy, including the socioeconomic standing of the community, may affect the grouping of students by ability in elementary schools. Less than half of the fourth graders (43 percent) were in classes of mixed ability.

[57] *NAEP's 1990 Policy Information Framework* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1988).

TABLE 6.1 Teachers' Reports on the Prevalence of Ability Grouping

	Yes, Students Grouped by Ability		No, Students Not Grouped by Ability	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	26 (3.1)	222 (2.0)	74 (3.1)	216 (1.0)
Grade 8	66 (2.5)	270 (1.4)	34 (2.5)	258 (2.5)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 6.2 Teachers' Reports on the Ability Levels of Their Students' Classes

	Primarily High Ability		Primarily Average Ability		Primarily Low Ability		Ability Mixed Widely	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	10 (1.5)	240 (3.0)	34 (1.8)	217 (1.1)	13 (1.5)	201 (1.9)	43 (3.0)	217 (1.3)
Grade 8	26 (1.6)	290 (2.2)	37 (1.9)	264 (1.3)	17 (1.4)	241 (1.9)	21 (2.3)	260 (2.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

Ability grouping appears to be much more common in grade 8, which is understandable since the curriculum begins to differentiate in middle school. As presented in Chapter Four, 38 percent of the students in grade 8 were taking either pre-algebra or algebra rather than general eighth-grade mathematics. The proficiency results at grade 8 suggest that ability grouping is used more often for higher-performing students than for lower-performing ones.

USE OF INSTRUCTIONAL MATERIALS

In the best learning situations, effective instructional materials and activities encourage students to construct their own ways of solving problems, facilitating sustained classroom discussions about a variety of solution methods.[58] Conversely, much mathematics instruction is characterized by extensive teacher

[58] Paul Cobb, Erna Yackel, and Terry Wood, "Curriculum and Teacher Development: Psychological and Anthropological Perspectives" in *Integrating Research on Teaching and Learning Mathematics* (Madison, WI: National Center for Research in Mathematical Sciences Education, 1988).

explanation and individual student work on paper-and-pencil assignments.[59] Although constant use of textbooks and worksheets does not preclude effective instruction, and NAEP data cannot establish the quality of instruction accompanying the use of these materials, excessive reliance on these materials does indicate less attention to various strategies with the potential for more active student involvement.

TABLE 6.3 presents teachers' reports on the use of textbooks and worksheets in mathematics instruction. The data are presented for grades 4 and 8, as well as by the ability-level grouping. TABLE 6.4 presents students' reports of the use of these two types of instructional materials. Taken together, these results indicate that textbooks and worksheets still comprise the primary instructional materials in school mathematics.

Both teachers and students agreed that working problems from textbooks was a common activity. About two-thirds of the students at grades 4 and 8 were asked to do this type of activity on a daily basis, and teachers reported this activity for most students at least several times a week. At grade 4, however, teachers reported using this approach least often with high-ability classes. In contrast, at grade 8, more students in high-ability classes were asked to work problems from their textbook on a daily basis.

Working problems on worksheets also appeared to be a common activity for fourth graders. At grade 8 fewer students were asked to engage in this activity, particularly those in high- or mixed-ability classes. About three-fourths of the eighth graders in low- or average-ability classes were asked to do worksheet problems on at least a weekly basis.

Students' reports support the notion of a shift from worksheets to textbooks for the more proficient students. At grades 8 and 12, those reporting more frequent use of textbooks had successively higher average proficiency, while those reporting more use of worksheets had successively lower average proficiency.

---

[59]Thomas A. Romberg and Thomas P. Carpenter, "Research on Teaching and Learning Mathematics: Two Disciplines of Scientific Inquiry" in *Handbook of Research on Teaching (Third Edition)*, M.C. Wittrock, editor (New York, NY: Macmillan, 1986).

TABLE 6.3 Teachers' Reports on Frequency of Use of Instructional Materials

Do mathematics problems from textbooks	About how often do students in this class do the following types of activities for mathematics class?					
	Almost Every Day		Several Times a Week		About Once a Week or Less	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	64 (2.4)	217 (0.8)	29 (2.3)	216 (1.4)	8 (1.4)	224 (3.2)
High ability	46 (6.5)	237 (3.2)	36 (6.7)	241 (4.2)	18 (6.4)	247 (8.2)
Average ability	72 (3.3)	217 (1.3)	24 (3.3)	216 (2.3)	4 (1.1)	224 (5.3)
Low ability	56 (5.2)	201 (2.9)	39 (5.1)	199 (2.2)	5 (2.5)	205(10.5)
Mixed ability	63 (4.3)	218 (1.6)	26 (3.5)	214 (2.6)	11 (3.3)	219 (3.7)
Grade 8	71 (2.2)	270 (1.5)	23 (1.9)	257 (2.1)	7 (1.3)	265 (3.0)
High ability	86 (3.0)	291 (2.5)	12 (2.8)	285 (4.5)	2 (1.0)	289 (8.6)
Average ability	65 (3.4)	265 (1.6)	30 (3.0)	261 (2.4)	5 (2.0)	269 (4.2)
Low ability	64 (4.9)	242 (2.2)	28 (4.5)	239 (4.1)	8 (2.0)	242 (3.5)
Mixed ability	68 (5.1)	263 (2.7)	22 (5.0)	246 (3.7)	11 (3.7)	272 (3.1)
Do mathematics problems on worksheets	At Least Several Times a Week		About Once a Week		Less than Weekly	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	62 (2.2)	217 (1.0)	24 (2.0)	216 (1.8)	14 (1.4)	218 (1.9)
High ability	53 (7.5)	242 (4.2)	27 (6.4)	241 (5.0)	21 (4.4)	235 (4.1)
Average ability	60 (4.2)	218 (1.4)	24 (3.2)	217 (2.5)	17 (3.4)	217 (3.1)
Low ability	54 (5.3)	200 (2.2)	31 (5.3)	198 (3.6)	15 (3.8)	206 (9.3)
Mixed ability	63 (3.7)	217 (1.7)	25 (3.5)	216 (2.4)	12 (2.7)	216 (3.6)
Grade 8	38 (2.9)	261 (1.3)	28 (2.6)	264 (1.7)	34 (3.0)	274 (2.3)
High ability	24 (3.7)	284 (3.7)	26 (3.1)	284 (3.9)	50 (4.4)	297 (2.8)
Average ability	45 (4.3)	263 (2.1)	30 (3.8)	263 (1.9)	25 (4.0)	267 (3.3)
Low ability	49 (4.6)	240 (2.0)	25 (3.8)	246 (4.8)	26 (4.4)	240 (3.1)
Mixed ability	35 (5.5)	262 (4.4)	31 (6.8)	254 (4.3)	34 (6.8)	264 (3.3)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

TABLE 6.4 Students' Reports on Frequency of Use of Instructional Materials

Do mathematics problems from textbooks	In mathematics class, how often do you do each of the following? Almost Every Day		Several Times a Week		About Once a Week or Less	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	59 (1.4)	218 (0.7)	18 (0.8)	220 (1.3)	23 (1.0)	208 (1.4)
Grade 8	73 (1.6)	270 (1.0)	15 (0.7)	256 (1.3)	12 (1.3)	250 (2.8)
Grade 12 - All Students	62 (1.1)	304 (1.1)	11 (0.5)	289 (2.0)	26 (1.0)	278 (1.2)
Grade 12 - Taking Math	81 (1.2)	308 (1.2)	11 (0.6)	298 (2.1)	9 (0.8)	291 (2.9)
Do mathematics problems on worksheets	**At Least Several Times a Week**		**About Once a Week**		**Less than Weekly**	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	57 (1.3)	216 (0.9)	22 (0.9)	217 (1.1)	21 (0.9)	215 (1.1)
Grade 8	39 (1.7)	253 (1.5)	24 (0.7)	264 (1.2)	37 (1.9)	274 (1.4)
Grade 12 - All Students	29 (1.1)	289 (1.2)	20 (0.7)	298 (1.5)	51 (1.3)	298 (1.4)
Grade 12 - Taking Math	30 (1.4)	294 (1.5)	23 (1.0)	304 (1.8)	47 (1.7)	314 (1.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

GROUP WORK, USING MATHEMATICS MANIPULATIVES, AND DOING PROJECTS

No single teaching method or learning experience can develop a range of mathematical activities as efficiently as a broad-based approach that includes individual and group work, some projects and activities accompanied by teacher explanation, and practical work with concrete materials in concert with practice of important techniques. However, small-group work, using manipulatives, and problem solving in the context of projects can be considered positive signs of implementation of many recent recommendations for the reform of school mathematics.

The benefits of cooperative learning resulting from effective use of small-group work have been documented through various research studies.[60] Mathematics problems are ideally suited for group discussion because they can be objectively demonstrated, and students in groups can discuss the merits of different proposed solutions and learn multiple strategies for solving the same problems. Because they can help each other, students in groups can often handle challenging situations beyond their individual capabilities. Further, the positive affective impact of working together mirrors the use of mathematics in the workplace and reduces mathematics anxiety. Mathematics need not be a solitary activity, and working with others is often more effective. Students can build self-confidence and gain useful insights into the social interactions and skills required for shared responsibility, while gaining more in-depth understanding of the mathematics concepts being studied.

Similarly, research on mathematics learning supports the use of concrete objects such as colored rods, unit cubes, geometric shapes, and spinners to illustrate concepts.[61] Students appear to be quite responsive to hands-on activities, and the *NCTM Standards* recommend that every classroom be equipped with ample sets of manipulative materials and supplies. Finally, to help students understand the utility of mathematics and how to communicate those ideas effectively, the *NCTM Standards* also recommend mathematical projects and reports. For example, students might be asked to conduct a survey in their school and report the results. TABLES 6.5 and 6.6 present teachers' and students' reports on the frequency of small group work; the use of rulers, counting blocks, and geometric shapes; and the prevalence of reports and projects.

---

[60]Neil Davidson, "Introduction and Overview" in *Cooperative Learning in Mathematics*, Neil Davidson, editor (Menlo Park, CA: Addison-Wesley Publishing Company, 1990).

Robert E. Slavin, "When Does Cooperative Learning Increase Students' Achievement?" in *Psychological Bulletin* 94, 1983, pp. 429-45.

David W. Johnson, et al., "Effects of Cooperative, Competitive, and Individualistic Goal Structures on Achievement: A Meta-Analysis" in *Psychological Bulletin*, 89, 1981, pp. 47-62.

[61]Julian Weissglass, "Cooperative Learning Using a Small-Group Laboratory Approach" in *Cooperative Learning in Mathematics*, Neil Davidson, editor (Menlo Park, CA: Addison Wesley Publishing Company, 1990).

Thomas A. Romberg, "A Common Curriculum for Mathematics" in *Individual Differences and the Common Curriculum: Eighty-Second Yearbook of the National Society for the Study of Education* (Chicago, IL: University of Chicago Press, 1983).

TABLE 6.5 Teachers' Reports on Frequency of Small Group Work, Using Manipulatives, and Doing Mathematics Projects

	About how often do students in this class do the following types of activities for mathematics class?					
	At Least Once a Week		Less than Once a Week		Never	
Work in small groups	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	63 (2.5)	216 (1.0)	32 (2.5)	219 (1.3)	5 (0.8)	215 (2.8)
High ability	57 (7.9)	243 (3.3)	42 (8.0)	236 (4.0)	---	---
Average ability	62 (3.7)	216 (1.4)	31 (3.5)	218 (2.1)	7 (1.9)	218 (5.0)
Low ability	64 (5.3)	201 (2.3)	34 (5.4)	200 (3.6)	2 (1.0)	195 (10.9)
Mixed ability	64 (4.7)	216 (1.6)	32 (4.6)	219 (2.2)	4 (1.3)	212 (4.6)
Grade 8	49 (3.0)	265 (1.9)	41 (2.9)	268 (1.8)	11 (1.7)	265 (3.1)
High ability	45 (4.2)	291 (3.6)	45 (3.8)	291 (2.7)	10 (2.3)	285 (4.2)
Average ability	49 (3.7)	262 (1.9)	40 (3.5)	265 (2.2)	11 (2.1)	269 (4.1)
Low ability	47 (4.6)	239 (2.3)	38 (4.8)	244 (3.5)	16 (4.0)	242 (3.7)
Mixed ability	51 (7.2)	259 (5.3)	41 (7.7)	261 (3.4)	8 (3.4)	263 (5.4)
Work with rulers, counting blocks, or geometric shapes	At least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	49 (2.2)	217 (1.1)	50 (2.3)	217 (1.0)	1 (0.4)	201 (4.8)
High ability	49 (6.7)	241 (4.9)	51 (6.7)	240 (4.2)	---	---
Average ability	53 (3.6)	219 (1.7)	44 (3.9)	216 (1.8)	3 (1.1)	207 (8.8)
Low ability	48 (6.7)	201 (2.5)	50 (6.6)	201 (3.9)	2 (0.9)	191(11.7)
Mixed ability	44 (3.3)	216 (2.3)	56 (3.4)	218 (1.6)	1 (0.5)	199 (6.8)
Grade 8	28 (3.0)	260 (2.0)	64 (3.3)	267 (1.5)	8 (1.2)	284 (4.7)
High ability	17 (3.0)	282 (3.8)	64 (4.4)	290 (2.6)	19 (3.3)	[illegible]
Average ability	27 (3.6)	264 (2.2)	70 (3.4)	264 (1.7)	3 (0.9)	[illegible]
Low ability	36 (4.5)	237 (2.9)	59 (4.5)	244 (2.7)	5 (1.5)	235 (8.3)
Mixed ability	37 (8.8)	263 (6.3)	58 (9.0)	260 (2.9)	6 (3.0)	250 (4.0)
Write reports or do mathematics projects	At least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 8	2 (0.8)	259 (5.0)	54 (2.8)	267 (1.9)	43 (3.1)	266 (1.5)
High ability	1 (0.8)	301 (9.2)	59 (3.9)	290 (3.0)	39 (4.1)	291 (2.4)
Average ability	2 (0.9)	265 (7.5)	52 (4.3)	264 (1.8)	46 (4.6)	265 (2.5)
Low ability	4 (1.8)	235 (5.2)	49 (5.5)	241 (2.8)	47 (5.4)	242 (3.0)
Mixed ability	3 (1.5)	254(24.2)	59 (5.5)	259 (3.9)	38 (6.2)	262 (3.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

TABLE 6.6 Students' Reports on Frequency of Small Group Work, Using Manipulatives, and Doing Mathematics Projects

	In mathematics class, how often do you do each of the following?					
Work in small groups	At Least Once a Week		Less Than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	33 (1.3)	212 (1.0)	23 (0.8)	227 (1.0)	44 (1.4)	214 (1.0)
Grade 8	28 (1.9)	263 (1.7)	27 (1.0)	273 (1.6)	45 (2.1)	263 (1.2)
Grade 12 - All Students	32 (1.1)	295 (1.2)	24 (0.7)	300 (1.3)	44 (1.3)	294 (1.4)
Grade 12 - Taking Math	34 (1.3)	305 (1.4)	26 (0.9)	309 (1.5)	41 (1.5)	304 (1.4)
Work with rulers, counting blocks, or geometric shapes	At Least Once a Week		Less Than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	43 (1.1)	214 (0.9)	27 (0.7)	226 (1.0)	30 (1.1)	211 (0.9)
Grade 8	30 (1.4)	263 (1.8)	31 (0.7)	272 (1.2)	39 (1.5)	262 (1.1)
Grade 12 - All Students	30 (2.8)	293 (1.3)	29 (0.7)	303 (1.2)	41 (1.0)	292 (1.5)
Grade 12 - Taking Math	27 (1.2)	302 (1.6)	33 (1.0)	311 (1.3)	39 (1.3)	303 (1.6)
Write reports or do mathematics projects	At Least Once a Week		Less Than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 8	10 (0.6)	245 (2.1)	21 (0.9)	271 (1.5)	70 (1.0)	266 (1.1)
Grade 12 - All Students	9 (0.5)	280 (1.8)	20 (0.8)	298 (1.4)	71 (0.9)	297 (1.1)
Grade 12 - Taking Math	9 (0.7)	289 (2.6)	21 (0.9)	307 (1.7)	70 (1.0)	307 (1.1)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

It may not be surprising that teachers reported much more group work than did students, since these activities can affect classroom management and may have stood out more in the minds of teachers than students. Students are placed in groups but work independently, and these types of situations may have been reported differently by students. At grade 4, teachers report that 63 percent of their students worked in small groups at least once a week, without much differentiation by ability level. However, only 33 percent of the fourth graders reported weekly work in small groups. Similarly, teachers of eighth graders reported that about half work in small groups on a weekly basis, whereas only 28 percent of the students reported working in small groups this frequently.

Teachers and students, however, agreed on the frequency of using rulers and such manipulatives as counting blocks and geometric shapes. Somewhat less than half the fourth graders and about 30 percent of the eighth graders appeared to engage in such activities on a weekly basis. Fourth-grade teachers reported little difference in the use of these materials according to the ability level of their classes. However, at grade 8, teachers reported using these materials more frequently with students in low- and mixed-ability classes. At all three grades, the students who reported moderate use of such materials had higher average proficiency than did students who reported either weekly or no use.

At grade 8, teachers and students also were asked about the frequency of doing mathematics reports or projects. Both agreed that such work was rare, although they seemed to have different opinions about whether it was merely infrequent or virtually nonexistent. Teachers reported that nearly half the eighth graders were never asked to do such activities, including 39 percent of those in high-ability classes. However, 70 percent of the eighth graders reported never doing reports or projects. Their reports were supported by those of students at grade 12, where an equal proportion reported never being assigned these long-term activities.

TESTING IN MATHEMATICS CLASSES

The data on frequency of testing in mathematics classes are presented in TABLES 6.7 and 6.8. Again, it is important to remember that NAEP data cannot establish the quality of the tests administered, but they do suggest that testing is a frequent activity in mathematics classrooms. According to their teachers, about half of the fourth and eighth graders were given teacher-made tests on a weekly basis. In addition, more than 80 percent occasionally took mathematics tests required by the school, district, or state, and about two-thirds also occasionally took other published mathematics tests. Although middle-school teachers did not report more testing than elementary school teachers, eighth-grade students reported more testing than did fourth-grade students, who seemed to be in somewhat better agreement with their teachers. Seventy-one percent of the eighth graders reported taking a mathematics test weekly (or even more frequently), compared to approximately half of the fourth graders. However, students reporting less frequent testing performed better, on average, than did those reporting more frequent testing.

TABLE 6.7 Teachers' Reports on Frequency of Testing in Mathematics Classes

	About how often do students in this class do the following types of activities for mathematics class?					
	At Least Several Times a Week		About Once a Week		Less than Weekly	
Take teacher-generated mathematics tests	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	7 (0.9)	212 (3.0)	41 (2.4)	214 (1.2)	52 (2.3)	220 (1.3)
Grade 8	4 (1.2)	281 (5.2)	56 (2.7)	264 (1.8)	40 (2.9)	268 (1.4)
Take mathematics tests required by the school, district, or state	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	12 (1.6)	207 (2.[illegible])	82 (1.9)	219 (0.8)	6 (1.0)	214 (2.6)
Grade 8	8 (1.8)	256 (4.5)	84 (2.3)	268 (1.3)	8 (1.9)	263 (4.3)
Take other published mathematics tests	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	8 (1.5)	214 (2.8)	67 (2.4)	217 (0.9)	24 (2.4)	220 (1.4)
Grade 8	12 (1.8)	261 (4.0)	69 (2.6)	266 (1.4)	19 (2.1)	271 (2.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 6.8 Students' Reports on Frequency of Testing in Mathematics Classes

	In mathematics class, how often do you do the following?					
	At Least Several Times a Week		About Once a Week		Less than Weekly	
Take mathematics tests	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	19 (0.8)	197 (1.2)	33 (0.8)	216 (0.8)	49 (1.1)	223 (0.8)
Grade 8	12 (0.8)	250 (1.8)	59 (1.7)	266 (1.4)	29 (1.6)	271 (1.0)
Grade 12 - All Students	9 (0.5)	280 (2.2)	49 (1.2)	301 (1.2)	42 (1.2)	293 (1.3)
Grade 12 - Taking Math	10 (0.6)	286 (2.7)	60 (1.4)	306 (1.2)	30 (1.4)	313 (1.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

AVAILABILITY OF RESOURCES IN MATHEMATICS CLASSES

Teachers' use of materials is inevitably affected by the availability of resources. To examine the possible impact of access to resources on mathematics instruction, teachers were asked to what extent they got all of the resources and materials they needed. Their responses are summarized in TABLE 6.9.

With the recommended move to "hands-on" and technology-based instructional approaches in mathematics classrooms, the adequacy of resources becomes an important issue. Teachers' reports did show a positive relationship with student achievement. In general, students in classrooms with all the necessary resources had higher average proficiency than did those in classrooms with none or only some of the necessary resources. However, according to their teachers, few fourth- and eighth-grade students appeared to be in well-supplied classrooms and approximately one-third were in classrooms where access to resources appeared to be a serious problem. The teachers of 13 percent of the fourth graders and 19 percent of the eighth graders reported receiving all the resources they needed. Although about half the students at grades 4 and 8 were in classes where most of the necessary resources were available, teachers of 38 percent of the fourth graders and 28 percent of the eighth graders reported getting only some or none of the resources they needed.

As might be anticipated, students in advantaged urban areas were more likely than those in disadvantaged urban areas to have teachers who reported access to a full array of resources. Conversely, students in disadvantaged urban areas were more likely to be in classes where resources were reportedly lacking. Forty-eight percent of the fourth graders and 40 percent of the eighth graders in disadvantaged urban areas were in classrooms where teachers reported only receiving some or none of the needed resources.

TABLE 6.9 Teachers' Reports on the Availability of Resources

	How well supplied are you by your school system with the instructional materials and other resources you need to teach your class?					
	I get all the resources I need.		I get most of the resources I need.		I get some or none of the resources I need.	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	13 (1.5)	220 (2.2)	49 (1.8)	219 (1.1)	38 (2.0)	213 (1.1)
Advantaged Urban	22 (5.0)	233 (2.8)	63 (6.1)	232 (2.7)	15 (4.5)	231 (3.1)
Disadvantaged Urban	13 (3.7)	202 (8.1)	39 (4.8)	200 (3.1)	48 (5.2)	200 (3.9)
Extreme Rural	14 (5.1)	225 (3.7)	42 (8.0)	217 (3.9)	44 (6.9)	216 (4.0)
Other	11 (1.7)	217 (2.8)	50 (2.5)	218 (1.1)	39 (2.8)	214 (1.4)
Grade 8	19 (2.4)	274 (3.5)	53 (2.9)	266 (1.4)	28 (2.8)	263 (1.8)
Advantaged Urban !	44(11.2)	286 (7.4)	46 (8.8)	283 (3.8)	10 (4.2)	283 (2.8)
Disadvantaged Urban	8 (3.8)	240 (5.9)	52 (7.0)	257 (3.9)	40 (7.6)	254 (4.7)
Extreme Rural !	12 (6.5)	273(11.4)	57(10.1)	262 (4.9)	31 (8.6)	260 (2.6)
Other	17 (2.6)	271 (2.8)	54 (3.7)	265 (1.4)	29 (3.7)	264 (2.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 because of rounding. !Interpret with caution--the nature of the sample does not allow accurate determination of the variability of the results for these population subgroups.

SUMMARY

The *NCTM Standards* for both curriculum and teaching recommend well-equipped classrooms and instruction reflecting the vitality of mathematics.[62] According to both students and teachers, textbooks and worksheets were by far the predominant materials used in teaching mathematics. More than half the fourth graders appeared to work problems from their textbooks on a daily basis

[62] *Professional Standards for Teaching Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1990).

Curriculum and Evaluation Standards (Reston, VA: National Council of Teachers of Mathematics, 1989).

and complete worksheets at least weekly. The textbook became the primary instructional source at the upper grades, with about 70 percent of the eighth graders and 81 percent of the twelfth graders working problems from their textbooks on a daily basis. Even at the higher grades, worksheets were still used, and this occurred even more frequently with lower-performing students. There also seemed to be considerable testing in mathematics classes at all three grades.

In contrast, approximately one-third of the students across all three grades reported never working in small groups or with manipulatives and tools such as counting blocks, rulers, or geometric shapes. Their teachers reported using these strategies supported by research on a more frequent basis, but even so, they reported far less use of these activities than they did of their textbooks. Both teachers and students agreed that mathematics reports or projects were done infrequently, if at all. According to their teachers, nearly half the eighth graders were never asked to write reports or do mathematics projects.

Finally, many teachers reported difficulty in obtaining the necessary resources to teach their classes. Close to half the students attending schools in disadvantaged urban communities were in classrooms that had none or only some of the resources needed.

Chapter 7

Calculators and Computers

INTRODUCTION

In recognition of the potential provided by calculators and computers for increasing children's mathematical power, recommendations for improving mathematics education often include more use of these new tools in today's classrooms.[63] Incorporating calculators and computers as integral parts of classroom instruction can help make school mathematics become more like the mathematics people actually use in their everyday lives and on the job. How many businesses actually use paper-and-pencil methods to keep track of accounts or inventories? How many people actually do detailed paper-and-pencil computations as part of their daily activities at home or at work? The availability of increasingly sophisticated and economically feasible technology can be used to accelerate the pace of student learning in mathematics, allowing the tedious computations required to arrive at complex solutions and check alternatives to be accomplished in seconds rather than hours.

---

[63] *Professional Standards for Teaching Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1991).

The Governors' 1991 Report on Education, Results in Education: 1990 (Washington, DC: The National Governors Association, 1990).

Everybody Counts: A Report to the Nation on the Future of Mathematics Education, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

Curriculum and Evaluation Standards for School Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1989).

Ray Hembree and Donald J. Dessart, "Effects of Hand-Held Calculators in Precollege Mathematics Education: A Meta-analysis" in *The Journal for Research in Mathematics Education*, Vol. 17, Number 2, March 1986, pp. 83-99.

The National Science Board Commission on Precollege Education in Mathematics, Science, and Technology, *Educating Americans for the 21st Century* (Washington, DC: National Science Foundation, 1983).

The *NCTM Standards* state that:

- Appropriate calculators (i.e., scientific calculators for middle school and scientific/graphing calculators for high school) should be available to all students at all times.

- A computer should be available in every classroom for demonstration purposes.

- Every student should have access to a computer for individual and group work.

- Students should learn to use the computer as a tool for processing information and performing calculations to investigate and solve problems.

Consistent with the importance of technology in mathematics instruction, NAEP provided four-function calculators to fourth graders and scientific calculators to eighth and twelfth graders for portions of the assessment, conducting brief training exercises in their usage prior to testing. As well as measuring whether students knew how to use a calculator, the assessment collected information about their understanding of when to use a calculator. Additionally, students, teachers, and schools were asked questions about the availability and use of calculators and computers in school, as well as questions about policies related to the pervasiveness of such activities.

TEACHERS' POLICIES ON USING CALCULATORS IN MATHEMATICS CLASS

As some gauge of support and underlying perceptions regarding calculator usage in school mathematics, teachers of the fourth and eighth graders who participated in the assessment were asked about their overall policies for using calculators. The results are presented in TABLES 7.1 and 7.2.

TABLE 7.1 Teachers' Reports on Permitting the Use of Calculators in Mathematics Class

	Unrestricted Use		Restricted Use	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	3 (0.7)	219 (3.4)	97 (0.7)	217 (0.8)
Grade 8	19 (2.2)	280 (2.6)	81 (2.2)	263 (1.2)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent that for each population of interest, the value fcr the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 7.2 Teachers' Reports on Permitting the Use of Calculators on Tests

	Permit Use on Tests			
	Yes		No	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	2 (0.5)	226 (8.9)	99 (0.5)	217 (0.8)
Grade 8	34 (3.3)	274 (2.1)	66 (3.3)	262 (1.3)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent due to rounding.

According to their teachers, only 3 percent of the fourth graders and 19 percent of the eighth graders are permitted free and open use of this important tool, and only 2 percent of the fourth graders and 34 percent of the eighth graders are permitted to use calculators on tests. Although proficiency did not differ by teachers' calculator policies at grade 4, the eighth graders who were given unrestricted use of calculators or permitted to use them on tests had higher proficiency.

Although few would argue the importance of learning basic arithmetic facts without reliance on a calculator, these skills should be well in hand by the middle of grade 4. In the upper primary grades, and especially by grade 8, the curriculum might well require some mathematics of the sort that depends on calculators.[64]

STUDENTS' ACCESS TO CALCULATORS

To incorporate calculator usage into the curriculum, students must have access to this technology. Related information on student access to calculators is presented in TABLES 7.3 and 7.4. Teachers reported that about half their students (44 percent of the fourth graders and 52 percent of the eighth graders, respectively) had access to school-owned calculators. Virtually all students, however, reported that they themselves or their family owned a calculator.

TABLE 7.3 Teachers' Reports on Students' Access to School-Owned Calculators

	Access to School-Owned Calculators			
	Yes		No	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	44 (2.5)	220 (1.5)	56 (2.5)	216 (1.1)
Grade 8	52 (3.5)	267 (2.0)	48 (3.5)	266 (1.7)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

[64] *Reshaping School Mathematics: A Philosophy and Framework for Curriculum* (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

TABLE 7.4 Students' Reports on Owning Calculator

	Student or Family Owns Calculator			
	Yes		No	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 8	97 (0.3)	266 (1.0)	3 (0.3)	236 (2.6)
Grade 12 - All Students	98 (0.2)	296 (1.0)	2 (0.2)	266 (3.1)
Grade 12 - Taking Math	99 (0.2)	306 (1.0)	1 (0.2)	268 (4.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

Information about older students' familiarity with scientific calculators is presented in TABLE 7.5. Approximately half the eighth graders and approximately four-fifths of the twelfth graders reported ever having used a scientific calculator. The majority of eighth and twelfth graders were asked to use a scientific calculator in the assessment (with some training), and it is worth noting that for a nontrivial proportion of these students, this was their first contact with this technology. Because only 58 percent of the twelfth graders reported being in any type of mathematics class, the data on calculator and computer usage are presented separately for those students. However, not that many more students in mathematics classes -- 87 percent as compared to 81 percent of all twelfth graders -- reported ever having used a scientific calculator.

TABLE 7.5 Students' Reports on Use of Scientific Calculators

	Student Ever Used Scientific Calculator			
	Yes		No	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 8	56 (1.4)	269 (1.3)	44 (1.4)	261 (1.0)
Grade 12- All Students	81 (0.8)	302 (1.0)	19 (0.8)	269 (1.2)
Grade 12 - Taking Math	87 (0.7)	311 (1.1)	13 (0.7)	272 (1.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

FREQUENCY OF CALCULATOR USE IN MATHEMATICS CLASS

As shown in TABLES 7.6 and 7.7, both teachers and students were asked how frequently calculators were used in mathematics classes. To supplement the view provided by the national results, teachers' reports also are presented in relation to their categorizations of the ability levels of their classes.

TABLE 7.6 Teachers' Reports on Frequency of Use of Calculators in Mathematics Classes

	About how often do students in this class do the following activity?					
	At Least Several Times a Week		Weekly or Less		Never	
Use a calculator	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	6 (1.1)	224 (3.0)	48 (2.6)	219 (1.1)	47 (2.5)	214 (1.1)
High ability	13 (4.0)	243 (8.6)	55 (7.7)	244 (3.5)	32 (6.9)	233 (4.1)
Average ability	3 (1.0)	227 (4.6)	53 (4.7)	217 (1.7)	45 (4.5)	217 (1.9)
Low ability	2 (1.0)	186 (5.9)	47 (5.9)	205 (3.1)	51 (5.1)	197 (2.0)
Mixed ability	7 (1.9)	221 (3.6)	43 (4.5)	219 (2.3)	50 (4.4)	214 (1.6)
Grade 8	30 (3.0)	274 (1.8)	49 (2.8)	264 (2.0)	22 (2.2)	261 (2.1)
High ability	34 (4.2)	297 (2.6)	48 (4.8)	289 (3.1)	19 (3.2)	285 (4.2)
Average ability	32 (3.7)	267 (2.3)	45 (3.5)	264 (1.9)	23 (3.1)	259 (2.7)
Low ability	19 (4.3)	248 (4.3)	52 (4.8)	241 (2.3)	28 (4.5)	238 (2.6)
Mixed ability	27 (5.7)	269 (3.3)	54 (5.2)	255 (4.2)	20 (5.3)	262 (4.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

TABLE 7.7 Students' Reports on Frequency of Use of Calculators in Mathematics Classes

	In mathematics class, how often do you do the following?					
	At Least Several Times a Week		Weekly or Less		Never	
Use a calculator	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	9 (0.7)	200 (1.7)	29 (1.5)	224 (1.2)	62 (1.9)	215 (0.8)
Grade 8	30 (1.9)	269 (1.3)	31 (1.1)	268 (1.7)	39 (2.3)	260 (1.1)
Grade 12 - All Students	58 (1.2)	305 (1.1)	20 (0.9)	290 (2.1)	24 (1.1)	282 (1.6)
Grade 12 - Taking Math	70 (1.1)	311 (1.1)	16 (0.9)	300 (1.9)	14 (0.9)	287 (2.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

Teachers reported that 47 percent of the fourth graders and 22 percent of the eighth graders were never asked to use a calculator in mathematics class. Fourth-grade teachers, however, tended to use calculators somewhat more frequently in their high-ability classes. Similarly, eighth-grade teachers reported the least frequent use with their low-ability classes. Although there were some exceptions, the more proficient students seemed to be given more opportunity for calculator usage, even across ability levels.

This tendency, whereby mathematics is made less painful and more challenging, only after students prove that they can do it the "old-fashioned" way, may contribute to increasing the performance gap between higher- and lower-performing students.

There was strong agreement between teachers and students about the prevalence of routine calculator use. Both reported that fewer than 10 percent of the fourth graders and 30 percent of the eighth graders used a calculator several times a week. There was less agreement about moderate use, with far more fourth and eighth graders than their teachers reporting that they never used a calculator. Twelfth graders reported more calculator usage than did students at the lower grades, with 70 percent of those taking mathematics classes reporting use at least several times a week. At the twelfth grade, there was a strong positive relationship between frequency of calculator use and average mathematics proficiency.

NATURE OF STUDENT CALCULATOR USE

Students in the eighth and twelfth grades were asked how frequently they used a calculator to work problems in class, to do problems at home, and to take tests or quizzes (see TABLE 7.8). At both grades, approximately half the students reported almost always using a calculator to work problems in class, and about one-third reported doing so sometimes, although the relationship of this use with proficiency differed dramatically for the two grades. At the eighth grade, the students who almost always relied on the calculator had lower performance, while at the twelfth grade, the lowest performance was for students who reported never using a calculator to solve problems in class.

TABLE 7.8 Students' Reports on Ways They Use a Calculator

	For mathematics class, how often do you use a calculator to do each of the following?					
	Almost Always		Sometimes		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Work Problems in Class						
Grade 8	46 (0.9)	257 (1.1)	30 (1.1)	271 (1.6)	24 (1.3)	275 (1.2)
Grade 12 - All Students	42 (1.0)	301 (1.1)	32 (0.8)	298 (1.4)	27 (1.0)	285 (1.6)
Grade 12 - Taking Math	53 (1.2)	306 (1.3)	33 (1.0)	308 (1.5)	14 (0.9)	299 (3.0)
Do Problems at Home						
Grade 8	30 (1.0)	264 (1.2)	52 (0.8)	266 (1.3)	19 (0.7)	266 (1.3)
Grade 12 - All Students	38 (0.9)	305 (1.2)	38 (0.7)	295 (1.4)	24 (0.8)	283 (1.5)
Grade 12 - Taking Math	46 (1.0)	311 (1.3)	41 (1.0)	303 (1.5)	13 (0.6)	294 (2.5)
Take Tests or Quizzes						
Grade 8	25 (0.9)	257 (1.6)	43 (1.2)	261 (1.5)	32 (1.3)	277 (1.2)
Grade 12 - All Students	34 (0.9)	303 (1.2)	34 (0.9)	298 (1.4)	32 (1.1)	286 (1.5)
Grade 12 - Taking Math	43 (1.3)	309 (1.3)	38 (1.2)	304 (1.6)	19 (1.1)	300 (2.7)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

About half the high-school seniors enrolled in mathematics courses reported almost always using a calculator to work mathematics problems at home, as did 38 percent of the twelfth graders overall. In both groups, a greater frequency of use was related to higher average proficiency. At grade

8, the majority of the students reported at-home use "sometimes," and there was no relationship between frequency of use and average proficiency.

Although one-third of the eighth and twelfth graders reported never using calculators to take tests or quizzes, the results parallel those for the question on solving problems in class. At grade 12, students who reported almost always using calculators to take tests and quizzes performed better than those reporting using them sometimes, who in turn performed better than those never using calculators. At grade 8, the pattern was reversed.

STUDENT PROFICIENCY IN USING A CALCULATOR

Because of the importance of calculator usage in mathematics, some students were given calculators to use for portions of the assessment and were provided instruction and practice in how to use them prior to the test administration. Fourth graders were provided with four-function calculators, and students at grades 8 and 12 were given scientific calculators. At each grade, two of the seven sections of the assessment (not including the three sections administered via paced audiotape) were administered with a calculator. However, because of the sampling methodology, some students took both sections, some took only one section, and some took neither. Approximately five-sevenths of the students were given at least one calculator section.

Part of the mathematics assessment was designed to investigate not only if students know how to use a calculator, but also whether they know when use of a calculator is helpful and when it is not. For the calculator portions of the assessment, students could choose whether or not to use a calculator for each item, and they were asked to indicate in their test booklets whether they did or did not use the calculator for each item.

The questions in the calculator sections were classified in three ways: calculator inactive, calculator neutral, and calculator active. Calculator-inactive items are those whose solution neither requires nor suggests the use of a calculator; in fact, a calculator would be virtually useless as an aid to solving the problem. Calculator-neutral items are those in which the solution to the question does not require the use of a calculator, but some students might choose to do so. In contrast, calculator-active items require calculator use; a student would likely find it almost impossible to solve the question without the aid of a calculator.

To compare the mathematics proficiency of students more knowledgeable about calculator use, to that of their less knowledgeable classmates, the students who responded to the calculator sections of the assessment were categorized into two groups:

- High Group -- Students who used the calculator appropriately (i.e., used it for the calculator-active items and did not use it for the calculator-inactive items) at least 85 percent of the time and indicated that they had used the calculator for at least half of the calculator-active items they were presented.

- Other Group -- Students who did not use the calculator appropriately at least 85 percent of the time or indicated that they had used the calculator for less than half of the calculator-active items they were given.

The results presented in TABLE 7.9 indicate that the students in the high group had higher average proficiency than did those in the other group. Also, starting with the fourth grade, fewer students were in the high group for each successive grade assessed. Whereas the majority of the fourth graders were in the high group, which showed some facility with a four-function calculator, less than half of the eighth graders and only 30 percent of the high-school seniors demonstrated a high degree of knowledge in how and when to use a scientific calculator.

TABLE 7.9 Students' Understanding of When to Use a Calculator

	High Group		Other Group	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	57 (0.7)	221 (0.7)	43 (0.7)	209 (0.9)
Grade 8	44 (0.9)	275 (1.3)	56 (0.9)	258 (1.1)
Grade 12	30 (0.8)	310 (1.3)	70 (0.8)	289 (1.1)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

SCHOOLS' AND TEACHERS' REPORTS ON AVAILABILITY OF COMPUTERS

Computers can be used in a wide variety of ways in mathematics classrooms. Although they may be most frequently used for computational drill and practice, teachers can take full advantage of this technology by using computers to teach graphs, spreadsheets, and extended investigations of mathematical ideas.[65] The computer has the potential to provide opportunities for problem solving using "hands-on" techniques and also can be effective as a tool in small-group work.

However, because computers are so much more expensive than calculators, providing them for student use can present a resource problem. NAEP asked both school administrators and teachers about the availability of computers in mathematics classrooms, and the results are presented in TABLES 7.10 and 7.11.

TABLE 7.10 Schools' Reports on the Availability of Computers

	Yes, computers available all the time in mathematics classrooms	Yes, computers grouped in a laboratory available to mathematics classes	Yes, computers available to bring to classroom when needed
	Percent of Students	Percent of Students	Percent of Students
Grade 4	22 (2.7)	56 (2.9)	53 (3.1)
Grade 8	10 (2.6)	61 (4.4)	57 (3.5)
Grade 12	10 (2.6)	79 (3.8)	64 (3.7)

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

[65] Mary Male, "Cooperative Learning and Computers in the Elementary and Middle School Math Classroom" in *Cooperative Learning in Mathematics*, Neil Davidson, editor (Menlo Park, CA: Addison-Wesley Publishing Company, 1990).

Charlene Sheets and M. Kathleen Heid, "Integrating Computers as Tools in Mathematics Curricula (Grades 9-13): Portraits of Group Interactions" in *Cooperative Learning in Mathematics*, Neil Davidson, editor (Menlo Park, CA: Addison Wesley Publishing Company, 1990).

TABLE 7.11 Teachers' Reports on the Availability of Computers for Student Use

	Available in Classroom		Difficult to Access		Not Available	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	34 (2.4)	221 (1.6)	47 (2.9)	217 (1.3)	19 (2.1)	213 (2.2)
High ability	30 (6.1)	244 (3.5)	52 (8.1)	238 (4.7)	18 (5.7)	236 (6.0)
Average ability	30 (3.4)	222 (1.9)	48 (3.7)	218 (1.7)	21 (3.2)	211 (2.9)
Low ability	31 (7.1)	209 (3.9)	52 (7.3)	200 (3.0)	17 (3.9)	190 (4.2)
Mixed ability	37 (3.6)	219 (1.9)	44 (4.0)	217 (2.1)	20 (3.4)	217 (3.5)
Grade 8	21 (2.9)	264 (2.8)	52 (3.4)	267 (1.7)	27 (3.0)	266 (1.8)
High ability	20 (4.5)	289 (5.4)	52 (4.7)	291 (2.6)	28 (4.1)	290 (3.2)
Average ability	16 (2.8)	262 (3.1)	57 (4.1)	265 (2.0)	27 (3.7)	264 (2.6)
Low ability	19 (4.7)	235 (3.0)	48 (4.9)	242 (3.1)	33 (4.5)	243 (2.6)
Mixed ability	32 (8.1)	260 (5.3)	45 (7.3)	261 (3.5)	22 (5.3)	260 (3.1)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent because of rounding.

School administrators and teachers appeared to agree that more fourth-grade than eighth-grade mathematics classrooms have computers. However, in both instances, teachers reported more students in classrooms with computers than did administrators. At grade 4, teachers reported that about one-third of the students had at least one computer in their mathematics classroom. This data did not vary much across ability groupings. At grade 8, teachers reported that about one-fifth of the students had at least one computer in their mathematics classroom, with availability perhaps being somewhat more likely in classrooms where students were of mixed ability. At grade 12, school administrators reported the same level of classroom availability as they did for grade 8 (10 percent).

School administrators reported that 56 percent of the students in grade 4, 61 percent in grade 8, and 79 percent in grade 12 were in schools with computer laboratories. Across the grades, they also reported that more than half the students were in schools where computers were available for classroom use when needed.

Teachers' reports, however, indicated that computer access was more limited. At both grades 4 and 8, they reported that while computers were available for about half the students, they were difficult to access. Teachers of fourth graders reported no computer availability for about one-fifth of their students, and teachers of eighth graders reported no computer availability for more than one-fourth of their students. At both grades, teachers' reports about computer availability were relatively constant, regardless of the ability levels of their classes.

Overall, there was a positive relationship between the availability of computers and average proficiency at grade 4. This relationship tended to hold across the different ability groupings. At grade 8, there appeared to be no relationship between availability of computers and performance, except perhaps in low-ability classes where students with computers in their classrooms had lower average proficiency than did their classmates in classrooms where computers were difficult to access or not available. This may reflect attempts by districts and businesses to provide "at risk" students with computers in school or the use of ESEA Chapter 1 funds to purchase computers.

TEACHERS' AND STUDENTS' REPORTS ON EXTENT OF COMPUTER USE IN MATHEMATICS INSTRUCTION

Availability and access to computers is necessary for them to have an impact on mathematics instruction and achievement--but the equipment must also be used. TABLES 7.12, 7.13, and 7.14 show responses to questions posed to both teachers and students about frequency of computer use.

TABLE 7.12 Teachers' Reports on the Frequency of Computer Use in Mathematics Class

	About how often do students in this class do the following activity for mathematics class?					
	At Least Once a Week		Less than Once a Week		Never	
Use a computer	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	49 (2.2)	219 (1.1)	25 (2.1)	219 (1.4)	26 (1.5)	212 (1.6)
High ability	50 (7.5)	242 (3.0)	29 (6.3)	247 (4.2)	21 (5.5)	226 (5.6)
Average ability	47 (3.7)	221 (1.6)	31 (3.4)	217 (1.9)	22 (2.9)	210 (2.8)
Low ability	53 (5.4)	204 (2.5)	17 (4.7)	205 (7.5)	31 (5.0)	192 (2.9)
Mixed ability	51 (3.3)	217 (1.9)	25 (2.9)	218 (2.3)	25 (3.5)	214 (2.7)
Grade 8	13 (2.4)	257 (2.6)	35 (3.4)	269 (2.2)	52 (2.8)	267 (1.7)
High ability	11 (3.0)	284 (3.5)	39 (4.4)	294 (3.0)	50 (4.5)	289 (3.0)
Average ability	7 (2.1)	255 (5.4)	38 (4.0)	265 (2.0)	55 (3.5)	265 (2.0)
Low ability	17 (3.4)	232 (4.1)	30 (5.0)	240 (2.5)	54 (5.2)	245 (2.6)
Mixed ability	21 (7.8)	258 (4.9)	33 (7.7)	258 (6.0)	47 (5.5)	263 (2.7)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Percentages of students may not total 100 percent because of rounding.

TABLE 7.13 Students' Reports on the Frequency of Computer Use in Mathematics Class

	In mathematics class, how often do you do the following?					
	At Least Once a Week		'ess than Once a Week		Never	
Use a computer?	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	38 (1.3)	216 (1.1)	12 (0.8)	222 (1.7)	50 (1.3)	215 (0.8)
Grade 8	16 (0.8)	253 (1.7)	15 (1.1)	272 (2.1)	69 (1.3)	267 (1.0)
Grade 12 - All Students	20 (0.7)	290 (1.2)	14 (0.8)	304 (2.1)	66 (1.1)	296 (1.2)
Grade 12 - Taking Math	18 (0.9)	301 (1.6)	16 (1.1)	312 (2.3)	66 (1.4)	305 (1.2)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 7.14 Teachers' Reports on the Amount of Time that Students Spend Each Week Working with Computers to Solve Mathematics Problems

	None		15 minutes		30 Minutes or More	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	31 (2.3)	214 (1.8)	29 (2.5)	222 (1.6)	41 (2.7)	218 (1.2)
Grade 8	73 (2.6)	268 (1.3)	15 (2.2)	260 (2.9)	12 (2.1)	262 (2.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

Consistent with the reports about availability and accessibility, both teachers and students agreed that there is more use of computers at grade 4 than there is at grade 8, but that, in general, usage is quite limited. Within these broad parameters, however, teachers and students were not in agreement. At grade 4, teachers reported more usage than did students. According to their teachers, about half the students used a computer at least weekly, and only about one-fourth never used a computer, although this percentage increased to about one-third for the students in low- and average-ability classes.

According to fourth graders' reports, 38 percent used a computer weekly, and half never did. At grade 8, the extent of the disagreement was smaller, but teachers still reported more computer use than did students, and their reports were consistent across ability levels. Teachers reported that approximately half the eighth graders never used a computer, compared to 69 percent of the students. According to their teachers, 31 percent of the fourth graders and 73 percent of the eighth graders did not spend time on a weekly basis solving problems with computers. However, teachers reported that 41 percent of the fourth graders did spend about 30 minutes each week working with computers to solve mathematics problems.

There was no consistent relationship between frequency of computer use and performance across the three grades. At grade 4, proficiency was lower for students whose teachers reported they never used the computer, except in mixed-ability classrooms. Conversely, at grade 8, proficiency seemed to be higher for students whose teachers reported they never used the computer, except in high- and mixed-ability classrooms. Based on students' reports, the higher proficiency was observed when students reported that computer use was somewhere in between weekly and never.

The relationship between teachers' reports on the average minutes per week used to solve problems with a computer and average proficiency indicates that fourth graders who spent some time doing mathematics problems with a computer had higher proficiency than did those who spent no time on this activity, but that the eighth graders who spent no time on this activity outperformed their counterparts.

SUMMARY

The NAEP results indicate that while some students were using calculators in their mathematics classes, particularly at grade 12, few students were using computers very frequently and what computer use there was appeared to be more heavily concentrated at grade 4. If one thinks back to the days when slide rules were common, the nation has made some progress in incorporating technology into mathematics classrooms. Yet, the use of calculators and computers was far from widespread. According to both students and teachers, about half the fourth graders never used calculators and about half the eighth graders never used computers. Two-thirds of the twelfth graders, both overall and in mathematics classes, reported that they never used computers.

Because the use of technology in mathematics classrooms was so limited, the relationships between frequency of use and student proficiency were not clear cut. However, in view of the promise that technology appears to hold for improving mathematics education, these results raise concerns. In *Reshaping School Mathematics*, two fundamentally important issues stand out among the many ideas for revitalizing the mathematics curriculum, including changing people's perspectives on the need for mathematics and changing the roles of calculators and computers.[66]

By reducing the emphasis on hand calculations and permitting more time to develop the understanding of processes and reasoning that lie at the heart of mathematical problem solving, and by more closely paralleling how mathematics is applied in business and industry, the use of technology in mathematics classrooms could facilitate substantial improvement in student achievement.

---

[66] *Reshaping School Mathematics: A Philosophy and Framework for Curriculum* (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

Chapter 8

Instructional Time and Emphases

INTRODUCTION

In Chapter Four, the examination of course-taking patterns revealed that by grade 8, students had been differentiated into at least three primary mathematics programs -- eighth-grade mathematics, pre-algebra, and algebra. By high school, many take Algebra I and more than half go on to Algebra II and geometry. Only a small percent take trigonometry, Algebra III, pre-calculus, or calculus. This chapter explores two related curricular issues -- the amount of overall mathematics instructional time provided to students, including homework, and teachers' reports about the topics emphasized in fourth- and eighth-grade mathematics classrooms. Both sets of information represent some measure of students' opportunity to learn mathematics at grades 4 and 8. Taken together with the course-taking information presented for high-school students, this information provides a broad view of students' mathematics curriculum as they progress through school.

Evidence from other studies suggests that the substance of elementary and middle school mathematics may be more problematic than is allocation of instructional time. For example, as might be expected from the low high-school enrollments in more challenging mathematics courses, the Second International Mathematics Study (SIMS) found that the U.S. devoted comparatively less time to advanced college-preparatory mathematics than did many other countries.[67] However, the average amount of time devoted to mathematics at grade 8 compared favorably to the time allocated in other countries. Further, in the lower grades, more time may be devoted to mathematics instruction than to any other subject except reading. In the *Report*

---

[67]Curtis C. McKnight, et al., *The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective, A National Report on the Second International Mathematics Study* (Champaign, IL: International Association for the Evaluation of Educational Achievement, Stipes Publishing Company, 1987).

Harold W. Stevenson, Max Lummis, Shin-Ying Lee, and James W. Stigler, *Making the Grade in Mathematics: Elementary School Mathematics in the United States, Taiwan, and Japan* (Reston, VA: National Council of Teachers of Mathematics, 1990).

of the 1985-86 National Survey of Science and Mathematics Education, K-3 teachers reported spending the most time on reading, but more time on mathematics than on other subjects, such as science or social studies.[68]

In contrast to the comparatively favorable results on time spent, the SIMS study found the content of U.S. curriculum to be characterized by a great deal of repetition and review, with the effect that the eighth-grade curriculum tends to be arithmetic-driven, resembling the end of elementary school much more than the beginning of high school. This observation is consistent with the results reported in Chapter One indicating that eighth graders were farther behind the expected or intended curriculum than fourth graders were, and that twelfth graders appeared to be even farther behind than eighth graders. Further, the results in this chapter suggest that because of the repetitiveness of the curriculum, many elementary and middle-school students are not given an opportunity to learn higher mathematics. As a result, they may not be prepared for advanced course work in high school.

AMOUNT OF INSTRUCTIONAL TIME

As shown in TABLE 8.1, teachers reported that fourth graders received an average of approximately four hours of mathematics instruction each week and that eighth graders received slightly less instruction--about three and one-half hours per week. Although about 10 percent of the fourth graders were receiving two and one-half hours or less of mathematics instruction per week, another one-fifth were receiving between two and one-half and four hours per week, and nearly two-thirds were receiving four or more hours of instruction.

[68]Iris Weiss, *Report of the 1985-86 National Survey of Science and Mathematics Education* (Research Triangle Park, NC: Research Triangle Institute, 1987).

TABLE 8.1 Teachers' Reports on the Amount of Time Spent on Mathematics Instruction Each Week

	Average Hours of Instruction Provided Each Week	Two and One-Half Hours or Less Each Week		More than Two and One-Half Hours, but Less than Four Hours Each Week		Four Hours or More Each Week	
		Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	4.1 (0.1)	13 (1.4)	216 (2.3)	22 (1.8)	218 (1.8)	65 (1.7)	217 (0.9)
White	4.1 (0.1)	13 (1.6)	223 (2.0)	22 (2.0)	225 (1.8)	65 (2.1)	224 (1.0)
Black	4.3 (0.1)	15 (2.8)	191 (3.8)	21 (3.9)	196 (3.3)	65 (4.4)	197 (1.9)
Hispanic	4.3 (0.1)	12 (1.7)	203 (4.7)	22 (3.3)	201 (2.8)	66 (3.3)	201 (1.7)
Male	4.1 (0.1)	13 (1.4)	218 (2.6)	22 (2.0)	219 (2.3)	65 (1.8)	219 (1.1)
Female	4.2 (0.1)	13 (1.5)	215 (2.7)	22 (1.7)	218 (1.6)	65 (1.9)	216 (1.1)
Grade 8	3.4 (0.1)	27 (2.4)	265 (1.9)	42 (3.1)	268 (1.6)	31 (3.2)	264 (2.4)
White	3.4 (0.1)	26 (2.5)	273 (1.9)	43 (3.5)	273 (1.6)	31 (3.3)	270 (2.8)
Black	3.5 (0.1)	27 (4.7)	241 (2.4)	36 (4.1)	246 (2.9)	38 (5.1)	241 (3.0)
Hispanic	3.3 (0.1)	31 (3.8)	246 (2.6)	42 (5.0)	252 (3.5)	27 (4.0)	253 (3.3)
Male	3.4 (0.1)	26 (2.5)	265 (2.3)	43 (3.3)	269 (2.0)	31 (3.1)	264 (2.4)
Female	3.4 (0.1)	27 (2.5)	265 (2.3)	42 (3.2)	266 (1.6)	32 (3.4)	264 (2.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

According to their teachers, however, more than one-fourth of the eighth graders were receiving two and one-half hours or less of mathematics instruction per week. About 40 percent were receiving between two and one-half and four hours per week, and about one-third were receiving four hours or more.

At both grades 4 and 8, teachers' reports about instructional time were relatively consistent across population subgroups, and there did not appear to be a systematic relationship between the amount of instructional time provided and students' mathematics proficiency.

MATHEMATICS HOMEWORK

Homework can be used effectively to increase the amount of instructional time provided in the classroom. Both teachers and students were asked about homework, and the results are presented in TABLES 8.2 and 8.3. Teachers reported students doing somewhat less homework than the students reported themselves. Also, teachers said they assigned more homework to eighth graders than to fourth graders, but students reported less difference in homework between the grades.

TABLE 8.2 Teachers' Reports on Amount of Mathematics Homework Assigned Each Day

	None		15 Minutes		30 Minutes	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	4 (0.7)	213 (2.8)	49 (2.3)	220 (1.4)	34 (2.6)	218 (1.5)
Grade 8	1 (0.3)	245 (4.5)	40 (2.9)	260 (1.5)	45 (2.8)	269 (2.1)

	45 Minutes		An Hour or More	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	5 (1.0)	205 (4.0)	4 (0.8)	210 (4.4)
Grade 8	11 (1.2)	276 (3.4)	4 (0.7)	277 (3.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

TABLE 8.3 Students' Reports on Amount of Mathematics Homework Done Each Day

	None		15 Minutes		30 Minutes	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	8 (0.6)	221 (2.2)	39 (1.0)	219 (0.8)	27 (0.7)	219 (1.0)
Grade 8	10 (0.6)	256 (2.1)	32 (1.2)	267 (1.2)	32 (0.7)	267 (1.4)
Grade 12 - All Students	21 (0.7)	283 (1.5)	14 (0.6)	301 (1.5)	20 (0.6)	306 (1.5)
Grade 12 - Taking Math	12 (0.7)	296 (2.7)	21 (0.8)	304 (1.5)	31 (0.8)	308 (1.5)

	45 Minutes		An Hour or More	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	12 (0.6)	210 (1.5)	14 (0.6)	205 (1.5)
Grade 8	15 (0.6)	268 (1.7)	12 (0.6)	262 (2.1)
Grade 12 - All Students	11 (0.4)	305 (1.6)	13 (0.5)	305 (1.6)
Grade 12 - Taking Math	17 (0.6)	308 (1.7)	19 (0.9)	308 (1.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

According to both teachers' and students' reports, from two-thirds to four-fifths of fourth and eighth graders did 15 to 30 minutes of mathematics homework each day. At grade 4, those who spent at least 45 minutes or more each day had lower average proficiency than those who spent less time on homework. Perhaps the poorer students need more time to complete their homework or teachers give more homework to poorer students in an effort at remediation.

According to teachers' reports, the higher the students' proficiency levels at grade 8, the more homework assigned, up to 45 minutes each day. Teachers may perceive that they are giving more homework to their more able eighth graders, but according to students this may not be the case. Based on students' reports, proficiency levels did not vary much by amount of homework, except that those who reported no homework had lower performance.

Twelfth graders enrolled in mathematics classes (58 percent) reported doing somewhat more homework than did eighth graders, with fewer spending only 15 minutes each day on their homework and more spending an hour or more. However, the majority still reported doing only 15 to 30 minutes of homework each day and the relationship of their proficiency levels to achievement paralleled that for grade 8. Those who did some homework (15 minutes) had higher proficiency than those who did no homework, and those who did 30 minutes or more of homework had higher proficiency than those who did only 15 minutes each day. However, beyond 30 minutes of daily homework, proficiency levels were virtually identical.

INSTRUCTIONAL EMPHASES IN MATHEMATICS CONTENT AREAS

To collect information about students' instruction in the content areas covered by the NAEP assessment, at grades 4 and 8, their teachers were asked to estimate the emphasis placed on various mathematics content area topics. The results for the numbers and operations area are presented in TABLE 8.4 for the nation as a whole and by class ability level. However, research indicates considerable variation in topics covered across textbooks and across teachers' instructional choices within any given curriculum, and the results reflect these differences.[69] Although differences tend to be reduced when proportion of total allocated time is considered, variation between classrooms is still a factor.

[69] Thomas A. Romberg and Thomas P. Carpenter, "Research on Teaching and Learning Mathematics: Two Disciplines of Scientific Inquiry" in *Handbook of Research on Teaching (Third Edition): M.C. Wittrock, editor (New York, NY: Macmillian, 1986).*

TABLE 8.4 Teachers' Reports on the Instructional Emphasis Placed on Numbers and Operations

Numbers and Operations Topics	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Numbers and Operations Proficiency	Percent of Students	Numbers and Operations Proficiency	Percent of Students	Numbers and Operations Proficiency
Whole Number Operations						
Grade 4	86 (1.3)	214 (0.9)	13 (1.3)	215 (2.2)	1 (0.4)	222 (9.8)
Grade 8	34 (2.3)	262 (1.8)	30 (2.4)	266 (1.9)	35 (2.3)	280 (1.8)
Common Fractions						
Grade 4	17 (1.8)	214 (2.4)	60 (2.6)	214 (1.2)	23 (2.0)	214 (1.9)
Grade 8	49 (2.5)	263 (1.7)	37 (2.3)	272 (1.5)	14 (1.3)	289 (2.6)
Decimal Fractions						
Grade 4	7 (1.1)	208 (3.8)	39 (1.9)	214 (1.5)	55 (2.1)	215 (1.0)
Grade 8	48 (2.8)	264 (1.9)	39 (2.3)	271 (1.6)	13 (1.5)	290 (4.2)
Ratio or Proportion						
Grade 8	39 (2.6)	268 (1.6)	48 (2.2)	270 (1.6)	12 (1.5)	274 (4.0)
Percents						
Grade 8	49 (3.0)	266 (1.5)	42 (2.7)	270 (1.9)	9 (1.3)	287 (4.6)
Average for Numbers and Operations Topics						
Grade 4	42 (2.1)	213 (1.4)	33 (2.2)	216 (1.3)	25 (2.1)	213 (1.7)
High Ability	45 (8.2)	237 (3.7)	27 (6.1)	242 (5.6)	27 (7.5)	235 (6.7)
Average Ability	42 (4.1)	214 (2.1)	37 (3.3)	217 (2.3)	21 (2.8)	209 (3.1)
Low Ability	39 (6.0)	197 (3.5)	28 (5.0)	196 (3.8)	34 (6.0)	200 (4.8)
Mixed Ability	41 (3.9)	210 (1.9)	32 (4.3)	216 (2.9)	27 (4.1)	216 (2.6)
Grade 8	51 (2.7)	264 (1.3)	35 (2.4)	270 (1.8)	14 (1.3)	292 (2.7)
High Ability	29 (4.2)	288 (2.9)	32 (3.4)	287 (3.1)	39 (4.0)	301 (3.2)
Average Ability	54 (4.3)	265 (1.8)	38 (3.6)	271 (2.0)	8 (1.8)	274 (3.7)
Low Ability	60 (5.0)	244 (2.1)	36 (5.0)	246 (3.4)	4 (1.1)	259 (5.9)
Mixed Ability	63 (6.2)	262 (3.0)	34 (5.5)	269 (4.2)	2 (1.3)	264 (6.1)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

At grade 4, within the area of numbers and operations, teachers reported an overwhelming emphasis on whole number operations -- 86 percent of the fourth graders were receiving heavy instructional emphasis on this topic. Although 60 percent of the fourth graders were receiving moderate attention to common fractions, the majority were receiving little or no instruction in decimal fractions. Across the numbers and operations topics, teachers' emphases did not tend to vary, on average, across the ability levels of their classes.

At grade 8, one-third of the students were still receiving heavy instructional emphasis in whole number operations, although half were also receiving heavy emphasis in fractions, and 39 percent were receiving heavy emphasis in ratio or proportion. About one-third were receiving little or no emphasis in whole number operations. Teachers' reports of emphasis on numbers and operations topics, on average, differed substantially by class ability level. It appears that eighth graders in high-ability classes were the ones being given an opportunity to go beyond arithmetic. Half the eighth graders in average-ability classes and 60 percent or more of those in low- or mixed-ability classes were still receiving heavy emphasis in the content area of numbers and operations. Compared to two-fifths of the students in high-ability classes, fewer than 10 percent of the students in other ability groupings were receiving little or no emphasis in numbers and operations.

TABLE 8.5 presents teachers' reports on the emphasis placed on measurement in the fourth and eighth grades. The results between the two grades did not differ dramatically, although fourth graders may have been receiving somewhat more emphasis in this area. Two-thirds of the fourth graders and half of the eighth graders were receiving moderate emphasis in the area of measurement, with 15 percent and 33 percent receiving little or no emphasis, respectively. Although no discernible pattern between emphasis and proficiency exists at grade 4, eighth graders were given more emphasis in the measurement area in relation to their proficiency levels -- the lower the proficiency level, the more emphasis. This is consistent with the pattern of stressing elementary school mathematics for the lower-performing eighth graders.

TABLE 8.5 Teachers' Reports on the Instructional Emphasis Placed on Measurement

	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Measurement Proficiency	Percent of Students	Measurement Proficiency	Percent of Students	Measurement Proficiency
Grade 4	18 (2.0)	221 (2.3)	67 (2.3)	244 (1.0)	15 (2.0)	222 (2.4)
High ability	19 (5.2)	248 (5.0)	69 (6.6)	247 (3.2)	12 (4.8)	239 (5.3)
Average ability	17 (4.1)	221 (4.7)	72 (4.1)	224 (1.8)	12 (2.5)	226 (3.5)
Low ability	15 (4.3)	197 (5.7)	64 (6.2)	208 (3.4)	20 (5.4)	202 (4.4)
Mixed ability	19 (3.2)	222 (2.9)	63 (3.7)	223 (2.0)	18 (3.3)	224 (4.1)
Grade 8	17 (1.7)	254 (3.2)	50 (2.6)	260 (1.6)	33 (2.5)	274 (2.9)
High ability	11 (2.2)	276 (8.4)	37 (3.7)	287 (3.4)	52 (4.2)	293 (3.9)
Average ability	16 (2.8)	255 (4.3)	56 (3.3)	259 (1.8)	28 (3.3)	269 (3.3)
Low ability	19 (3.7)	235 (3.9)	55 (5.2)	235 (2.6)	26 (4.1)	241 (5.3)
Mixed ability	28 (4.6)	253 (6.5)	49 (5.7)	258 (5.1)	23 (5.2)	265 (4.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

As shown in TABLE 8.6, more eighth graders than fourth graders were receiving heavy emphasis in geometry and fewer are receiving little or no emphasis. Still, only about one-fourth of the eighth graders were receiving heavy emphasis, and one-fourth were receiving little or no emphasis. The emphasis placed on geometry did not appear to be related to differences in achievement at either grade. However, the moderate treatment given geometry in the middle school may affect students' preparation in this area and may influence their decisions to take geometry courses in high school.

TABLE 8.6 Teachers' Reports on the Instructional Emphasis Placed on Geometry

	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Geometry Proficiency	Percent of Students	Geometry Proficiency	Percent of Students	Geometry Proficiency
Grade 4	8 (1.1)	214 (3.3)	53 (2.6)	219 (1.1)	39 (2.6)	218 (1.5)
High ability	14 (4.0)	241 (8.6)	62 (7.8)	239 (4.0)	24 (6.7)	242 (4.9)
Average ability	8 (2.0)	208 (6.2)	57 (4.1)	219 (1.7)	33 (4.0)	220 (2.2)
Low ability	6 (2.9)	189 (7.6)	46 (5.3)	204 (3.3)	48 (5.7)	202 (2.6)
Mixed ability	7 (1.8)	214 (4.3)	49 (4.5)	217 (1.8)	44 (4.5)	220 (2.3)
Grade 8	27 (2.2)	263 (2.0)	49 (2.5)	262 (1.6)	23 (2.4)	265 (3.6)
High ability	23 (3.6)	280 (4.2)	40 (3.5)	280 (2.2)	38 (4.4)	293 (4.6)
Average ability	26 (3.3)	263 (3.2)	56 (3.7)	263 (2.3)	18 (3.5)	253 (3.2)
Low ability	23 (4.0)	242 (3.5)	47 (5.7)	244 (3.4)	30 (4.6)	238 (3.6)
Mixed ability	40 (5.6)	261 (4.4)	50 (5.7)	257 (3.4)	10 (2.5)	246 (5.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

TABLE 8.7 summarizes teachers' responses concerning instructional emphasis in the area of data analysis, statistics, and probability. Although 27 percent of the fourth graders and 13 percent of the eighth graders were receiving heavy emphasis in table and graph reading skills, the majority were receiving only moderate emphasis on this topic. Limited attention to probability and statistics prevailed in high schools (see Chapter Four), and 75 percent of the fourth graders and 57 percent of the eighth graders were receiving little or no instruction on this topic. According to their teachers, the majority of students in fourth and eighth grade were also receiving little or no instruction in data analysis, statistics, and probability, on average. Reflecting the lack of school emphasis in this area, the assessment contained too few questions at grade 4 to permit extending the proficiency scale to that grade level. At grade 8, however, there was no pattern in the relation between the emphasis placed on data analysis, statistics, and probability and student achievement in this area.

TABLE 8.7 Teachers' Reports on the Instructional Emphasis Placed on Data Analysis, Statistics, and Probability

Data Analysis, Statistics, and Probability Topics	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Data Analysis Proficiency	Percent of Students	Data Analysis Proficiency	Percent of Students	Data Analysis Proficiency
Tables and Graphs						
Grade 4	27 (1.9)	--	60 (2.2)	--	12 (1.5)	--
Grade 8	13 (1.5)	269 (4.4)	57 (2.4)	266 (2.2)	30 (2.6)	271 (2.5)
Probability or Statistics						
Grade 4*	2 (0.6)	--	23 (1.7)	--	75 (1.9)	--
Grade 8	9 (1.4)	274 (3.8)	35 (2.5)	269 (2.4)	57 (2.8)	266 (2.0)
Average for Data Analysis, Statistics, and Probability Topics						
Grade 4	11 (1.3)	--	29 (2.5)	--	59 (2.4)	--
Grade 8	14 (1.7)	271 (3.0)	30 (2.2)	269 (3.0)	56 (2.8)	266 (1.8)
High ability	18 (3.1)	291 (4.4)	29 (3.5)	295 (4.2)	53 (4.5)	296 (3.0)
Average ability	14 (2.4)	264 (4.3)	30 (2.7)	264 (2.8)	56 (3.4)	266 (2.3)
Low ability	5 (1.5)	238 (7.3)	27 (3.7)	245 (4.8)	68 (3.6)	237 (3.0)
Mixed ability	16 (4.0)	263 (6.7)	35 (6.6)	262 (8.4)	49 (7.6)	259 (3.7)

*Informal introduction of concepts at grade 4.

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

It appears that most fourth graders (84 percent) were given little or no introduction to algebra concepts, even on an informal basis. As shown in TABLE 8.8, the amount of heavy and moderate emphasis was small, and the teacher responses of no emphasis substantial. Consequently, the results are presented for somewhat different response categories than those in the preceding tables. According to their teachers, 40 percent of the fourth graders were receiving no emphasis in this area. Although the results indicate no relationship between amount of emphasis and student algebra achievement, teachers did report more emphasis on algebra concepts in their high-ability classes. In comparison to 21 percent of the fourth graders in high-ability classes, 49 percent of the students in low-ability classes were receiving no emphasis in this area. The data indicate that the pleas from many mathematics educators to introduce more widely varied subject matter into the elementary mathematics curriculum are generally unheeded.[70] Only 16 percent of the fourth graders were receiving at least moderate attention to the informal concepts underlying algebra.

TABLE 8.8 Teachers' Reports on the Instructional Emphasis Placed on Algebra and Functions

	Moderate to Heavy Emphasis		Little Emphasis		No Emphasis	
	Percent of Students	Algebra Proficiency	Percent of Students	Algebra Proficiency	Percent of Students	Algebra Proficiency
Grade 4*	16 (1.7)	215 (2.0)	44 (2.4)	219 (1.3)	40 (2.3)	217 (1.6)
High ability	24 (4.8)	232 (4.1)	55 (7.5)	241 (4.1)	21 (6.8)	236 (4.9)
Average ability	18 (2.7)	213 (4.0)	38 (3.3)	217 (2.6)	44 (3.8)	219 (2.0)
Low ability	14 (3.9)	200 (7.6)	37 (6.0)	204 (3.6)	49 (5.2)	203 (2.9)
Mixed ability	16 (3.0)	214 (3.1)	48 (4.0)	218 (1.5)	36 (3.7)	217 (2.0)
	Heavy Emphasis		**Moderate Emphasis**		**Little or No Emphasis**	
	Percent of Students	Algebra Proficiency	Percent of Students	Algebra Proficiency	Percent of Students	Algebra Proficiency
Grade 8	50 (2.1)	278 (1.7)	33 (2.1)	256 (2.1)	17 (1.8)	246 (2.5)
High ability	89 (2.1)	295 (2.5)	10 (2.1)	279 (4.1)	1 (0.4)	301 (4.4)
Average ability	42 (3.3)	266 (1.8)	40 (3.5)	259 (2.2)	18 (2.9)	255 (3.8)
Low ability	18 (3.2)	245 (5.0)	39 (5.0)	241 (2.4)	44 (4.8)	237 (2.9)
Mixed ability	43 (7.1)	264 (3.0)	45 (7.2)	255 (4.5)	13 (3.8)	242 (5.5)

*Informal introduction of concepts at grade 4.

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

At grade 8, teachers reported that half the students were receiving heavy emphasis in algebra, one-third were receiving moderate emphasis, and about one-sixth little or no emphasis. There was a strong relationship between algebra emphasis and proficiency, with those students receiving the most emphasis having higher achievement. There were vast differences in emphases across class ability levels, however. Nearly all the students in high-ability classes (89 percent) were receiving heavy emphasis in algebra, compared to very few in low-ability classes (18 percent). Less than half the eighth graders

---

[70] *Curriculum and Evaluation Standards for School Mathematics*, (Reston, VA. National Council of Teachers of Mathematics, 1989).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

in average- or mixed-ability classes were receiving heavy emphasis in algebra. More than one-sixth of the eighth graders overall and nearly half those in low-ability classes (44 percent) were receiving little or no instruction in algebra.

The *NCTM Standards* recommend that the middle-school years represent a transition from arithmetic to algebra, building on students' experiences with mathematical patterns in the elementary school years. The NAEP results indicate that few students are given these experiences in elementary school, and that for half the eighth graders, the middle-school years do not represent a transition to algebra. It further appears that about one-sixth of the eighth graders have had at best a cursory introduction to algebra concepts.

Teachers were also asked the extent to which they emphasized the four mathematics skill areas -- facts and concepts, skills and procedures, reasoning, and communication. The results are presented in TABLE 8.9 for fourth graders and eighth graders overall, as well as by ability level.

At grade 4, teachers reported overwhelming emphasis on learning facts and concepts and learning skills and procedures. This concentration did not shift much across ability levels, nor did it seem related to proficiency. At grade 8, teachers still reported considerable emphasis in these two skill areas, but the focus shifted toward greater attention on procedures as compared to facts and concepts. Again, these emphases seemed to be applied equally across classrooms, regardless of students' ability levels.

Improving students' reasoning ability appears to be a universally accepted goal of mathematics education; however, the majority of students were not receiving heavy instructional emphasis in this area.[71] At both grades, teachers reported providing fewer than half their students with heavy instructional emphasis on developing reasoning and analytic ability. Further, the results suggest that teachers may perceive thinking as a skill to be stressed only after the mastery of facts and procedures. According to their teachers, more students in high-ability classes received emphasis in the reasoning area than did those in other types of classes. The difference in the proportion of students receiving such emphasis was particularly striking between eighth-grade high- and low-ability classes -- 69 percent as compared to 28 percent. According to teachers' own reports, fewer than 30 percent of the eighth graders in low-ability classes were receiving little or no emphasis in reasoning strategies.

---

[71] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

TABLE 8.9 Teachers' Reports of Mathematics Skills Emphasized by Ability Level of Classes

	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Learning Facts and Concepts						
Grade 4	91 (1.4)	217 (0.7)	8 (1.3)	218 (2.9)	0 (0.2)	--
High ability	82 (4.9)	239 (3.0)	16 (4.3)	244 (5.8)	2 (2.0)	271 (5.5)
Average ability	93 (1.8)	217 (1.2)	7 (1.8)	216 (3.4)	0 (0.1)	--
Low ability	90 (2.8)	201 (2.1)	10 (2.8)	193 (4.7)	0 (0.0)	--
Mixed ability	92 (3.0)	217 (1.3)	8 (3.0)	218 (5.2)	0 (0.3)	--
Grade 8	57 (3.0)	266 (1.8)	36 (2.9)	265 (1.6)	7 (1.1)	274 (5.3)
High ability	60 (3.8)	292 (2.6)	30 (3.3)	286 (4.1)	11 (2.3)	296 (8.6)
Average ability	54 (4.0)	264 (2.1)	39 (3.7)	264 (2.1)	7 (1.8)	266 (5.5)
Low ability	61 (4.5)	241 (2.3)	34 (4.7)	243 (2.9)	5 (1.5)	242 (6.0)
Mixed ability	58 (6.7)	260 (3.4)	38 (6.6)	260 (3.8)	4 (2.1)	263 (6.7)
Learning Skills and Procedures						
Grade 4	85 (1.4)	218 (0.8)	15 (1.4)	215 (1.9)	0 (0.1)	--
High ability	89 (4.1)	240 (3.0)	11 (4.1)	245 (8.5)	0 (0.0)	--
Average ability	88 (2.4)	217 (1.2)	12 (2.4)	215 (3.8)	0 (0.2)	--
Low ability	81 (4.9)	201 (2.2)	19 (4.9)	198 (3.9)	0 (0.1)	--
Mixed ability	86 (2.5)	217 (1.4)	14 (2.5)	215 (2.4)	0 (0.3)	--
Grade 8	68 (2.8)	266 (1.6)	29 (2.7)	266 (1.7)	3 (0.8)	270 (5.3)
High ability	70 (3.8)	293 (2.5)	26 (3.3)	286 (3.6)	4 (1.6)	283 (12.7)
Average ability	65 (5.0)	264 (1.8)	32 (4.9)	264 (2.2)	2 (0.9)	258 (9.8)
Low ability	72 (3.2)	241 (1.9)	26 (3.3)	242 (3.3)	2 (1.0)	255 (4.4)
Mixed ability	71 (5.0)	258 (3.4)	26 (5.0)	266 (3.6)	3 (2.1)	270 (5.4)
Developing Reasoning and Analytic Ability						
Grade 4	41 (2.3)	217 (1.2)	49 (2.3)	217 (1.1)	11 (1.6)	218 (1.9)
High ability	64 (5.9)	240 (3.4)	34 (5.9)	242 (4.6)	2 (1.0)	221 (7.5)
Average ability	39 (3.3)	216 (1.9)	50 (3.2)	217 (1.7)	11 (2.5)	224 (3.1)
Low ability	42 (5.9)	200 (3.2)	46 (5.5)	201 (3.0)	12 (2.9)	203 (4.4)
Mixed ability	39 (4.3)	214 (1.9)	50 (4.5)	220 (1.8)	12 (2.8	216 (3.4)
Grade 8	45 (2.4)	274 (2.1)	42 (2.7)	263 (1.4)	14 (1.4)	253 (2.5)
High ability	69 (4.3)	294 (2.5)	27 (4.2)	283 (3.4)	4 (1.2)	292 (4.6)
Average ability	41 (3.6)	266 (2.1)	44 (3.9)	264 (1.6)	15 (1.9)	259 (3.8)
Low ability	28 (4.0)	239 (3.3)	41 (5.4)	241 (2.7)	30 (4.2)	244 (2.9)
Mixed ability	36 (6.3)	263 (6.1)	54 (6.8)	262 (2.7)	10 (3.0)	242 (4.5)
Learning How to Communicate Ideas Effectively						
Grade 4	36 (3.0)	216 (1.3)	45 (2.7)	218 (1.3)	19 (2.3)	219 (1.5)
High ability	46 (7.5)	237 (4.1)	44 (7.2)	244 (3.3)	10 (4.6)	236 (12.2)
Average ability	37 (4.6)	216 (1.9)	46 (4.2)	218 (1.8)	17 (3.4)	217 (1.9)
Low ability	41 (6.4)	203 (3.7)	42 (5.4)	195 (2.2)	17 (4.6)	208 (5.7)
Mixed ability	32 (4.0)	213 (1.8)	46 (4.2)	217 (2.1)	21 (3.7)	222 (2.6)
Grade 8	37 (2.9)	269 (2.5)	45 (2.9)	266 (1.5)	17 (1.7)	261 (1.7)
High ability	51 (4.9)	291 (3.4)	42 (5.1)	290 (2.9)	7 (1.5)	294 (3.9)
Average ability	31 (3.6)	264 (2.3)	48 (3.2)	264 (1.9)	20 (2.7)	264 (3.0)
Low ability	30 (3.9)	239 (3.0)	43 (4.6)	242 (2.3)	27 (3.7)	242 (3.6)
Mixed ability	39 (6.6)	259 (6.3)	44 (7.7)	260 (3.1)	17 (4.0)	262 (5.1)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is 0 percent, the standard error is inestimable. However, in the table, percentages less than 0.5 were rounded to 0 percent.

At both grades, teachers reported that approximately one-third of their students were receiving heavy emphasis in mathematics communication skills, and that about one-fifth were receiving little or no emphasis. At grade 4, there seemed to be little difference in this degree of emphasis across class ability levels. For eighth graders, more students in high-ability classes received heavy instructional emphasis in communication skills than did those in low- or average-ability classes. Teachers reported that 27 percent of the students in low-ability classes were given little or no emphasis in mathematics communication skills.

Not only do the curriculum reforms emphasized for mathematics instruction stress reasoning and analytic skills as well as communications skills, but they drive home the urgency of educating all Americans in mathematics.[72] Such differences in curricular approaches for high- and low-ability students may only serve to widen the performance gap between these groups.

SUMMARY

The results indicate that fourth- and eighth-grade students are provided with three and one-half to four hours of instructional time in mathematics each week, but this time may not be used effectively. Teachers reported spending about three and one-half to four hours per week on mathematics instruction, and it appeared that students spent another 15 to 30 minutes each day on mathematics homework.

Fourth-grade teachers reported an overwhelming emphasis on whole number operations. At eighth grade, about half the students -- those with higher mathematics proficiency -- were receiving heavy emphasis in algebra, but the other half -- those with lower mathematics proficiency -- were still receiving heavy emphasis in numbers and operations. According to their teachers, relatively small proportions of students at either grade received emphasis in measurement, geometry, or data analysis, statistics, and probability.

---

[72] *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

The National Science Board Commission on Precollege Education in Mathematics, Science, and Technology, *Educating Americans for the 21st Century* (Washington, DC: National Science Foundation, 1983).

295-027 0 - 31 - 8 QL 3

The teachers' reports suggested a lack of balance in instructional emphasis across skill areas. Teachers tended to emphasize facts and procedures for all students, but reasoning and communications skills were emphasized for fewer than half the fourth and eighth graders. Again, these analytic skills, featured so prominently in the calls for reform in mathematics education, were more often emphasized for the higher-achieving students, suggesting that teachers see mathematics facts and procedures as a hurdle that must be overcome before learning can proceed in other content areas or before students can be taught to reason mathematically.

From 81 to 93 percent of the fourth graders were receiving heavy emphasis in facts and procedures. This figure was somewhat lower at the eighth grade, where the emphasis shifted toward procedures rather than facts. Yet the majority of the eighth graders were still receiving heavy emphases in both these skill areas.

In contrast, according to their teachers, fewer than half the fourth and eighth graders were receiving heavy instructional emphasis in mathematical reasoning -- an instructional goal that pervades objectives for mathematics education. Further, particularly at the eighth grade, mathematical thinking seemed to be perceived as much more appropriate for high-ability students. Only about one-fourth of the students in low-ability classes were receiving heavy instructional emphases in reasoning skills. Finally, about one-third of the fourth and eighth graders were receiving heavy emphasis in mathematics communication skills. These results indicate that the majority of our nation's eighth graders are not being given an opportunity to develop skills considered paramount to improving mathematics achievement.[73]

[73]*Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

Chapter 9

Students' Perceptions of Mathematics

INTRODUCTION

Students come to mathematics classrooms with a wide variety of skills, prior knowledge, work habits, attitudes, and beliefs that interact with learning. Unfortunately, it may be that an "I never could do math" attitude prevails in our country. This attitude may be reflected in students' perceptions of the discipline, which in turn affect their desire to engage in the study of mathematics and their achievement in school.[74] Thus, mathematics reform recommendations for the school curriculum include helping students develop confidence in their mathematical abilities and to value mathematics as a discipline.[75] To provide information related to these additional goals of mathematics instruction, students were asked about their agreement or disagreement with the following five statements designed to elicit their perceptions of mathematics:

- Three statements about their personal experience with mathematics, including their enjoyment of mathematics and level of confidence in their mathematics abilities -- *"I like mathematics," "I am good in mathematics,"* and *"Mathematics is more for boys than for girls."*

- Two statements about the value of mathematics, including students' perception of its present utility and its expected relevance to future work and life requirements -- *"Mathematics is useful for solving everyday problems,"* and *"Almost all people use mathematics in their jobs."*

---

[74] *Everybody Counts: A Report to the Nation on the Future of Mathematics Education,* Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

[75] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

The overall summary of students' perceptions and attitudes is presented in TABLE 9.1.[76] The results support the link between perceptions and learning. Across all three grades, students with more positive perceptions and attitudes had higher mathematics proficiency.

TABLE 9.1 Summary of Students' Positive Perceptions and Attitudes Toward Mathematics

	Strongly Agree		Agree		Undecided, Disagree, Strongly Disagree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	At grade 4, students were not given the "strongly agree" and "strongly disagree" options.		78 (0.5)	220 (0.7)	22 (0.5)	203 (1.1)
White			80 (0.6)	226 (0.8)	20 (0.6)	210 (1.2)
Black			76 (1.8)	198 (1.2)	24 (1.8)	184 (2.6)
Hispanic			71 (1.9)	207 (1.4)	30 (1.9)	187 (1.8)
Male			77 (0.8)	221 (0.9)	23 (0.8)	203 (1.5)
Female			79 (0.8)	219 (0.8)	21 (0.8)	202 (1.4)
Grade 8	27 (0.8)	274 (1.2)	49 (0.8)	266 (1.1)	24 (0.9)	254 (1.4)
White	26 (1.0)	282 (1.5)	49 (0.9)	274 (1.3)	26 (1.0)	260 (1.6)
Black	34 (1.6)	252 (2.5)	49 (1.6)	238 (2.1)	16 (1.4)	230 (2.4)
Hispanic	28 (1.4)	262 (3.1)	47 (1.2)	248 (1.2)	25 (1.3)	238 (2.1)
Male	28 (0.9)	276 (1.5)	48 (1.1)	267 (1.5)	24 (1.1)	254 (1.7)
Female	27 (1.0)	272 (1.4)	49 (1.1)	266 (1.2)	24 (1.1)	255 (1.5)
Grade 12	20 (0.8)	311 (1.6)	46 (0.8)	298 (1.2)	34 (0.8)	285 (1.2)
White	19 (0.9)	319 (1.7)	45 (0.8)	303 (1.4)	36 (0.9)	290 (1.1)
Black	25 (1.8)	279 (2.5)	48 (2.2)	271 (1.8)	29 (1.9)	261 (2.0)
Hispanic	20 (1.8)	298 (3.5)	43 (2.0)	280 (2.1)	37 (2.4)	266 (3.9)
Male	22 (0.9)	314 (2.2)	45 (1.0)	301 (1.6)	34 (1.1)	286 (1.5)
Female	19 (1.0)	308 (1.7)	46 (1.1)	295 (1.3)	34 (0.9)	284 (1.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Population percentages may not total 100 percent because of rounding.

Although students' attitudes tended to be positive, some interesting differences among grades suggested that positive perceptions of mathematics may diminish in high school. For example, at grades 4 and 8, about three-

[76] The summary was created by averaging responses to the five statements. In the analysis, the direction for the statement "Mathematics is more for boys than for girls" was reversed to be consistent with the direction of the responses to the other four statements.

fourths of the students were in agreement, on average, with the statements. At grade 12, the proportion that agreed or strongly agreed, on average, decreased to 66 percent. Even by the fourth grade, more than one-fifth of the students were uncertain or negative in their perceptions and attitudes toward mathematics.

The results across population subgroups show few differences in attitudes based on race/ethnicity and gender, although at grade 4, more White students tended to report positive perceptions of mathematics than either Black or Hispanic students did. Although, among the racial/ethnic groups, Black students reported the least mathematics course taking, in grades 8 and 12, more Black students tended to report positive attitudes than did White or Hispanic students.

STUDENTS' PERSONAL EXPERIENCE WITH MATHEMATICS

Because a positive attitude toward mathematics may foster further study of the subject, NAEP asked students if they liked mathematics. The results are summarized in TABLE 9.2. Although students who reported liking mathematics tended to have higher proficiency levels, their degree of interest in mathematics was not especially strong. Only two-thirds of the fourth graders reported that they liked mathematics, and this pattern generally held across racial/ethnic and gender subpopulations. The percentage reporting uncertain or negative attitudes was larger at grades 8 and 12. By grade 12, nearly half reported an ambivalence toward or dislike of mathematics. This pattern was relatively consistent across subpopulations defined by race/ethnicity and gender.

TABLE 9.2 Students' Responses to the Statement "I Like Mathematics"

	Strongly Agree		Agree		Undecided, Disagree, Strongly Disagree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	At grade 4, students were not given the "strongly agree" and "strongly disagree" options.		67 (0.8)	219 (0.7)	33 (0.8)	211 (1.0)
White			67 (0.9)	226 (0.8)	34 (0.9)	217 (1.1)
Black			72 (2.1)	195 (1.2)	29 (2.1)	192 (2.6)
Hispanic			64 (1.7)	205 (1.6)	36 (1.7)	195 (1.9)
Male			66 (1.0)	220 (0.8)	34 (1.0)	212 (1.3)
Female			68 (1.1)	218 (0.9)	32 (1.1)	211 (1.3)
Grade 8	17 (0.7)	273 (1.4)	39 (0.7)	269 (1.5)	43 (1.0)	259 (1.1)
White	15 (0.8)	281 (1.7)	39 (1.0)	277 (1.7)	46 (1.3)	266 (1.2)
Black	26 (1.5)	252 (3.1)	38 (1.9)	241 (1.9)	36 (1.7)	235 (2.2)
Hispanic	18 (1.8)	260 (3.3)	42 (1.8)	252 (2.1)	40 (1.8)	241 (1.6)
Male	19 (0.8)	273 (1.9)	40 (1.1)	271 (1.9)	41 (1.1)	259 (1.3)
Female	16 (0.9)	273 (1.9)	39 (1.0)	268 (1.6)	46 (1.3)	260 (1.3)
Grade 12	17 (0.6)	315 (1.7)	37 (0.8)	300 (1.2)	47 (1.0)	286 (1.1)
White	16 (0.5)	322 (1.8)	36 (0.9)	306 (1.3)	48 (1.1)	291 (1.1)
Black	20 (1.9)	287 (2.7)	39 (2.3)	270 (1.9)	41 (2.2)	263 (1.7)
Hispanic	18 (1.8)	299 (3.9)	36 (1.8)	285 (2.8)	47 (2.4)	266 (2.8)
Male	19 (0.8)	319 (2.1)	39 (1.2)	302 (1.6)	43 (1.3)	287 (1.5)
Female	15 (0.8)	310 (1.9)	35 (1.0)	298 (1.3)	51 (1.1)	286 (1.2)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

Confidence may be one of the most important affective variables related to mathematics achievement.[77] Extensive research has shown strong relationships between achievement and confidence as well as gender differences in these relationships.[78] For example, when males are found to have an advantage in performance, the advantage is generally accompanied by a higher level of confidence. Even when achievement results do not favor males, males

[77] H.L. Reyes, "*Affective Variables and Mathematics Education*," Elementary School Journal, 18(2), pp. 207-218, 1984.

[78] Margaret R. Meyer and Mary Schatz Koehler, "Internal Influences on Gender Differences in Mathematics" in *Mathematics and Gender*, Elizabeth Fennema and Gilah C. Leder, editors (New York, NY: Teachers College Press, 1990).

still tend to have more confidence than females do in their mathematical abilities.

The NAEP results in response to the statement "I am good at mathematics," presented in TABLE 9.3, lend some support to this research. At grades 4 and 8, the proficiency results indicated few gender differences, yet more males than females reported that they were good in mathematics. At each grade, 10 percent more females than males reported a lack of confidence in their mathematical abilities.

TABLE 9.3 Students' Responses to the Statement "I Am Good in Mathematics"

	Strongly Agree		Agree		Undecided, Disagree, Strongly Disagree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	At grade 4, students were not given the "strongly agree" and "strongly disagree" options.		62 (0.8)	222 (0.7)	38 (0.8)	207 (0.9)
White			64 (1.1)	229 (0.8)	36 (1.1)	213 (0.9)
Black			61 (1.8)	200 (1.3)	39 (1.8)	187 (2.0)
Hispanic			57 (1.6)	207 (1.5)	43 (1.6)	194 (1.8)
Male			67 (0.9)	223 (0.8)	33 (0.9)	207 (1.3)
Female			57 (1.2)	222 (0.9)	43 (1.2)	207 (1.2)
Grade 8	18 (0.7)	278 (1.6)	45 (0.8)	272 (1.1)	37 (0.9)	253 (1.1)
White	17 (0.9)	286 (2.0)	46 (1.1)	279 (1.2)	38 (1.2)	259 (1.2)
Black	25 (1.6)	254 (3.0)	43 (2.0)	244 (1.9)	32 (2.2)	229 (1.9)
Hispanic	15 (1.6)	264 (3.6)	43 (1.8)	256 (2.5)	42 (2.4)	238 (1.5)
Male	22 (1.1)	279 (1.9)	46 (1.1)	272 (1.4)	32 (1.1)	251 (1.2)
Female	14 (0.7)	276 (2.1)	45 (1.1)	273 (1.2)	42 (1.3)	254 (1.3)
Grade 12	14 (0.6)	322 (1.9)	43 (0.8)	302 (1.1)	43 (0.9)	283 (1.1)
White	14 (0.6)	329 (1.9)	43 (0.9)	306 (1.2)	43 (1.0)	288 (1.2)
Black	16 (1.8)	287 (3.2)	42 (2.4)	275 (1.9)	43 (1.9)	261 (1.9)
Hispanic	12 (1.6)	305 (4.5)	37 (2.1)	290 (2.4)	52 (2.5)	264 (2.7)
Male	18 (0.8)	324 (2.4)	44 (1.0)	303 (1.5)	38 (1.1)	282 (1.4)
Female	11 (0.7)	318 (2.5)	41 (1.0)	301 (1.2)	48 (1.0)	283 (1.2)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

The differences in students' confidence by racial/ethnic groups across grades are also of interest. At grade 4, fewer Black and Hispanic students than White students reported that they were good in mathematics. In contrast, Black eighth graders reported relatively more confidence than their White or Hispanic classmates did. At grade 12, the reports of White students were similar to those of Black students, but Hispanic students still reported the least confidence in their abilities. The majority of the Hispanic high-school seniors were unsure or negative about being good in mathematics.

The value of mathematics to a female may be influenced by whether or not she thinks studying mathematics is appropriate only for males.[79] Females' attitudes toward mathematics also can be influenced by the perceptions of others. Those who feel that their parents, teachers, and peers have lower expectations for them in mathematical endeavors because they are female, may also adopt this attitude. Students were asked if mathematics is more for boys than girls, and the results are presented in TABLE 9.4.

[79] Gilah C. Leder, "Gender Differences in Mathematics" in *Mathematics and Gender*, Elizabeth Fennema and Gilah C. Leder, editors (New York, NY: Teachers College Press, 1990).

TABLE 9.4 Students' Responses to the Statement "Mathematics Is More for Boys than for Girls"

	Strongly Disagree		Disagree		Undecided, Agree, Strongly Agree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	At grade 4, students were not given the "strongly agree" and "strongly disagree" options.		82 (0.7)	219 (6.7)	18 (0.7)	205 (1.3)
White			84 (0.7)	225 (0.8)	16 (0.7)	213 (1.5)
Black			80 (1.5)	197 (1.2)	20 (1.5)	186 (2.8)
Hispanic			75 (2.0)	207 (1.3)	26 (2.0)	186 (2.4)
Male			77 (1.1)	220 (0.6)	23 (1.1)	208 (1.5)
Female			87 (0.7)	218 [illegible]	13 (0.7)	199 (1.8)
Grade 8	53 (0.8)	270 (1.0)	31 (0.7)	[illegible]	16 (0.5)	259 (1.8)
White	53 (1.1)	275 (1.1)	31 (0.9)	272 (1.8)	16 (0.7)	266 (2.0)
Black	56 (2.0)	248 (1.9)	31 (1.8)	235 (2.0)	14 (1.4)	234 (3.9)
Hispanic	52 (1.7)	255 (1.9)	32 (1.7)	245 (1.7)	17 (1.1)	239 (2.8)
Male	43 (1.0)	270 (1.5)	35 (1.1)	266 (1.6)	22 (0.8)	263 (1.8)
Female	64 (1.2)	269 (1.0)	27 (1.0)	261 (1.8)	9 (0.6)	249 (3.1)
Grade 12	46 (0.9)	300 (1.4)	35 (0.8)	294 (1.2)	19 (0.8)	293 (1.4)
White	46 (0.9)	305 (1.5)	36 (0.9)	299 (1.4)	19 (0.9)	298 (1.6)
Black	47 (2.8)	274 (2.0)	33 (1.8)	267 (2.5)	20 (1.1)	269 (2.5)
Hispanic	45 (2.8)	281 (3.1)	36 (2.6)	278 (3.5)	19 (2.0)	273 (3.3)
Male	34 (1.1)	301 (1.8)	38 (1.4)	299 (1.7)	28 (1.2)	298 (1.6)
Female	58 (1.1)	299 (1.4)	32 (1.0)	289 (1.2)	10 (0.7)	281 (2.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

About four-fifths of the students at each grade strongly disagreed or disagreed that mathematics is more for boys than for girls. However, at each grade, fewer males than females strongly agreed or disagreed. This percentage decreased at each successive grade as students got older. At grade 4, 10 percent fewer males than females disagreed with the statement. At grade 8, 13 percent fewer either strongly disagreed or disagreed, and at grade 12, 18 percent did. At grades 8 and 12, there were particularly large differences in the percentages of males and females strongly disagreeing with the statement. At grade 8, 64 percent of the females strongly disagreed with the statement, compared to 43 percent of the males. For high-school seniors, 58 percent of the females strongly disagreed, compared to only about one-third of the males.

STUDENTS' PERCEPTIONS OF THE UTILITY OF MATHEMATICS

Students' perceptions of the usefulness, of mathematics is a variable that has been shown to be strongly associated with achievement.[80] The NAEP assessment included two questions related to usefulness, and the results support existing research. Students' reports on their perceptions of the utility of mathematics in their everyday lives are presented in TABLE 9.5, and their views about the importance mathematics has in careers are presented in TABLE 9.6. In both instances, those in agreement with the value of mathematics tended to have higher proficiency levels.

[80]Margaret R. Meyer and Mary Schatz Koehler, "Internal Influences on Gender Differences in Mathematics" in *Mathematics and Gender*, Elizabeth Fennema and Gilah C. Leder, editors (New York, NY: Teachers College Press, 1990).

TABLE 9.5 Students' Responses to the Statement "Mathematics Is Useful for Solving Everyday Problems"

	Strongly Agree		Agree		Undecided, Disagree, Strongly Disagree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	At grade 4, students were not given the "strongly agree" and "strongly disagree" options.		65 (0.6)	219 (0.8)	35 (0.6)	211 (0.9)
White			67 (0.8)	225 (0.8)	33 (0.8)	219 (1.0)
Black			58 (2.2)	196 (1.6)	42 (2.2)	193 (1.7)
Hispanic			61 (1.8)	205 (1.7)	39 (1.8)	197 (1.7)
Male			65 (0.9)	220 (0.9)	35 (0.9)	211 (1.1)
Female			65 (1.0)	218 (0.9)	35 (1.0)	211 (1.0)
Grade 8	32 (0.7)	267 (1.2)	44 (0.7)	269 (1.2)	24 (0.8)	260 (1.4)
White	31 (0.8)	275 (1.6)	45 (0.8)	275 (1.4)	24 (1.0)	266 (1.6)
Black	38 (1.8)	241 (2.1)	40 (1.8)	245 (2.4)	22 (1.6)	238 (2.0)
Hispanic	33 (2.0)	253 (2.4)	41 (2.3)	250 (1.8)	26 (1.7)	244 (1.7)
Male	34 (1.0)	270 (1.3)	43 (1.0)	269 (1.5)	23 (1.1)	258 (2.1)
Female	30 (0.8)	264 (1.6)	45 (0.9)	268 (1.2)	25 (0.8)	261 (1.4)
Grade 12	23 (0.7)	298 (1.6)	50 (0.9)	300 (1.2)	27 (0.9)	289 (1.4)
White	20 (0.8)	307 (1.9)	52 (1.1)	304 (1.3)	28 (1.0)	294 (1.3)
Black	33 (1.9)	271 (2.4)	43 (1.6)	273 (2.1)	24 (2.0)	267 (2.3)
Hispanic	26 (1.8)	279 (3.5)	44 (2.6)	284 (2.1)	30 (2.5)	270 (4.0)
Male	26 (1.0)	301 (2.1)	49 (1.1)	303 (1.7)	25 (1.0)	290 (1.6)
Female	20 (0.8)	295 (1.8)	51 (1.1)	297 (1.3)	29 (1.1)	289 (1.5)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 9.6 Students' Responses to the Statement "Almost All People Use Mathematics in Their Jobs"

	Strongly Agree		Agree		Undecided, Disagree, Strongly Disagree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	At grade 4, students were not given the "strongly agree" and "strongly disagree" options.		66 (0.9)	219 (0.7)	34 (0.9)	211 (1.0)
White			68 (1.2)	225 (0.8)	32 (1.2)	219 (1.2)
Black			60 (1.9)	198 (1.5)	40 (1.9)	189 (1.9)
Hispanic			60 (1.9)	207 (1.6)	40 (1.9)	194 (1.7)
Male			66 (1.1)	220 (0.9)	34 (1.1)	211 (1.4)
Female			66 (1.2)	218 (0.8)	34 (1.2)	210 (1.2)
Grade 8	33 (0.8)	266 (1.4)	50 (0.7)	268 (1.1)	18 (0.7)	260 (1.4)
White	31 (0.8)	273 (1.7)	51 (0.9)	274 (1.2)	18 (0.8)	266 (1.5)
Black	41 (1.8)	242 (2.2)	44 (1.9)	243 (2.3)	15 (1.5)	238 (2.3)
Hispanic	33 (1.9)	251 (1.9)	50 (2.1)	250 (1.7)	17 (1.2)	243 (2.4)
Male	34 (1.1)	268 (1.7)	49 (1.0)	268 (1.4)	17 (0.9)	260 (2.0)
Female	32 (1.1)	263 (1.7)	50 (1.2)	267 (1.2)	18 (0.9)	261 (1.5)
Grade 12	20 (0.7)	295 (1.7)	55 (0.9)	297 (1.2)	25 (0.8)	294 (1.5)
White	18 (0.8)	303 (2.1)	55 (1.0)	302 (1.4)	27 (1.1)	299 (1.3)
Black	28 (1.9)	270 (2.6)	52 (1.8)	272 (1.8)	20 (1.9)	268 (3.4)
Hispanic	22 (2.1)	283 (4.2)	56 (2.5)	280 (2.8)	22 (2.0)	270 (4.7)
Male	21 (0.8)	300 (2.2)	55 (1.2)	300 (1.6)	24 (0.9)	294 (1.8)
Female	18 (0.9)	290 (2.1)	55 (1.1)	295 (1.2)	27 (1.1)	295 (1.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

Approximately two-thirds of the fourth graders and three-fourths of the eighth and twelfth graders agreed that mathematics can be useful in solving everyday problems. The results did not tend to vary substantially by race/ethnicity or gender. Although a somewhat higher proportion of eighth graders than twelfth graders felt mathematics was useful for solving everyday problems, in general, the older students appeared to have more positive perceptions about the everyday utility of mathematics than did the fourth graders.

This pattern was even more evident in the responses to the question about the value of mathematics in people's work. Similar to the previous question, about two-thirds of the fourth graders agreed that almost all people use mathematics in their jobs. However, even more eighth and twelfth graders agreed with this statement than the previous statement (82 percent and 75 percent, respectively). Although the older students appeared to have a greater recognition of the utility of mathematics in work related situations than did the fourth graders, the percentage of positive responses was somewhat smaller at grade 12 than at grade 8.

SUMMARY

In general, the majority of the students appeared to have positive perceptions toward mathematics and those with positive perceptions also had higher proficiency levels. Many students, particularly those at the higher grades, reported that they see the value of mathematics in their everyday lives and the utility of it on the job. Also, most students did not report viewing mathematics as a male-oriented activity, even though considerably fewer males than females strongly disagreed or disagreed that mathematics is more for boys than girls.

However, students' liking of the subject area and their confidence in their mathematical abilities did not appear to be strong. Only two-thirds of the fourth graders reported liking mathematics, and by grade 12, only half reported that they liked this discipline. Similarly, fewer than two-thirds at any grade strongly agreed or agreed that they were good in mathematics. Also, smaller percentages of Hispanic students reported confidence in their mathematical abilities than did students in other racial/ethnic groups, and fewer females reported confidence than did males.

Chapter 10

Characteristics of Mathematics Teachers

INTRODUCTION

Because teachers are key figures in improving mathematics learning, it is of some interest to gain information about their knowledge of mathematics and mathematics pedagogy as well as their role in professional development.[81] Are they experienced? Are they well trained? Do they keep up with current mathematics content and educational practices?

To provide some information about these topics, NAEP asked the teachers of fourth- and eighth-grade students a series of questions about their background and training, including their experience, certification, undergraduate and graduate mathematics course work, and involvement in pre-service education. (As a result of the relatively low percentage of twelfth-grade students enrolled in mathematics classes, their teachers were not given questionnaires). This chapter discusses these teacher questionnaire results. Similar to teacher questionnaire results presented previously, the data are for the percentages of students taught by teachers reporting various characteristics.

YEARS OF TEACHING EXPERIENCE

Previous studies have found mathematics teachers to be experienced, and the NAEP results corroborate these findings.[82] As shown in TABLE 10.1, teachers reported an average of 17 years of classroom experience overall and 14 years of experience specifically teaching mathematics. At both grades 4 and 8, about one-third of the students were taught mathematics by teachers with 10

---

[81] *Professional Standards for Teaching Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1991).

[82] Iris Weiss, *Report of the 1985-86 National Survey of Science and Mathematics Education* (Research Triangle Park, NC: Research Triangle Institute, 1987).

Status of the American Public School Teacher (Washington, DC: National Education Association, 1987).

years or less experience, and about half were taught by teachers with more than 10 years but less than 25 years experience. More than 10 percent were taught by teachers with 25 years experience.

As reflected by the somewhat lower average years of experience in teaching mathematics compared to teaching experience overall, somewhat more students were taught by teachers with 10 years or less experience teaching mathematics than were taught by teachers with 10 years or less general experience -- approximately 40 percent at both grades 4 and 8. These results were generally similar across student subgroups. At least 10 percent of the fourth and eighth graders were taught by teachers with 25 years or more experience in teaching mathematics, and approximately half were taught by teachers with more than 10 years but less than 25 years of experience.

TABLE 10.1 Teachers' Reports on Number of Years Teaching Experience at the Elementary or Secondary Level

	Overall Teaching Experience						
	Average Years Teaching Experience	10 Years or Less Experience		More than 10 Years, but Less than 25 Years Experience		25 Years or More Experience	
		Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	14.8 (0.4)	34 (2.3)	216 (1.2)	53 (2.5)	217 (0.9)	13 (1.5)	217 (2.2)
Grade 8	16.0 (0.5)	32 (2.5)	263 (1.4)	51 (3.0)	268 (1.4)	17 (2.1)	269 (3.1)

	Experience Teaching Mathematics						
	Average Years Teaching Mathematics	10 Years or Less Teaching Mathematics		More than 10 Years, but Less than 25 Years Teaching Mathematics		25 Years or More Teaching Mathematics	
		Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	13.6 (0.4)	39 (2.4)	216 (1.0)	51 (2.5)	217 (0.9)	11 (1.5)	219 (2.3)
White	13.8 (0.5)	37 (2.9)	222 (1.1)	51 (2.8)	224 (1.0)	11 (1.7)	225 (2.4)
Black	13.7 (0.6)	40 (3.9)	197 (2.0)	50 (4.5)	194 (1.7)	10 (2.3)	197 (3.7)
Hispanic	12.9 (0.5)	44 (2.7)	201 (2.2)	47 (2.7)	200 (2.1)	10 (2.0)	205 (3.3)
Male	13.6 (0.5)	38 (2.5)	216 (1.3)	51 (2.6)	218 (1.1)	11 (1.7)	221 (2.8)
Female	13.6 (0.5)	39 (2.6)	215 (1.1)	50 (2.7)	216 (1.2)	11 (1.4)	217 (2.6)
Grade 8	14.0 (0.5)	42 (2.9)	264 (1.3)	45 (3.1)	269 (1.6)	13 (2.0)	269 (3.9)
White	14.1 (0.6)	42 (3.2)	269 (1.5)	46 (3.5)	275 (1.5)	12 (2.3)	278 (3.9)
Black	14.1 (0.8)	42 (4.6)	245 (2.6)	44 (4.8)	245 (2.5)	15 (3.7)	238 (5.1)
Hispanic	13.1 (0.9)	49 (4.8)	251 (2.0)	40 (4.3)	253 (2.3)	11 (2.6)	248 (5.4)
Male	14.0 (0.5)	42 (3.0)	264 (1.7)	46 (3.2)	269 (1.6)	12 (2.1)	270 (4.8)
Female	14.1 (0.6)	42 (3.0)	263 (1.4)	45 (3.1)	268 (2.0)	13 (2.0)	267 (3.5)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate with 95 percent certainty for the sample. Population percentages may not total 100 percent because of rounding.

GENDER AND RACE/ETHNICITY

TABLE 10.2 summarizes the distribution of fourth- and eighth-grade students by their teachers' gender and race/ethnicity. The results show that the overwhelming majority of fourth graders were taught mathematics by female teachers (83 percent), which is consistent with data from a variety of sources indicating that most elementary school teachers are female.[83] At grade 8, there was balance across the genders, with 58 percent of the students being taught by females and 42 percent by males. At both grades, the results by subpopulations did not differ much from those for the nation.

TABLE 10.2 Teachers' Reports on Their Gender and Race/Ethnicity

	Teachers' Gender		Teachers' Race/Ethnicity		
	Male	Female	White	Black	Hispanic
	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students
Grade 4	17 (1.8)	83 (1.8)	85 (2.0)	11 (1.6)	2 (0.6)
White	17 (2.2)	83 (2.2)	93 (1.8)	5 (1.6)	1 (0.4)
Black	14 (2.8)	86 (2.8)	57 (4.3)	40 (4.3)	2 (0.7)
Hispanic	17 (2.2)	83 (2.2)	75 (4.0)	13 (2.5)	8 (2.9)
Male	17 (2.0)	83 (2.0)	85 (2.1)	11 (1.7)	2 (0.7)
Female	16 (1.8)	84 (1.8)	85 (2.0)	11 (1.7)	2 (0.6)
Grade 8	42 (3.0)	58 (3.0)	91 (1.7)	5 (1.3)	3 (0.9)
White	43 (3.4)	57 (3.4)	95 (1.2)	3 (0.9)	2 (0.7)
Black	38 (4.6)	62 (4.6)	77 (5.2)	21 (5.0)	2 (0.8)
Hispanic	40 (4.5)	60 (4.5)	80 (5.1)	5 (1.7)	13 (4.8)
Male	44 (3.2)	56 (3.2)	91 (1.9)	5 (1.3)	3 (1.1)
Female	40 (3.0)	60 (3.0)	91 (1.7)	6 (1.3)	2 (0.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate with 95 percent certainty for the sample. Population percentages may not total 100 percent because of rounding.

[83] Barbara H. Nelson, Iris R. Weiss, and Joanne Capper, *Science and Mathematics Education Briefing Book, Volume II* (Chapel Hill, NC: Horizon Research, Inc., 1990).

Eighty-five percent of the fourth graders and 91 percent of the eighth graders were taught by White teachers, but the results suggest some substantial differences across students' racial/ethnic groups. For example, nearly all the White fourth graders (93 percent) had White mathematics teachers, while about 40 percent of the Black students had Black teachers and about half had White teachers. At grade 8, fewer Black students had Black teachers (21 percent), and very few Hispanic students at either grade had Hispanic teachers (8 to 13 percent). Studies have reported that minority children benefit from positive minority role models.[84] Although the NAEP results suggest some success in this area, they also indicate that there are relatively few black and Hispanic mathematics teachers.

LEVEL AND TYPE OF CERTIFICATION

Although more than two-thirds of the fourth and eighth graders were taught by teachers with the highest level of certification, at grade 4 there was no apparent relationship between certification and student achievement (see TABLE 10.3). At grade 8, those students taught by teachers with the highest certification had slightly higher average proficiency. Most fourth graders (83 percent) were taught by teachers certified in education, while most eighth graders (78 percent) were taught by teachers certified in mathematics. There was no apparent pattern in the related proficiency results.

---

[84] Shirley M. McBay, *Increasing the Number and Quality of Minority Science and Mathematics Teachers* (New York, NY: Carnegie Forum on Education and the Economy, 1986).

TABLE 10.3 Teachers' Reports on Their Level and Type of Teaching Certification

	Level of Certification					
	None, Temporary, Probational, Provisional, or Emergency		Regular Certification, but Not the Highest		Highest Certification (Permanent or Long-term)	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Pr ficiency
Grade 4	10 (1.4)	219 (2.7)	26 (2.3)	214 (1.8)	64 (2.5)	217 (0.8)
Grade 8	7 (1.0)	261 (2.9)	28 (3.0)	262 (2.2)	65 (3.0)	269 (1.4)
	Type of Certification					
	Mathematics (Middle or Secondary School)		Education (Elementary or Middle School)		Other	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	15 (1.7)	221 (2.0)	83 (1.7)	216 (0.7)	3 (0.6)	219 (4.7)
Grade 8	78 (1.8)	266 (1.2)	17 (1.5)	266 (2.7)	5 (1.0)	265 (4.1)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said that for the population of interest, the value for the whole population is within plus or minus two standard errors of the estimate with 95 percent certainty for the sample. Population percentages may not total 100 percent because of rounding.

Certification generally provides some standards in mathematics training for teachers. According to a survey conducted by the Council of Chief State School Officers (CCSSO), however, 13 of 50 states had no course requirements as of 1987 in mathematics for elementary teachers, and the states that did require course work had minimums ranging from two to nine semester credit hours.[85] Further, at the middle- and secondary-school levels, course requirements, when they existed, varied dramatically, from 12 to 36 semester hours for middle school and from 16 to 45 hours for secondary school.

PRE-SERVICE TRAINING

To provide more detailed information about mathematics teachers' pre-service training, NAEP asked them a number of questions about their college course work. As shown in TABLE 10.4, the majority of fourth graders were taught mathematics by teachers with a bachelor's degree, about one-third by teachers with a master's or specialist's degree, and none by teachers who reported

[85] Rolf Blank, *State Education Policies on Science and Mathematics* (Washington, DC: Council of Chief State School Officers, 1987).

having a doctorate or professional degree. These results were relatively constant across subgroups.

TABLE 10.4 Teachers' Reports on Their Highest Academic Degree

	Bachelor's Degree		Master's or Specialist's Degree		Doctorate or Professional Degree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	64 (2.6)	217 (0.9)	36 (2.6)	216 (1.4)	0 (0.0)	---
White	64 (3.1)	224 (0.9)	36 (3.1)	223 (1.6)	0 (0.0)	---
Black	59 (3.8)	196 (1.4)	41 (3.8)	194 (2.0)	0 (0.0)	---
Hispanic	69 (2.7)	203 (1.5)	31 (2.7)	198 (2.8)	0 (0.0)	---
Male	64 (2.5)	218 (1.0)	36 (2.5)	217 (1.6)	0 (0.0)	---
Female	63 (2.9)	216 (1.0)	37 (2.9)	215 (1.5)	0 (0.0)	---
Grade 8	55 (2.5)	265 (1.3)	44 (2.6)	269 (2.0)	1 (0.6)	255 (8.4)
White	53 (2.8)	271 (1.4)	45 (3.1)	276 (2.1)	2 (0.9)	255 (8.7)
Black	53 (4.5)	245 (2.5)	47 (4.5)	243 (2.7)	0 (0.0)	---
Hispanic	64 (3.8)	250 (1.9)	36 (3.8)	253 (2.3)	0 (0.2)	---
Male	55 (2.4)	265 ([illegible])	45 (2.5)	270 (2.2)	1 (0.4)	260(11.4)
Female	55 (2.9)	264 ([illegible])	44 (3.0)	268 (2.2)	2 (0.9)	253 (7.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate with 95 percent certainty for the sample. When the proportion of students is 0 percent students is 0 percent, the standard error is inestimable. Population percentages may not total 100 percent because of rounding.

The majority of eighth graders also were taught mathematics by teachers with bachelor's degrees, although 44 percent were taught by teachers with a master's or specialist's degree, and a few by teachers with a doctorate or professional degree. Again, these results were relatively constant across subgroups. Presence or absence of a master's or specialist's degree appeared to be unrelated to mathematics proficiency at either grade 4 or 8, although the small proportion of eighth graders whose mathematics teachers had doctorates or professional degrees had the lowest average proficiency. However, it may be that teachers with the highest degrees were assigned or elected to work with "at risk" students or those students needing special remediation.

As shown in TABLE 10.5, teachers' reports of their major course work emphases were consistent with their reports on type of certification. Most fourth graders had teachers who majored in education during their undergraduate years and also during graduate school, if they did graduate work. Although some had teachers who majored in other subjects, only a negligible percentage of fourth graders were taught mathematics by mathematics majors.

TABLE 10.5 Teachers' Reports on Their Undergraduate and Graduate Majors

	Undergraduate Major					
	Undergraduate Major in Mathematics		Undergraduate Major in Education		Other Undergraduate Major	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	1 (0.3)	211 (9.0)	83 (1.9)	217 (0.7)	16 (1.8)	213 (1.9)
Grade 8	39 (3.2)	270 (2.3)	38 (2.5)	264 (1.6)	23 (2.1)	263 (2.6)
	Graduate Major					
	Graduate Major in Mathematics		Graduate Major in Education		Other Graduate Major or No Graduate Study	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	0 (0.3)	—	61 (2.5)	216 (0.9)	39 (2.5)	219 (1.1)
Grade 8	21 (2.3)	268 (3.0)	39 (2.7)	266 (1.6)	40 (2.0)	266 (1.7)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate with 95 percent certainty for the sample.

Of the eighth graders, 39 percent were taught by teachers who were undergraduate mathematics majors, 38 percent by education majors, and 23 percent by teachers with majors in other areas. Those with teachers who majored in mathematics had the highest achievement levels. Twenty-one percent were taught by teachers with graduate mathematics majors, but more were taught by teachers with graduate majors in education (39 percent) and by teachers whose graduate majors were in other areas or did no graduate-level study (40 percent). Teachers' graduate study in mathematics did not seem to be related to students' average proficiency.

Teachers' mathematics course-taking patterns are summarized in TABLE 10.6. For fourth graders, 41 percent had teachers who reported no course work in number systems, approximately half had teachers who reported no course work in probability and statistics or in computer science, more than 60 percent had teachers who reported no course work in geometry or computer programming, 82 percent had teachers who reported no course work in abstract or linear algebra, and 90 percent had teachers who reported no course work in calculus. Although the *NCTM Standards* call for elementary teachers to build the foundation for students' further study in geometry, probability and statistics, and algebra, it appears that the majority of elementary teachers have had no courses in these content areas.[86]

The relationship of teachers' course work to proficiency was not wholly consistent. In several instances, the students at grade 4 who performed the most poorly were those whose teachers reported two or more courses (e.g. geometry, and probability and statistics). However, this pattern did not hold at grade 8.

---

[86] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

Professional Standards for Teaching Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1991).

TABLE 10.6 Teachers' Reports on Number of Mathematics Courses Taken as Part of Undergraduate and Graduate Study

	Two or More Courses		One Course		No Courses	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Number Systems and Numeration						
Grade 4	17 (1.8)	216 (2.2)	42 (2.4)	217 (1.0)	41 (2.3)	217 (1.2)
Grade 8	33 (3.0)	269 (1.9)	46 (2.7)	265 (1.5)	21 (2.3)	267 (2.0)
Geometry						
Grade 4	6 (0.8)	208 (3.2)	32 (2.3)	218 (1.1)	62 (2.5)	217 (1.0)
Grade 8	39 (3.1)	267 (1.6)	39 (3.2)	269 (2.4)	22 (2.0)	261 (1.8)
Probability and Statistics						
Grade 4	8 (1.0)	211 (3.0)	39 (2.4)	217 (1.2)	53 (2.7)	218 (1.0)
Grade 8	35 (2.7)	269 (2.1)	50 (2.6)	266 (1.6)	15 (1.9)	261 (2.2)
Abstract or Linear Algebra						
Grade 4	4 (0.7)	210 (5.2)	15 (1.6)	217 (2.0)	82 (1.9)	217 (0.8)
Grade 8	35 (2.7)	270 (2.2)	35 (2.9)	267 (1.8)	30 (2.5)	264 (1.7)
Calculus						
Grade 4	3 (0.6)	214 (5.1)	7 (1.1)	218 (2.9)	90 (1.2)	217 (0.7)
Grade 8	61 (2.5)	269 (1.6)	13 (1.9)	263 (3.0)	26 (2.2)	262 (1.7)
Computer Science						
Grade 4	11 (1.5)	216 (2.5)	37 (2.3)	216 (1.1)	52 (2.3)	218 (1.2)
Grade 8	21 (2.1)	272 (2.2)	37 (2.7)	266 (1.8)	42 (2.8)	264 (1.7)
Computer Programming						
Grade 4	6 (1.0)	216 (2.7)	27 (2.0)	216 (1.3)	67 (2.0)	218 (0.8)
Grade 8	29 (2.4)	270 (1.9)	33 (2.8)	266 (2.0)	38 (3.1)	265 (1.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate with 95 percent certainty for the sample. Population percentages may not total 100 percent because of rounding.

Eighth graders' teachers had taken more mathematics courses. In general, students tended to have higher average mathematics proficiency when their teachers reported having taken two or more courses. Nevertheless, even for eighth graders, from 15 to 42 percent were taught by teachers with no course work in particular content areas.

The amount of course work in each specific area provides information about the depth of teachers' mathematics training. To gain insight into their breadth of training, the results were summarized according to the number of areas in which teachers had taken at least one course, as shown in TABLE 10.7. At grade 4, three-fourths of students were taught by teachers who had had course work in three or fewer of these mathematical areas, and the results were relatively consistent across subgroups of students. As with teachers' course-by-course reports, breadth of course work appeared to have no discernible relationship with achievement at grade 4.

TABLE 10.7 Teachers' Reports on Mathematics Courses Taken Across Seven Areas

	Courses in Six to Seven Areas		Courses in Four to Five Areas		Courses in Zero to Three Areas	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	7 (1.0)	215 (2.7)	18 (1.7)	217 (1.8)	75 (2.0)	217 (0.9)
White	7 (1.1)	223 (2.7)	18 (1.9)	223 (2.2)	75 (2.2)	223 (0.9)
Black	9 (1.9)	196 (3.4)	20 (3.2)	198 (2.5)	72 (3.8)	195 (1.4)
Hispanic	8 (1.5)	198 (4.5)	17 (1.9)	198 (2.9)	75 (2.4)	202 (1.9)
Male	7 (1.0)	217 (3.1)	20 (1.8)	217 (2.5)	74 (2.1)	218 (1.0)
Female	8 (1.2)	213 (3.1)	17 (1.7)	216 (1.8)	75 (2.0)	216 (1.1)
Grade 8	48 (2.6)	271 (1.8)	30 (2.4)	263 (1.6)	22 (2.0)	262 (1.8)
White	49 (2.9)	277 (1.8)	29 (2.6)	270 (1.6)	22 (2.2)	268 (2.1)
Black	42 (5.2)	246 (2.9)	37 (5.6)	242 (2.4)	21 (3.7)	243 (5.0)
Hispanic	39 (3.7)	252 (2.3)	34 (3.3)	250 (2.4)	28 (3.8)	251 (2.9)
Male	49 (2.8)	272 (2.0)	28 (2.3)	263 (1.8)	23 (2.2)	263 (2.3)
Female	47 (2.7)	270 (1.9)	32 (2.7)	263 (2.0)	22 (1.9)	261 (1.9)

These results are summarized across the results in Table 10.6, with course taking defined as at least one course in an area. The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate. Population percentages may not total 100 percent because of rounding.

At grade 8, almost half the students had teachers who reported course work in six or seven of the content areas, and the results tended to be relatively constant across subgroups. Greater breadth in course work was related to higher achievement for White students as well as for males and females, although, it appeared to have little association with proficiency for Hispanic and Black students.

As shown in TABLE 10.8, 95 percent of the fourth graders and 70 percent of the eighth graders had teachers who reported having taken at least one methods course, even though a number of states do not require mathematics methods courses for certification.[87] There was, however, no apparent relationship at either grade between course taking in the methods of teaching mathematics and students' average mathematics proficiency.

TABLE 10.8 Teachers' Reports on Number of Courses Taken in the Methods of Teaching Mathematics (Elementary-School Mathematics at Grade 4 and Middle-School Mathematics at Grade 8)

	Three Courses or More		Two Courses		One Course		None	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	32 (2.1)	217 (1.5)	32 (1.9)	215 (1.3)	31 (2.1)	219 (1.2)	5 (0.9)	212 (4.0)
Grade 8	24 (2.3)	269 (2.1)	18 (2.1)	265 (3.5)	29 (2.9)	267 (1.5)	30 (2.6)	265 (2.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate. Population percentages may not total 100 percent because of rounding.

IN-SERVICE TRAINING

Research indicates that teachers have positive attitudes about in-service training, and that teachers who have participated in in-service education are more likely to stay in the field.[88] As shown in TABLE 10.9, there was also some modest evidence of a positive relationship between amount of in-service training and student achievement. At grade 8, students had higher proficiency

[87] Rolf Blank, *State Education Policies on Science and Mathematics* (Washington, DC: Council of Chief State School Officers, 1987).

[88] Barbara H. Nelson, Iris R. Weiss, and Joanne Capper, *Science and Mathematics Education Briefing Book, Volume II* (Chapel Hill, NC: Horizon Research, Inc., 1990).

if their teachers had participated in at least 16 hours of in-service mathematics training.

TABLE 10.9 Teachers' Reports on the Amount of Time Spent on In-Service Education in Mathematics or the Teaching of Mathematics During the Last Year

	16 Hours or More		One to 15 Hours		None	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
Grade 4	12 (1.3)	217 (2.3)	58 (2.2)	217 (1.1)	31 (2.4)	217 (1.6)
White	10 (1.5)	225 (2.4)	58 (2.7)	223 (1.1)	31 (2.8)	223 (1.9)
Black	16 (2.4)	196 (4.1)	54 (3.7)	195 (1.8)	30 (3.8)	195 (2.0)
Hispanic	13 (1.9)	203 (3.5)	59 (2.7)	200 (1.7)	28 (2.7)	204 (2.8)
Male	12 (1.6)	218 (2.8)	57 (2.4)	217 (1.3)	31 (2.4)	218 (1.7)
Female	11 (1.4)	215 (2.7)	58 (2.3)	216 (1.1)	31 (2.6)	216 (2.0)
Grade 8	36 (2.9)	270 (1.7)	51 (2.9)	265 (1.6)	13 (1.6)	264 (2.9)
White	36 (3.1)	276 (1.7)	51 (3.1)	272 (1.6)	13 (1.7)	269 (3.0)
Black	35 (5.3)	253 (3.1)	55 (5.4)	238 (1.8)	11 (3.0)	243 (5.8)
Hispanic	38 (3.8)	259 (2.1)	50 (4.0)	250 (1.7)	12 (2.4)	255 (5.1)
Male	35 (2.9)	271 (2.1)	52 (2.9)	265 (1.8)	14 (1.7)	265 (3.0)
Female	37 (3.1)	269 (1.7)	51 (3.1)	264 (1.8)	12 (1.6)	264 (3.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate. Population percentages may not total 100 percent because of rounding.

In-service mathematics training does not appear to be very common for elementary-school teachers. About one-third of the fourth graders had teachers who reported no such in-service education in mathematics and only 12 percent had teachers who reported 16 hours or more of in-service mathematics training. At the fourth grade, in-service training did not seem to be associated with differing mathematics achievement, and the results were relatively constant across subgroups.

In comparison, 13 percent of the eighth graders had teachers who reported no in-service education in mathematics, and 36 percent had teachers who reported 16 hours or more of in-service training, with the latter students having higher average mathematics achievement. These findings tended to be similar across the subgroups, although Hispanic students whose teachers reported at least 16 hours of mathematics in-service training did not perform better than those whose teachers reported fewer hours of in-service education in mathematics.

SUMMARY

It appears that most fourth- and eighth-grade students were taught mathematics by experienced teachers who had the highest level of certification.

Fourth graders, by and large, had female teachers with training in education, but little training in mathematics. Although a substantial proportion of the Black fourth graders had Black teachers, 85 percent of the fourth graders were taught by White teachers. The majority of fourth graders had teachers who reported no course work across a variety of content areas, including geometry, advanced algebra, and probability and statistics. Additionally, approximately one-third had teachers who reported no in-service mathematics education. There appeared to be little relationship between the fourth graders' average mathematics proficiency levels and their teachers' reports of mathematics training, but this lack of background may inhibit these teachers' ability to lay the foundation for students' future content area course work. The *NCTM Standards* call for elementary school teachers to introduce students to the concepts of geometry, probability and statistics, and algebra, yet the majority reported no college course work in these areas.

Two-fifths of the eighth graders were taught by male teachers, although as at grade 4, most were taught by White teachers (91 percent). More than three-fourths were taught by teachers who were certified in mathematics, and one-third were taught by mathematics majors. Almost half had teachers who reported at least one course in each of six or seven mathematics areas and more than one-third had teachers who reported 16 hours or more of in-service training during the last year. For most students, especially as they progress further through their schooling, proficiency may be more a result of the cumulative effect of mathematics education and is less related to current teaching. Still, at the eighth grade, a greater amount and breadth of mathematics course work by teachers as well as a greater amount of in-service education were positively related to students' mathematics achievement.

PART II

NAEP's 1990 Trial State Assessment
Mathematics Results
Grade 8 Public Schools

Chapter 11

Overall and Content Area Mathematics Proficiency at Grade 8 in the States

INTRODUCTION

An overview of NAEP's 1990 Trial State Assessment Program is provided in the Foreword to this report. For each state (including the District of Columbia) and territory participating in NAEP's 1990 Trial State Assessment Program, this chapter presents information about the overall average mathematics performance of eighth-grade students attending public schools. Information is also provided about the range of performance on the overall mathematics proficiency scale and about the results for each of the five content area scales -- numbers and operations; measurement; geometry; data analysis, statistics, and probability; and algebra and functions. Parallel information for population subgroups within states and territories, including race/ethnicity, type of community, parents' education, and gender, is presented in the following chapter. For further information about the methods used in establishing the scales, the procedures for anchoring the overall mathematics proficiency scale, and the descriptions of the mathematics content areas, see Chapters One through Three.[89]

DESCRIPTION OF THE FIGURES AND TABLES

The figures presented in this chapter illustrate why it would be misleading, to assign numerical rankings to states based on their average performance. When the results are organized by average proficiency, there often is very little difference from one state to the next. Further, the estimate of average proficiency in each state is associated with a certain degree of sampling and measurement error. The degree of potential sampling and measurement error

[89]See Appendix C for more information about 1990 assessment procedures and Appendix D for details about scale anchoring.

associated with each result in the report is indicated by the standard errors provided in parentheses. When the necessary confidence intervals to accommodate sampling and measurement error are established around the average proficiencies, the differences between states' achievement are further reduced.

This section briefly describes the types of information presented for overall mathematics proficiency in grade 8 public schools across states and territories participating in the 1990 Trial State Assessment Program. However, parallel sets of figures and tables are also presented for five mathematical content areas.

FIGURE 11.1 provides a method for making appropriate comparisons in average overall mathematics proficiency across the states (including the District of Columbia) and territories participating in NAEP's 1990 Trial State Assessment Program. It can be used as a sound basis for concluding when average proficiency between states actually differs, because it shows whether or not the average proficiency between pairs of states is statistically different.[90] For example, even though there may seem to be differences in the estimated average mathematics proficiency among the first few states listed in FIGURE 11.1, the average proficiency for North Dakota does not significantly differ from that of Montana, Iowa, Nebraska, Minnesota, and Wisconsin. There is no basis for concluding that the average mathematics proficiency in North Dakota is higher than the average mathematics proficiency in any of those five states. Apart from those five states, however, North Dakota did have higher average proficiency than the remaining states participating in the 1990 Trial State Assessment did.

Interestingly, the students in Montana displayed more homogeneity in their performance than did the students in North Dakota, and the degree of sampling and measurement error associated with the estimate of average proficiency for Montana was smaller. Thus, the confidence interval for Montana is smaller than that for North Dakota, and its average proficiency overlaps with fewer states -- North Dakota, Iowa, and Nebraska. Montana had higher proficiency than all but three states participating in the 1990 Trial State Assessment.

[90]The significance tests in FIGURE 11.1 are based on a Bonferroni procedure for multiple comparisons that holds the probability of erroneously declaring the means of any two states to be different, when they are not, to 5 percent across all 780 possible comparisons.

North Dakota, Montana, Iowa, and Nebraska, all had similar average mathematics proficiency. Yet it cannot be said that these four states outperformed the other states, because average proficiency in Nebraska, for example, also did not differ from that in Minnesota, Wisconsin, New Hampshire, Wyoming, Idaho, or Oregon. This type of overlapping prevails throughout FIGURE 11.1.

For most states, the pattern is one of having lower average proficiency than some states, the same average proficiency as some states, and higher average proficiency than some states. To find this information for any state, find the state's name in the left hand column in FIGURE 11.1 and then read across the figure. For example, Virginia's average proficiency was lower than that of 10 states, the same as that of eighteen states, and higher than that of 11 states.

FIGURE 11.2 provides a visual representation of percentile results organized by states' average proficiencies. For example, 25 percent of the students in each state performed below the 25th percentile, and 75 percent performed above the 25th percentile. For the 90th percentile, 10 percent performed above that level and 90 percent below.

This figure also shows the range and distribution of performance in each state. (For proficiency values corresponding to the percentile distributions plotted in FIGURE 11.2, see TABLE 11.2). In FIGURE 11.2, however, the boxes at the midpoints of the distributions show the 95 percent simultaneous confidence intervals around average proficiencies. These intervals take into account the amount of sampling measurement error associated with the estimates of average proficiency.[91]

TABLE 11.1 presents for each participating state (including the District of Columbia) and territory, in alphabetical order, average proficiency results on NAEP's overall mathematics proficiency scale based on the five content area scales.[92] It also contains information about the percentage of students

[91] Like the Bonferroni procedure for multiple comparisons employed in FIGURE 11.1, using the confidence intervals to compare between states holds to approximately 5 percent the probability of falsely declaring the average proficiencies of any two states to be different when they are not, across the 780 possible comparisons between pairs of the 40 states. The average proficiencies of two states are declared to be different when their confidence intervals do not overlap.

[92] In creating the overall scale, the content scales were weighted as specified in *Mathematics Objectives, 1990 Assessment*. At grade 8, these were: Numbers and Operations--30 percent; Measurement--15 percent; Geometry--20 percent; Data Analysis, Statistics, and Probability--15 percent; and Algebra and Functions--20 percent.

attaining each anchor level on the overall scale. For the complete description of the anchor levels summarized below, see FIGURE 1.1 in Chapter One. (Details about scale anchoring are included in Appendix D.)

Level 200--Simple Additive Reasoning and Problem Solving with Whole Numbers

Level 250--Simple Multiplicative Reasoning and Two-Step Problem Solving

Level 300--Reasoning and Problem Solving Involving Fractions, Decimals, Percents, Elementary Geometric Properties, and Simple Algebraic Manipulations

Level 350--Reasoning and Problem Solving Involving Geometric Relationships, Algebraic Equations, and Beginning Statistics and Probability

Results are presented for each participating state and territory as well as for the nation and for each region of the country. For example, in Alabama, students' overall average mathematics proficiency was 252, which compares to the national average of 261. Further, in Alabama, 96 percent of the students performed at or above Level 200, 52 percent performed at or above Level 250, 7 percent performed at or above Level 300, and virtually no students attained Level 350. The percentages of students reaching the various anchor levels in Alabama were similar to those for the Southeast as a whole. In the Southeast, 94 percent of the students performed at or above Level 200, 52 percent performed at or above Level 250, 8 percent performed at or above Level 300, and virtually no students reached Level 350.

THE DIFFERENCE BETWEEN THE NATIONAL RESULTS IN PARTS ONE AND TWO

Because the aggregate of the participating states did not provide a nationally representative sample, the results for the nation and the regions presented in the tables in Part Two are based on a subset of NAEP's national sample, as described in Part One of this report, rather than on the aggregate of the results presented for each state. The grade 8 national and regional results in Part Two are different from those previously presented in Part One, and the grade 8 national and regional results in Part Two provide a better match to the state results and are more appropriate for making state-to-nation comparisons. The results in Part One are based on the full NAEP national sample, including eighth graders in both public and private schools who were assessed during the January to mid-May time period. Those in Part Two, however, are based only on the subset of eighth graders attending public schools who were assessed during the shorter January to mid-March time period (also a nationally representative sample). The 1990 Trial State Assessment was conducted during the month of February.

AVERAGE OVERALL MATHEMATICS PROFICIENCY AND PERFORMANCE DISTRIBUTIONS

As shown in FIGURE 11.1, there were considerable differences in average performance between the higher- and lower-performing states. The national results portraying lower mathematics proficiency in the Southeast are reinforced by a general tendency of the participating states from the Southeast to have been among the lower-performing states. An examination of the contextual background data for states provided in Appendix A suggests that the highest-performing states, including North Dakota, Montana, Iowa, Nebraska, Minnesota, and Wisconsin, tended to have had fewer students in large-city schools, fewer students in free-lunch programs, fewer minority students, and to have been less densely populated. Yet the differences from state to state, ordered by average proficiency, were very small. Because most states had essentially the same average proficiency as a number of other states, it would be quite misleading to assign numerical rankings (1 through 40) based on these results. The results across percentiles show great variation in students' achievement within each state, to the extent that the variation within individual states tended to exceed the variation in average performance across states. However, differences across states are also of interest. For example, as shown in FIGURE 11.2, performance at the 90th percentile in some states and territories compared to performance at the 75th percentile in other states.

TABLE 11.1 presents, in alphabetical order, the overall average proficiency and anchor level results for the participating states and territories, as well as the comparable results for the nation and regions. Despite rather large differences between average mathematics proficiency for eighth-grade students in the higher- and lower-performing states, more than 90 percent of the students across the states and sometimes all (or nearly all) reached Level 200, except in the District of Columbia and in the two territories. Most students demonstrated a grasp of additive reasoning typical of material generally covered by the third grade. Conversely, very few eighth-grade students attending public schools, if any, reached Level 350 across all the states and territories participating in the Trial State Assessment Program. Performance at or above Level 350 indicated a breadth of mathematics understanding necessary for advanced study.

However, because of the nature of student performance on the assessment and the content typified by performance at Level 200 and Level 350, the differences in average achievement among states and territories are better illuminated by the differing percentages of students who performed at or above Levels 250 and 300. For example, in the District of Columbia, Guam and the Virgin Islands, the percentages of students attaining Level 250 or above ranged from 11 to 28 percent. For the remaining participants, the percentages of students performing at or above Level 250 ranged from 43 percent in Louisiana to 88 percent in North Dakota and Montana. These results indicate that while most of the public-school eighth graders in some states demonstrated a grasp of mathematics that included multiplicative reasoning and two-step problem solving with whole numbers, in other states and territories, far fewer eighth graders had reached this level of understanding. Similarly, the percentages of eighth graders attending public schools performing at or above Level 300 ranged from 0 percent to 24 percent, indicating that in some states and territories, very few eighth graders demonstrated a grasp of decimals, fractions, and simple algebra. In other states -- North Dakota (24 percent) and Montana (23 percent) -- about one-fourth of the eighth graders did.

TABLE 11.1 also provides a basis for comparison to the national results. Based on tests of statistical significance between average overall proficiency in each state and that of the nation, 15 states or territories performed above the national level, 12 similar to the national level, and 13 below the national level. This suggests a relatively diverse performance for the participating states. However, considering that the national results are representative of eighth graders across the 50 states and the District of Columbia, those states with larger populations of public-school eighth graders had a greater impact on the average national performance than did states with smaller populations of eighth graders in public schools. Even if all the states and territories had participated in the 1990 Trial State Assessment Program, there is no reason to expect that half would have performed above the national level and half below.

Finally, for these results and throughout Part Two of this report, it should be noted that the Virgin Islands' participation in the 1990 NAEP Trial State Mathematics Assessment was done within four months of suffering the destruction of Hurricane Hugo (September 18, 1989). Some students had lost two months of instruction, not only were schools sharing facilities, but were under reconstruction, and stress levels were high among students and school staff alike.

AVERAGE PROFICIENCY AND PERFORMANCE DISTRIBUTIONS IN THE MATHEMATICS CONTENT AREAS

The remaining tables and figures in this chapter present the results for the mathematical content areas. TABLE 11.3 summarizes the average proficiency in each of the five content areas for each of the states. Following TABLE 11.3 are figures for each content area, showing each state's standing compared to other states on average proficiency in that content area. The material includes a figure depicting the percentile distributions of performance across states in that content area, and a table showing the proficiency values for the percentile distributions in that content area. For example, as shown in FIGURE 11.3, North Dakota, Iowa, and Montana were the top-performing states in numbers and operations. North Dakota had higher average proficiency in the area of numbers and operations than did most participating states, with the exception of Iowa and Montana. Average proficiency in numbers and operations in North Dakota did not differ from that in Iowa and Montana. Similarly, Nebraska, Minnesota, and Wisconsin did not have lower average proficiency than Iowa or Montana.

North Dakota, Montana, Iowa, Nebraska, Wisconsin, New Hampshire, and Minnesota all had similar average proficiency in measurement, although Montana had higher average proficiency than did Minnesota. Also, a number of other states had average proficiency that did not differ from average proficiency in Iowa, Nebraska, Wisconsin, New Hampshire, and Minnesota. Although this type of overlapping prevailed across the average proficiency results for the content areas, Montana, North Dakota, and Iowa had higher average proficiency in geometry than many other participating states and territories did. North Dakota, Montana, Iowa, and Minnesota generally had higher average proficiency in data analysis, statistics, and probability. In algebra and functions, Montana, N 1 Dakota, Iowa, Minnesota, and Nebraska were the higher-performing states.

The general pattern of proficiency in each content area was consistent with the overall results. However, there were some interesting differences. For example, the average proficiency results for measurement suggest more clustering of similar performance across groups of states than occurred for the other four content areas. Within states, there were also some interesting findings. For instance, eighth-grade students in public schools in Connecticut appeared to perform comparatively better across states in the measurement area than they did in the other four content areas. Although Connecticut's eighth graders had lower measurement proficiency, on average, than did students in two other states (North Dakota and Montana), in other content areas, its students had lower proficiency than eighth graders in four to five other states. Similarly, eighth graders in New Jersey appeared to perform comparatively better in algebra and functions than they did in the other four content areas. Although New Jersey had algebra and functions proficiency below that of only two states (Montana and North Dakota), in the other content areas, its average proficiency was lower than three to five other states.

SUMMARY

The higher-performing states, which included North Dakota, Montana, Iowa, Nebraska, Minnesota, and Wisconsin, appeared to have fewer urban areas, fewer disadvantaged students, and fewer minority students. The lower-performing states appeared to be concentrated in the Southeast, which parallels NAEP findings for the nation. However, the differences from one state to the next were small and after sampling and measurement error was considered, average proficiency between states overlapped considerably. Because of this overlapping, it would be quite misleading to assign numerical rankings to states, even though substantial differences in average achievement were evident between the higher- and lower-performing ones (see FIGURE 11.2).

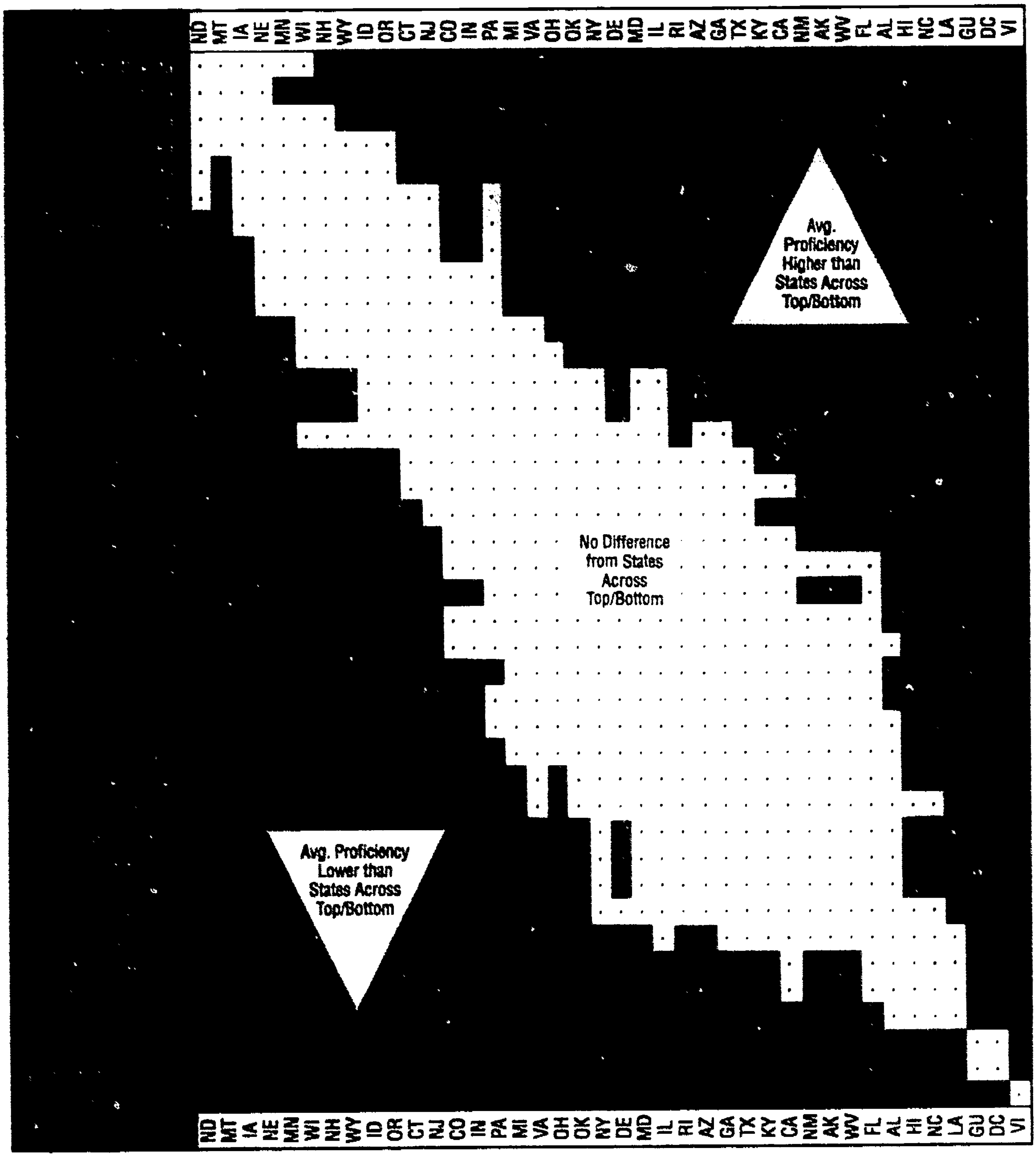
Performance among the eighth graders attending public schools within each state (including the District of Columbia) and territory participating in NAEP's 1990 Trial State Assessment Program varied tremendously. Within every state, the differences between the 10th and 90th percentiles were larger than the differences in average proficiency across states.

Most eighth graders across the states performed at or above Level 200 on the NAEP scale, indicating a grasp of reasoning and problem solving in whole-number addition and subtraction settings typified by the school mathematics generally covered by third grade. In contrast, almost no students in any state attained Level 350, which indicates a relatively broad grasp of mathematics, including preparedness for the study of advanced mathematics.

However, very real differences in performance existed between the highest- and lowest- performing states at Levels 250 and 300. For example, Level 250 on the NAEP scale suggests a grasp of multiplicative reasoning and problem solving with whole numbers, and in several states more than 80 percent of the public-school eighth graders achieved this level of performance. Yet in other states and territories, closer to half or even fewer students performed at or above this level, which can be characterized as something akin to fifth-grade mathematics. Across the participating jurisdictions, from 0 to 24 percent of the public-school eighth graders performed at or above Level 300 -- material generally introduced into the mathematics curriculum by the seventh grade.

FIGURE 11.1

Comparisons of Overall Mathematics Proficiency
Based on Appropriate Tests of Statistical Significance



Note: Reading across, from left to right, this chart shows whether the average proficiency of each state or territory is lower than, the same as, or higher than that of other participants.

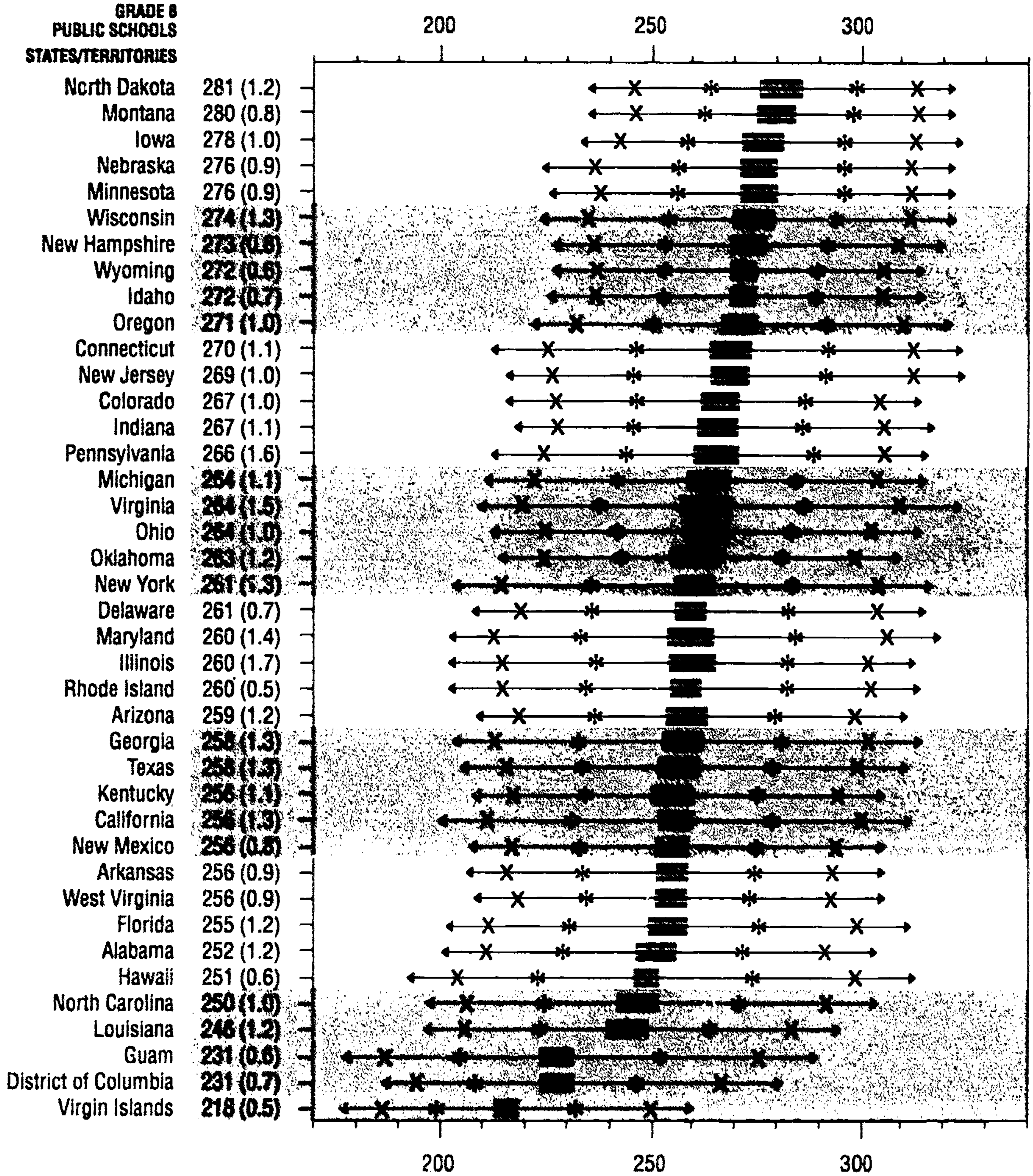
*Significance determined by an application of the Bonferroni procedure based on 780 comparisons by comparing the difference between the two means with four times the square root of the sum of the squared standard errors.

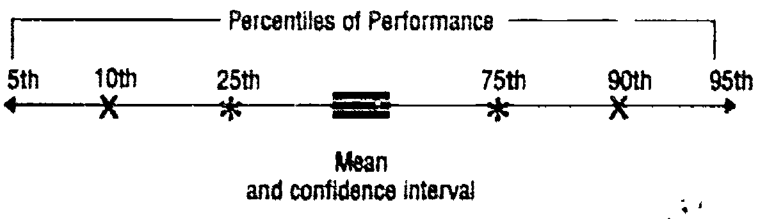
For any given state:

- Overall average proficiency statistically significantly higher than comparison state.
- No statistically significant difference from comparison state.
- Overall average proficiency statistically significantly lower than comparison state.

FIGURE 11.2

Distribution of Overall Mathematics Proficiency
Organized by Average Proficiency





The shaded box indicates a simultaneous confidence interval around the average overall mathematics proficiency for the state based on the Bonferroni procedure for 780 comparisons (the average ±2.83 times its standard error). The remaining symbols indicate values of the 5th, 10th, 25th, 75th, 90th, and 95th percentiles of the distribution of overall mathematics proficiency.

TABLE 11.1 | Overall Average Mathematics Proficiency and Anchor Level Results

GRADE 8 PUBLIC SCHOOLS	Average Proficiency	Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale			
		Level 200	Level 250	Level 300	Level 350
NATION	261 (1.4)	97 (0.7)	64 (1.6)	12 (1.2)	0 (0.2)
Northeast	269 (3.4)	99 (0.6)	72 (4.6)	16 (2.7)	0 (0.5)
Southeast	253 (2.7)	94 (2.2)	52 (3.2)	8 (1.6)	0 (0.0)
Central	265 (2.6)	98 (0.9)	70 (3.2)	12 (2.5)	0 (0.2)
West	261 (2.6)	97 (1.0)	63 (2.8)	12 (2.4)	0 (0.4)
STATES					
Alabama	**252 (1.2)**	**96 (0.7)**	**52 (1.7)**	**7 (0.7)**	**0 (0.1)**
Arizona	**259 (1.2)**	**98 (0.3)**	**61 (1.9)**	**10 (1.0)**	**0 (0.1)**
Arkansas	**256 (0.9)**	**97 (0.5)**	**57 (1.6)**	**7 (0.7)**	**0 (0.0)**
California	**256 (1.3)**	**95 (0.9)**	**56 (1.6)**	**11 (1.0)**	**0 (0.1)**
Colorado	267 (1.0)	99 (0.3)	72 (1.5)	14 (0.9)	0 (0.0)
Connecticut	270 (1.1)	98 (0.4)	72 (1.4)	19 (1.0)	0 (0.1)
Delaware	261 (0.7)	97 (0.5)	60 (1.2)	13 (0.9)	0 (0.2)
District of Columbia	231 (0.7)	86 (0.8)	23 (1.0)	2 (0.5)	0 (0.1)
Florida	255 (1.2)	96 (0.7)	54 (1.7)	10 (1.0)	0 (0.0)
Georgia	**258 (1.3)**	**96 (0.5)**	**59 (1.6)**	**12 (1.1)**	**0 (0.1)**
Hawaii	**251 (0.8)**	**93 (0.6)**	**49 (1.0)**	**10 (0.6)**	**0 (0.2)**
Idaho	**272 (0.7)**	**100 (0.2)**	**79 (1.0)**	**15 (0.9)**	**0 (0.1)**
Illinois	**260 (1.7)**	**96 (0.8)**	**64 (2.1)**	**12 (1.1)**	**0 (0.1)**
Indiana	**267 (1.1)**	**99 (0.4)**	**71 (1.5)**	**14 (1.2)**	**0 (0.1)**
Iowa	278 (1.0)	100 (0.1)	84 (1.3)	21 (1.4)	0 (0.2)
Kentucky	256 (1.1)	98 (0.5)	57 (1.7)	8 (0.8)	0 (0.0)
Louisiana	246 (1.2)	94 (0.8)	43 (1.8)	4 (0.6)	0 (0.0)
Maryland	260 (1.4)	96 (0.5)	61 (1.8)	14 (1.2)	0 (0.1)
Michigan	264 (1.1)	98 (0.3)	67 (1.5)	13 (1.0)	0 (0.1)
Minnesota	**276 (0.9)**	**99 (0.3)**	**82 (1.0)**	**20 (1.1)**	**0 (0.1)**
Montana	**280 (0.8)**	**100 (0.1)**	**88 (0.9)**	**23 (1.4)**	**0 (0.1)**
Nebraska	**276 (0.9)**	**99 (0.3)**	**81 (1.2)**	**21 (1.2)**	**0 (0.2)**
New Hampshire	**273 (0.8)**	**100 (0.2)**	**79 (1.2)**	**17 (1.1)**	**0 (0.2)**
New Jersey	**269 (1.0)**	**99 (0.4)**	**72 (1.5)**	**19 (1.3)**	**0 (0.2)**
New Mexico	256 (0.8)	98 (0.5)	56 (1.3)	8 (0.8)	0 (0.0)
New York	261 (1.3)	96 (0.6)	62 (1.9)	13 (1.0)	0 (0.1)
North Carolina	250 (1.0)	94 (0.6)	49 (1.4)	7 (0.7)	0 (0.0)
North Dakota	281 (1.2)	100 (0.2)	88 (1.4)	24 (1.7)	0 (0.4)
Ohio	264 (1.0)	98 (0.3)	67 (1.3)	12 (0.9)	0 (0.0)
Oklahoma	**263 (1.2)**	**99 (0.4)**	**67 (1.7)**	**10 (1.0)**	**0 (0.0)**
Oregon	**271 (1.0)**	**99 (0.2)**	**76 (1.4)**	**18 (1.0)**	**0 (0.1)**
Pennsylvania	**266 (1.6)**	**98 (0.4)**	**69 (2.1)**	**15 (1.2)**	**0 (0.1)**
Rhode Island	**260 (0.5)**	**96 (0.5)**	**61 (0.8)**	**12 (0.8)**	**0 (0.1)**
Texas	**258 (1.3)**	**97 (0.6)**	**58 (1.6)**	**10 (0.9)**	**0 (0.1)**
Virginia	264 (1.5)	98 (0.4)	64 (1.6)	15 (1.6)	1 (0.4)
West Virginia	256 (0.9)	98 (0.4)	56 (1.4)	7 (0.8)	0 (0.0)
Wisconsin	274 (1.3)	99 (0.3)	80 (1.4)	20 (1.4)	0 (0.2)
Wyoming	272 (0.6)	100 (0.1)	80 (1.0)	15 (0.7)	0 (0.1)
TERRITORIES					
Guam	**231 (0.6)**	**81 (1.0)**	**28 (0.8)**	**3 (0.4)**	**0 (0.1)**
Virgin Islands	**218 (0.5)**	**78 (1.5)**	**11 (0.8)**	**0 (0.2)**	**0 (0.0)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent. Descriptions of mathematics proficiency at the four anchor levels are found in Chapter One.

263

TABLE 11.2 | **Percentiles of Overall Mathematics Proficiency**

GRADE 8 PUBLIC SCHOOLS	Average Proficiency	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
NATION	261 (1.4)	207 (2.0)	218 (2.8)	239 (1.3)	262 (1.4)	285 (1.5)	303 (2.5)	315 (1.5)
Northeast	269 (3.4)	218 (3.9)	230 (4.2)	248 (3.9)	270 (3.7)	291 (4.4)	308 (4.3)	319 (4.0)
Southeast	253 (2.7)	196 (7.0)	210 (4.0)	229 (2.8)	251 (2.4)	277 (3.9)	298 (5.0)	310(10.8)
Central	265 (2.6)	213 (3.5)	224 (4.1)	244 (4.6)	267 (3.5)	287 (3.2)	303 (4.1)	312 (3.1)
West	261 (2.6)	207 (1.2)	217 (3.5)	238 (3.0)	261 (2.2)	283 (2.6)	305 (2.4)	317 (5.4)
STATES								
Alabama	**252 (1.2)**	**202 (1.8)**	**212 (2.0)**	**230 (2.1)**	**252 (1.3)**	**273 (1.5)**	**293 (1.1)**	**305 (1.4)**
Arizona	**259 (1.2)**	**210 (1.9)**	**220 (1.3)**	**238 (1.3)**	**259 (1.3)**	**281 (1.8)**	**300 (1.8)**	**311 (1.5)**
Arkansas	**256 (0.9)**	**207 (1.8)**	**217 (0.9)**	**235 (1.3)**	**256 (1.1)**	**276 (2.0)**	**294 (1.4)**	**304 (1.5)**
California	**256 (1.3)**	**201 (2.4)**	**212 (1.4)**	**232 (0.9)**	**255 (1.4)**	**280 (2.0)**	**301 (1.5)**	**313 (1.9)**
Colorado	267 (1.0)	216 (1.2)	228 (1.9)	247 (1.1)	267 (1.1)	288 (1.1)	306 (1.6)	315 (1.4)
Connecticut	270 (1.1)	213 (1.9)	226 (1.2)	247 (1.7)	270 (1.4)	293 (1.0)	313 (1.2)	325 (2.9)
Delaware	261 (0.7)	209 (1.3)	220 (1.1)	237 (1.1)	259 (1.1)	283 (1.1)	305 (1.6)	316 (1.1)
District of Columbia	231 (0.7)	188 (1.5)	196 (1.0)	210 (1.3)	228 (0.9)	248 (0.9)	268 (1.6)	283 (1.9)
Florida	255 (1.2)	203 (1.4)	213 (2.2)	232 (2.2)	254 (1.4)	278 (1.5)	300 (1.7)	313 (2.4)
Georgia	**258 (1.3)**	**204 (1.9)**	**214 (1.4)**	**234 (1.7)**	**258 (1.1)**	**282 (2.0)**	**303 (1.8)**	**315 (3.7)**
Hawaii	**251 (0.8)**	**194 (1.8)**	**205 (1.1)**	**224 (1.1)**	**249 (1.3)**	**276 (1.1)**	**300 (0.9)**	**314 (2.0)**
Idaho	**272 (0.7)**	**228 (1.4)**	**237 (1.1)**	**254 (1.2)**	**272 (1.1)**	**290 (0.9)**	**306 (1.5)**	**315 (1.7)**
Illinois	**260 (1.7)**	**203 (2.8)**	**216 (3.0)**	**238 (3.8)**	**262 (1.8)**	**283 (1.9)**	**303 (1.5)**	**313 (1.5)**
Indiana	**267 (1.1)**	**219 (1.8)**	**229 (1.8)**	**247 (1.1)**	**266 (1.4)**	**287 (1.2)**	**306 (1.3)**	**318 (1.2)**
Iowa	278 (1.0)	234 (1.4)	243 (1.8)	260 (1.1)	278 (1.2)	296 (1.1)	313 (1.4)	324 (2.6)
Kentucky	256 (1.1)	209 (1.7)	218 (1.3)	236 (1.2)	255 (1.1)	277 (1.6)	296 (1.8)	307 (1.4)
Louisiana	246 (1.2)	198 (2.1)	207 (2.0)	225 (1.7)	245 (1.4)	268 (2.2)	285 (1.9)	296 (2.4)
Maryland	260 (1.4)	203 (2.2)	214 (1.7)	234 (1.9)	261 (1.8)	286 (1.3)	308 (2.2)	320 (2.5)
Michigan	264 (1.1)	212 (2.2)	223 (2.1)	243 (1.4)	265 (1.3)	285 (1.8)	305 (1.6)	316 (2.8)
Minnesota	**276 (0.9)**	**226 (2.2)**	**239 (1.6)**	**257 (0.9)**	**276 (0.8)**	**295 (0.9)**	**312 (1.8)**	**322 (1.1)**
Montana	**280 (0.8)**	**236 (1.7)**	**247 (1.0)**	**263 (1.4)**	**280 (1.1)**	**299 (0.8)**	**313 (1.2)**	**322 (2.1)**
Nebraska	**276 (0.9)**	**225 (2.5)**	**237 (2.4)**	**257 (1.3)**	**277 (1.3)**	**296 (1.0)**	**312 (1.1)**	**322 (1.5)**
New Hampshire	**273 (0.8)**	**228 (1.6)**	**237 (1.4)**	**254 (1.5)**	**273 (1.5)**	**293 (1.0)**	**310 (1.7)**	**320 (2.2)**
New Jersey	**269 (1.0)**	**216 (2.1)**	**227 (2.5)**	**247 (1.4)**	**269 (1.5)**	**293 (0.8)**	**313 (2.5)**	**325 (3.1)**
New Mexico	256 (0.8)	208 (1.7)	218 (1.4)	235 (0.8)	255 (0.8)	276 (1.1)	295 (1.9)	307 (2.2)
New York	261 (1.3)	204 (1.6)	215 (1.9)	237 (1.7)	262 (1.4)	284 (1.6)	305 (1.7)	317 (1.5)
North Carolina	250 (1.0)	198 (1.0)	208 (0.9)	226 (1.0)	249 (1.1)	273 (1.1)	293 (1.9)	305 (2.0)
North Dakota	281 (1.2)	236 (4.1)	247 (2.4)	265 (1.9)	282 (1.4)	299 (1.0)	314 (1.2)	322 (2.4)
Ohio	264 (1.0)	213 (1.5)	226 (1.1)	243 (1.0)	263 (1.5)	285 (1.3)	303 (1.2)	315 (1.5)
Oklahoma	**263 (1.2)**	**215 (2.2)**	**225 (1.5)**	**244 (1.2)**	**263 (1.1)**	**282 (1.3)**	**300 (1.8)**	**310 (2.3)**
Oregon	**271 (1.0)**	**222 (1.9)**	**233 (1.4)**	**251 (1.3)**	**271 (1.7)**	**293 (2.1)**	**311 (1.9)**	**322 (2.0)**
Pennsylvania	**266 (1.8)**	**213 (2.8)**	**225 (2.5)**	**245 (2.1)**	**267 (1.9)**	**289 (1.8)**	**306 (1.4)**	**317 (1.7)**
Rhode Island	**260 (0.5)**	**203 (1.9)**	**216 (1.5)**	**236 (0.7)**	**260 (0.9)**	**284 (0.7)**	**303 (1.5)**	**315 (1.2)**
Texas	**258 (1.3)**	**206 (1.7)**	**217 (2.1)**	**235 (1.5)**	**257 (1.7)**	**280 (1.1)**	**300 (1.9)**	**312 (2.1)**
Virginia	264 (1.5)	210 (1.5)	220 (1.6)	238 (1.6)	262 (1.8)	287 (2.0)	310 (3.6)	324 (2.6)
West Virginia	256 (0.9)	209 (1.8)	220 (1.1)	236 (1.0)	254 (0.8)	275 (0.9)	295 (1.7)	306 (2.4)
Wisconsin	274 (1.3)	224 (2.8)	235 (1.7)	255 (1.8)	275 (1.4)	295 (1.5)	312 (1.6)	322 (2.1)
Wyoming	272 (0.6)	228 (1.1)	238 (1.3)	254 (0.8)	272 (1.5)	290 (1.2)	306 (1.2)	315 (1.5)
TERRITORIES								
Guam	**231 (0.6)**	**178 (1.5)**	**188 (1.2)**	**206 (1.1)**	**229 (1.7)**	**253 (0.9)**	**277 (1.7)**	**290 (1.1)**
Virgin Islands	**218 (0.5)**	**178 (1.3)**	**187 (0.8)**	**200 (0.9)**	**216 (0.9)**	**234 (0.8)**	**251 (1.0)**	**261 (1.0)**

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

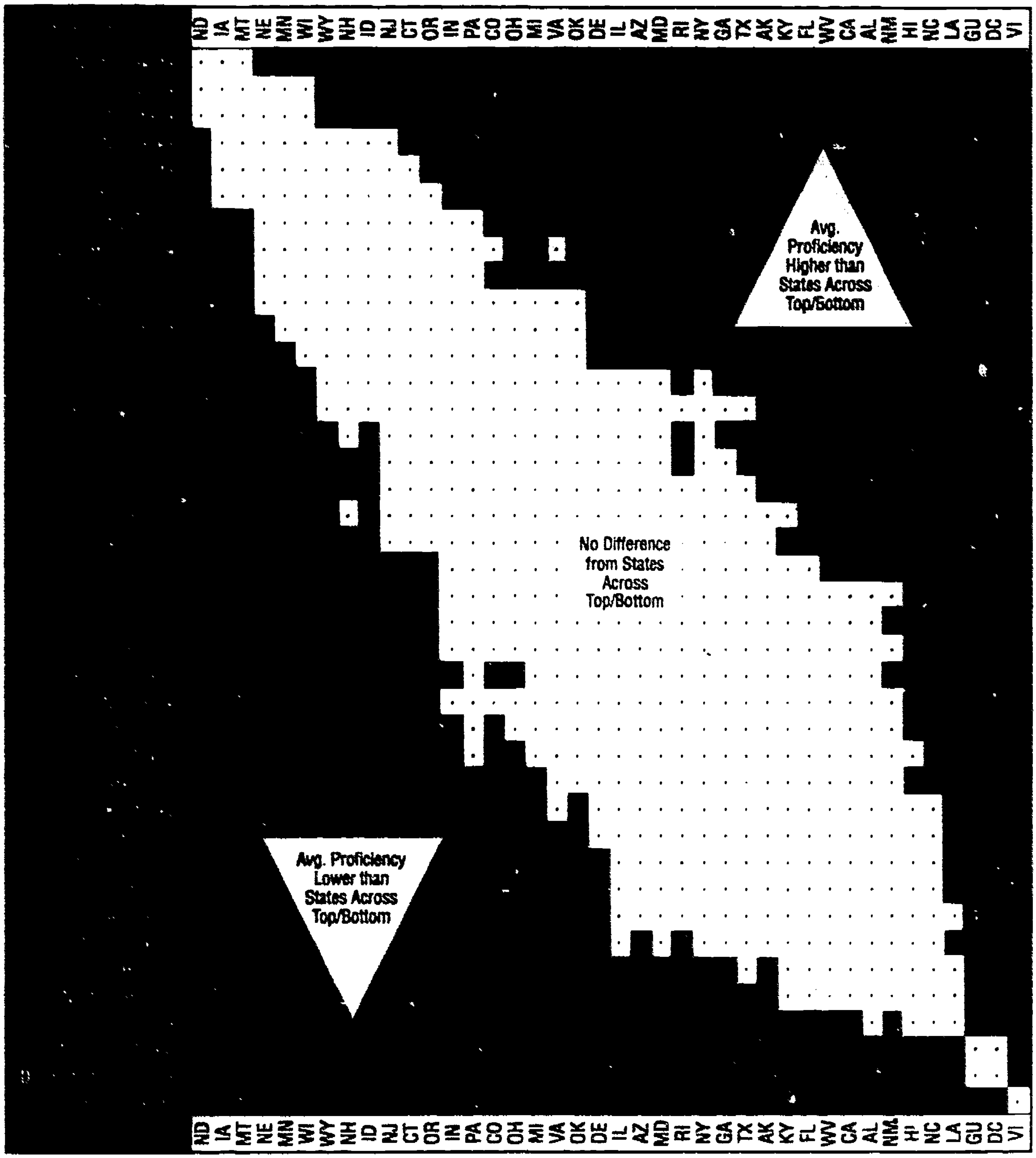
TABLE 11.3 | **Average Proficiency in Mathematics Content Areas**

GRADE 8 PUBLIC SCHOOLS	Numbers and Operations	Measurement	Geometry	Data Analysis, Statistics, and Probability	Algebra and Functions
NATION	268 (1.4)	258 (1.7)	259 (1.4)	262 (1.8)	260 (1.3)
Northeast	271 (3.1)	266 (4.7)	268 (3.6)	273 (3.6)	267 (3.4)
Southeast	259 (2.9)	246 (3.6)	249 (2.6)	250 (3.3)	254 (2.7)
Central	270 (2.7)	263 (3.4)	262 (3.1)	265 (3.2)	263 (2.1)
West	264 (2.6)	258 (3.0)	260 (2.6)	262 (3.6)	259 (2.4)
STATES					
Alabama	259 (1.2)	247 (1.4)	248 (1.2)	251 (1.8)	251 (1.4)
Arizona	264 (1.2)	257 (1.4)	256 (1.1)	258 (1.4)	258 (1.3)
Arkansas	262 (0.8)	253 (1.2)	253 (1.0)	254 (1.2)	253 (1.1)
California	259 (1.2)	252 (1.5)	255 (1.3)	254 (1.7)	256 (1.3)
Colorado	269 (1.0)	265 (1.3)	266 (1.1)	269 (1.1)	266 (1.1)
Connecticut	273 (1.0)	269 (1.5)	266 (1.1)	272 (1.4)	268 (1.2)
Delaware	265 (0.8)	258 (1.0)	256 (0.7)	261 (1.0)	260 (1.0)
District of Columbia	238 (0.8)	221 (1.0)	229 (0.9)	222 (1.1)	235 (1.1)
Florida	260 (1.2)	251 (1.4)	251 (1.3)	255 (1.5)	255 (1.3)
Georgia	263 (1.2)	252 (1.5)	256 (1.3)	260 (1.5)	257 (1.5)
Hawaii	256 (0.9)	249 (0.8)	252 (0.7)	242 (1.0)	249 (0.8)
Idaho	274 (0.8)	270 (1.0)	269 (0.8)	274 (0.9)	269 (0.9)
Illinois	265 (1.7)	256 (2.0)	258 (1.7)	262 (2.0)	260 (1.7)
Indiana	271 (1.2)	263 (1.3)	264 (1.1)	269 (1.4)	265 (1.2)
Iowa	283 (1.0)	277 (1.5)	275 (1.3)	281 (1.2)	274 (1.1)
Kentucky	261 (1.2)	253 (1.5)	253 (1.2)	257 (1.3)	256 (1.1)
Louisiana	253 (1.1)	241 (1.5)	242 (1.3)	243 (1.6)	245 (1.3)
Maryland	264 (1.4)	256 (1.7)	256 (1.4)	260 (1.5)	263 (1.6)
Michigan	268 (1.2)	260 (1.3)	262 (1.0)	264 (1.4)	264 (1.2)
Minnesota	279 (1.0)	272 (1.1)	273 (1.1)	279 (0.9)	274 (0.9)
Montana	282 (1.0)	279 (1.4)	280 (0.8)	282 (0.8)	276 (0.9)
Nebraska	279 (1.0)	274 (1.4)	273 (1.1)	279 (1.0)	273 (1.0)
New Hampshire	275 (1.0)	272 (1.3)	272 (1.0)	276 (0.9)	271 (1.0)
New Jersey	274 (1.1)	267 (1.4)	268 (1.1)	270 (1.3)	268 (1.1)
New Mexico	258 (0.8)	253 (0.8)	257 (0.9)	253 (1.1)	256 (1.0)
New York	263 (1.3)	255 (1.6)	259 (1.4)	263 (1.7)	260 (1.2)
North Carolina	255 (1.0)	241 (1.1)	249 (1.0)	247 (1.3)	251 (1.0)
North Dakota	286 (1.1)	280 (1.9)	278 (1.3)	286 (1.5)	275 (1.1)
Ohio	268 (1.0)	259 (1.2)	260 (1.1)	266 (1.2)	262 (1.0)
Oklahoma	268 (1.2)	258 (1.5)	259 (1.4)	264 (1.8)	262 (1.2)
Oregon	273 (1.0)	269 (1.3)	270 (0.9)	274 (1.3)	270 (1.1)
Pennsylvania	270 (1.5)	265 (2.0)	263 (1.7)	278 (1.9)	265 (1.6)
Rhode Island	264 (0.8)	256 (0.8)	256 (0.8)	258 (0.8)	261 (0.8)
Texas	262 (1.2)	253 (1.4)	258 (1.4)	256 (1.7)	256 (1.5)
Virginia	268 (1.4)	259 (1.8)	261 (1.5)	264 (1.8)	265 (1.6)
West Virginia	260 (0.9)	252 (1.3)	254 (0.9)	256 (1.2)	254 (1.0)
Wisconsin	278 (1.2)	273 (1.7)	272 (1.3)	277 (1.4)	271 (1.3)
Wyoming	275 (0.7)	270 (0.9)	270 (0.6)	274 (0.7)	270 (0.7)
TERRITORIES					
Guam	230 (0.7)	227 (0.9)	236 (0.8)	213 (0.8)	230 (0.7)
Virgin Islands	227 (0.8)	214 (1.3)	222 (0.8)	198 (1.2)	218 (0.8)

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Descriptions of the content area scales are found in Chapter Three.

FIGURE 11.3

Comparisons of Numbers and Operations Proficiency
Based on Appropriate Tests of Statistical Significance



Note: Reading across, from left to right, this chart shows whether the average proficiency of each state or territory is lower than, the same as, or higher than that of other participants.

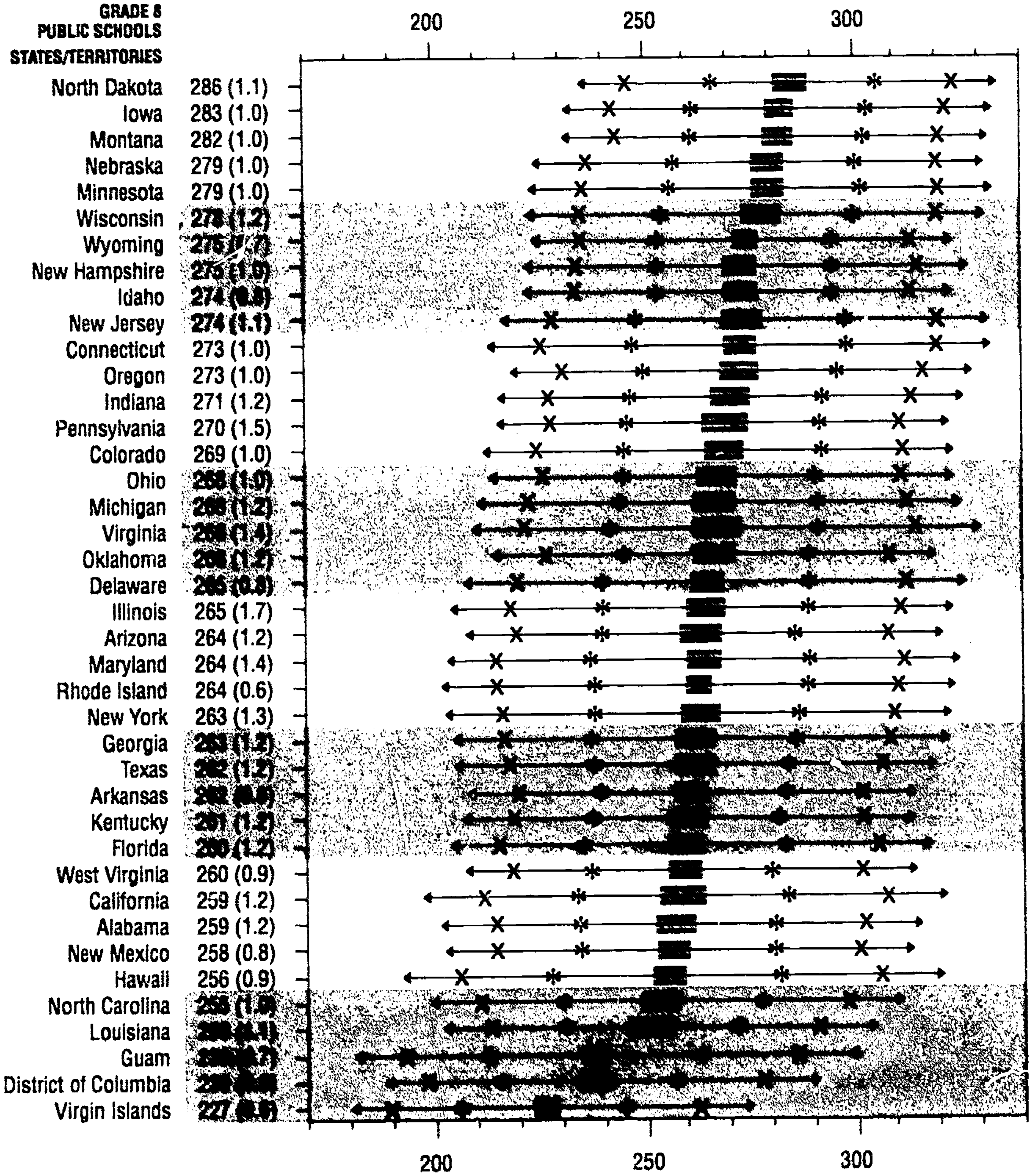
*Significance determined by an application of the Bonferroni procedure based on 780 comparisons by comparing the difference between the two means with four times the square root of the sum of the squared standard errors.

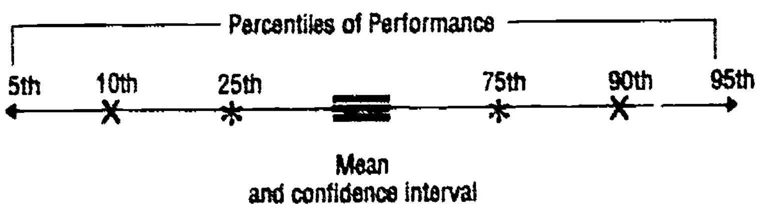
For any given state:

- Overall average proficiency statistically significantly higher than comparison state.
- No statistically significant difference from comparison state.
- Overall average proficiency statistically significantly lower than comparison state.

FIGURE 11.4

Distribution of Numbers and Operations Proficiency
Organized by Average Proficiency





The shaded box indicates a simultaneous confidence interval around the average overall numbers and operations proficiency for the state based on the Bonferroni procedure for 780 comparisons (the average ±2.83 times its standard error). The remaining symbols indicate values of the 5th, 10th, 25th, 75th, 90th, and 95th percentiles of the distribution of overall numbers and operations proficiency.

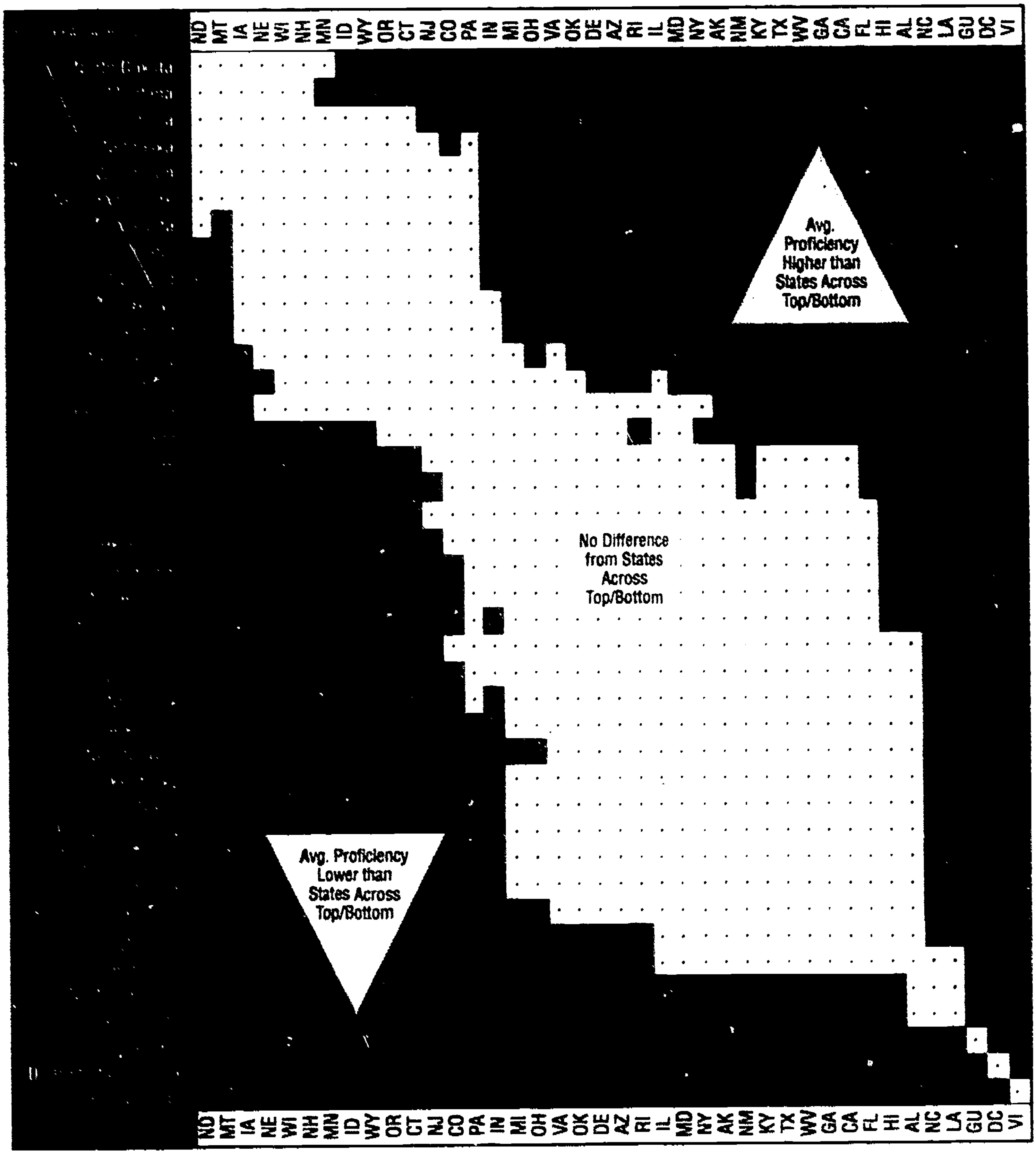
TABLE 11.4 | **Percentiles of Proficiency in Numbers and Operations**

GRADE 8 PUBLIC SCHOOLS	Average Proficiency	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
NATION	266 (1.4)	207 (2.4)	219 (2.8)	241 (3.3)	267 (1.6)	290 (1.3)	310 (2.9)	323 (2.5)
Northeast	271 (3.1)	216 (4.6)	229 (3.3)	248 (2.8)	271 (3.8)	294 (5.9)	316 (6.0)	328 (3.9)
Southeast	259 (2.9)	200 (4.4)	212 (8.7)	233 (5.5)	258 (4.1)	284 (2.7)	306 (4.2)	318 (4.2)
Central	270 (2.7)	213 (1.9)	227 (4.7)	249 (4.8)	273 (3.3)	292 (2.7)	311 (3.3)	322 (5.2)
West	264 (2.6)	204 (2.7)	216 (4.0)	239 (3.5)	265 (2.6)	289 (2.4)	310 (4.4)	323 (5.6)
STATES								
Alabama	259 (1.2)	203 (2.7)	215 (1.7)	235 (1.4)	258 (1.4)	281 (1.8)	303 (1.8)	316 (1.5)
Arizona	264 (1.2)	209 (2.2)	220 (1.8)	241 (2.2)	264 (1.8)	287 (1.5)	308 (2.7)	321 (1.8)
Arkansas	262 (0.8)	210 (2.4)	221 (1.5)	240 (0.9)	262 (1.0)	284 (1.1)	303 (1.1)	314 (2.1)
California	258 (1.2)	198 (2.5)	212 (2.7)	234 (1.5)	259 (1.5)	285 (1.8)	308 (1.5)	322 (2.1)
Colorado	269 (1.0)	214 (2.1)	226 (1.5)	246 (1.7)	270 (0.9)	292 (1.5)	312 (0.8)	323 (2.4)
Connecticut	273 (1.0)	214 (2.8)	227 (2.1)	248 (2.3)	274 (1.4)	299 (1.0)	320 (1.8)	332 (1.6)
Delaware	265 (0.8)	208 (2.6)	220 (1.7)	241 (1.0)	264 (1.1)	290 (1.4)	313 (2.4)	326 (1.1)
District of Columbia	238 (0.8)	189 (3.1)	199 (1.3)	216 (0.9)	236 (0.7)	258 (1.3)	279 (1.0)	291 (2.0)
Florida	260 (1.2)	205 (2.2)	216 (1.5)	236 (1.0)	259 (2.0)	284 (1.6)	306 (1.9)	318 (2.2)
Georgia	263 (1.2)	205 (2.5)	217 (1.8)	238 (2.1)	262 (1.9)	287 (1.0)	309 (2.3)	322 (2.0)
Hawaii	256 (0.9)	194 (1.9)	207 (1.3)	229 (1.4)	255 (1.4)	283 (1.2)	307 (1.7)	321 (2.2)
Idaho	274 (0.8)	223 (2.7)	234 (1.4)	254 (0.8)	275 (0.9)	295 (0.8)	314 (2.1)	323 (2.1)
Illinois	265 (1.7)	206 (2.6)	219 (1.9)	241 (1.8)	265 (1.6)	289 (2.0)	311 (2.9)	323 (1.3)
Indiana	271 (1.2)	216 (3.7)	228 (2.4)	248 (1.7)	270 (1.3)	293 (1.8)	314 (1.5)	326 (1.9)
Iowa	283 (1.0)	232 (1.3)	243 (2.3)	262 (1.3)	282 (1.0)	303 (2.2)	322 (2.2)	333 (2.6)
Kentucky	261 (1.2)	208 (2.7)	219 (3.4)	238 (1.0)	260 (1.7)	282 (1.9)	303 (1.8)	314 (1.9)
Louisiana	253 (1.1)	203 (1.7)	214 (1.8)	232 (1.4)	252 (1.0)	272 (1.6)	292 (1.3)	305 (1.5)
Maryland	264 (1.4)	204 (1.4)	216 (1.4)	238 (1.6)	264 (1.3)	290 (1.5)	312 (1.3)	325 (1.8)
Michigan	268 (1.2)	212 (2.7)	223 (2.2)	244 (1.8)	268 (2.3)	291 (1.6)	313 (1.8)	325 (2.0)
Minnesota	279 (1.0)	224 (2.1)	236 (1.7)	258 (1.1)	280 (1.0)	302 (1.7)	320 (1.5)	333 (3.0)
Montana	282 (1.0)	232 (2.9)	244 (2.2)	262 (0.9)	283 (1.3)	303 (1.3)	321 (2.8)	332 (1.4)
Nebraska	279 (1.0)	225 (3.8)	237 (1.4)	258 (1.9)	280 (1.2)	301 (1.3)	320 (1.5)	331 (1.9)
New Hampshire	275 (1.0)	223 (2.7)	234 (1.0)	253 (1.0)	275 (1.4)	296 (1.1)	315 (2.0)	327 (1.1)
New Jersey	274 (1.1)	217 (3.1)	229 (1.5)	249 (1.5)	272 (1.8)	299 (1.4)	320 (1.2)	332 (1.7)
New Mexico	258 (0.8)	204 (2.0)	216 (1.5)	235 (1.1)	258 (0.7)	281 (1.0)	301 (2.7)	314 (1.8)
New York	263 (1.3)	204 (1.9)	217 (2.6)	239 (2.4)	264 (1.6)	288 (1.7)	310 (1.5)	323 (1.6)
North Carolina	255 (1.0)	200 (2.1)	211 (1.2)	231 (1.2)	254 (1.9)	278 (1.4)	299 (1.9)	312 (2.2)
North Dakota	286 (1.1)	235 (2.0)	247 (2.8)	267 (1.6)	287 (1.4)	305 (2.1)	324 (1.7)	334 (3.7)
Ohio	268 (1.0)	214 (1.0)	227 (2.3)	246 (0.8)	268 (1.8)	291 (1.1)	312 (1.7)	323 (1.4)
Oklahoma	266 (1.2)	215 (1.9)	227 (2.2)	246 (1.3)	267 (1.3)	290 (1.1)	309 (2.9)	319 (2.9)
Oregon	273 (1.0)	220 (1.7)	231 (1.2)	250 (1.2)	273 (1.8)	296 (0.9)	317 (0.8)	328 (1.7)
Pennsylvania	270 (1.5)	216 (2.4)	227 (2.3)	247 (2.4)	270 (1.9)	292 (1.4)	311 (1.8)	322 (1.4)
Rhode Island	264 (0.8)	203 (1.2)	216 (1.2)	239 (0.8)	265 (0.9)	289 (1.3)	311 (1.2)	324 (2.6)
Texas	262 (1.3)	205 (3.4)	218 (2.9)	238 (1.0)	261 (1.7)	285 (1.5)	307 (1.7)	319 (2.3)
Virginia	268 (1.4)	211 (1.7)	222 (1.5)	242 (1.0)	267 (1.9)	292 (2.3)	315 (3.2)	330 (4.0)
West Virginia	260 (0.9)	208 (2.3)	219 (1.2)	238 (1.2)	259 (0.9)	281 (1.0)	302 (1.7)	315 (1.6)
Wisconsin	278 (1.2)	223 (2.1)	235 (1.8)	256 (1.2)	278 (1.1)	300 (1.6)	320 (1.6)	331 (3.3)
Wyoming	275 (0.7)	225 (2.3)	236 (1.1)	255 (1.1)	275 (1.1)	295 (0.7)	314 (2.0)	323 (1.7)
TERRITORIES								
Guam	239 (0.7)	182 (2.4)	194 (1.2)	213 (1.5)	236 (1.9)	264 (0.8)	287 (1.5)	301 (1.6)
Virgin Islands	227 (0.8)	181 (1.7)	190 (0.9)	207 (1.1)	226 (1.0)	246 (1.3)	264 (1.7)	276 (2.1)

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

FIGURE 11.5

Comparisons of Measurement Proficiency
Based on Appropriate Tests of Statistical Significance



Note: Reading across, from left to right, this chart shows whether the average proficiency of each state or territory is lower than, the same as, or higher than that of other participants.

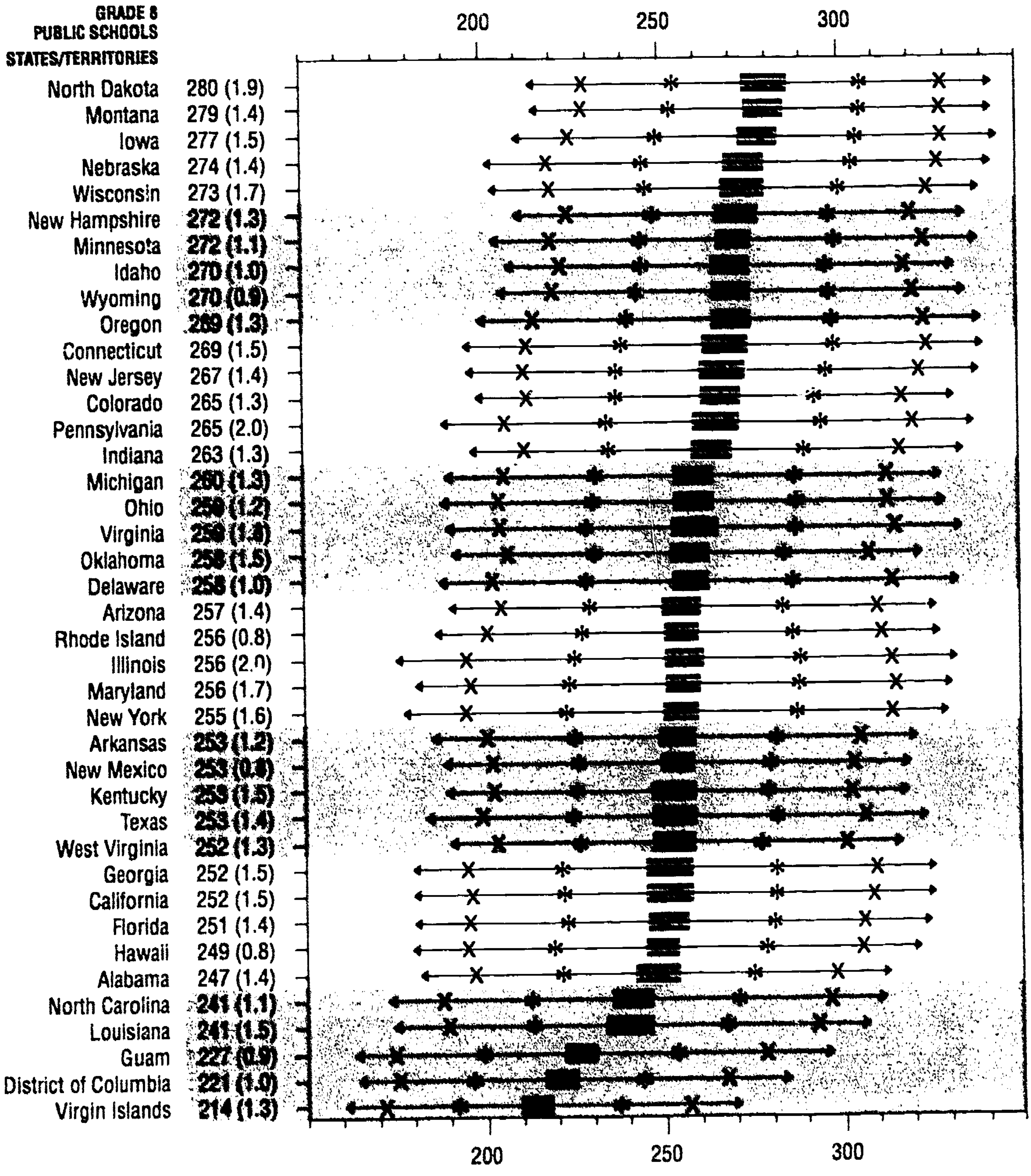
*Significance determined by an application of the Bonferroni procedure based on 780 comparisons by comparing the difference between the two means with four times the square root of the sum of the squared standard errors.

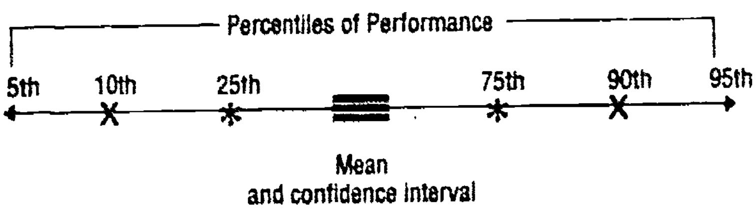
For any given state:

- Overall average proficiency statistically significantly higher than comparison state.
- No statistically significant difference from comparison state.
- Overall average proficiency statistically significantly lower than comparison state.

FIGURE 11.6

Distribution of Measurement Proficiency
Organized by Average Proficiency





The shaded box indicates a simultaneous confidence interval around the average overall measurement proficiency for the state based on the Bonferroni procedure for 780 comparisons (the average ±2.83 times its standard error). The remaining symbols indicate values of the 5th, 10th, 25th, 75th, 90th, and 95th percentiles of the distribution of overall measurement proficiency.

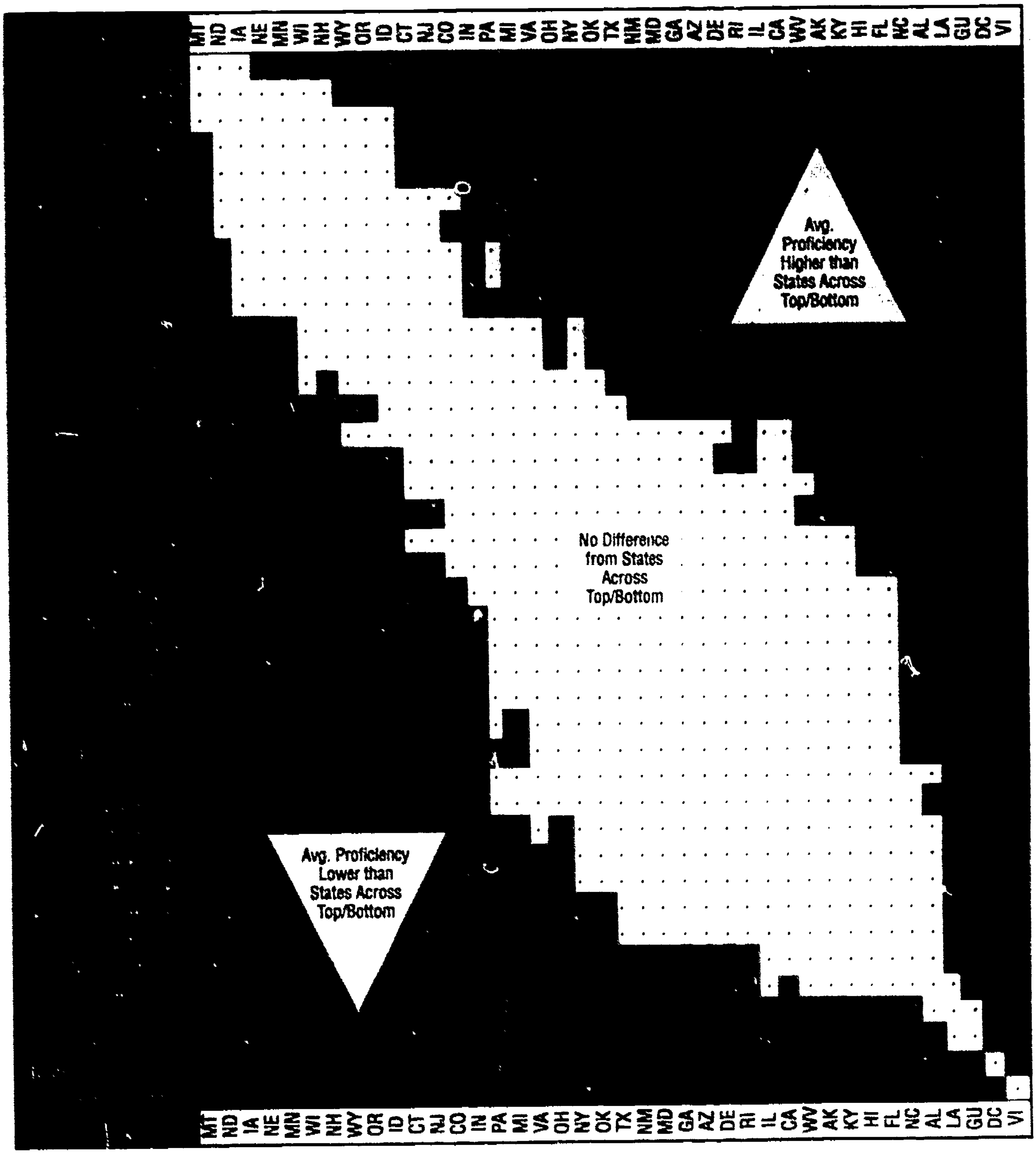
TABLE 11.5 | **Percentiles of Proficiency in Measurement**

GRADE 8 PUBLIC SCHOOLS	Average Proficiency	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
NATION	258 (1.7)	184 (3.5)	200 (3.2)	228 (2.1)	259 (2.2)	287 (1.9)	313 (2.5)	328 (4.4)
Northeast	266 (4.7)	197 (6.2)	214 (9.2)	238 (3.6)	266 (4.9)	293 (6.1)	319 (7.3)	337 (7.0)
Southeast	246 (3.8)	171(10.9)	187 (7.9)	215 (7.8)	248 (5.0)	278 (3.3)	305 (4.5)	318 (7.4)
Central	263 (3.4)	193 (4.5)	208 (6.2)	236 (4.3)	264 (3.7)	291 (4.8)	315 (6.5)	329(18.0)
West	258 (3.0)	186 (3.6)	202 (2.5)	228 (3.0)	259 (4.4)	287 (3.1)	314 (4.5)	331 (6.0)
STATES								
Alabama	247 (1.4)	182 (2.2)	197 (1.8)	221 (1.7)	247 (1.2)	274 (2.8)	298 (2.3)	312 (4.1)
Arizona	257 (1.4)	191 (2.7)	205 (2.3)	230 (1.2)	258 (1.4)	284 (1.7)	310 (2.2)	328 (2.8)
Arkansas	253 (1.2)	188 (2.1)	200 (1.8)	226 (2.1)	254 (1.8)	281 (1.4)	305 (1.8)	320 (2.6)
California	252 (1.5)	180 (2.4)	196 (2.4)	222 (1.4)	252 (1.9)	281 (2.5)	309 (2.4)	325 (2.6)
Colorado	265 (1.3)	199 (2.8)	213 (3.4)	238 (1.2)	265 (1.3)	293 (1.9)	317 (1.5)	331 (3.1)
Connecticut	269 (1.5)	196 (3.1)	213 (2.9)	239 (2.4)	269 (1.8)	298 (2.4)	325 (1.8)	340 (1.9)
Delaware	258 (1.0)	188 (2.4)	203 (1 ;	229 (1.7)	256 (1.5)	287 (1.6)	315 (4.4)	332 (3.1)
District of Columbia	221 (1.0)	184 (1.4)	175 (1.3)	196 (1.2)	220 (1.4)	243 (1.6)	268 (2.4)	284 (5.3)
Florida	251 (1.4)	180 (3.9)	196 (2.6)	223 (2.0)	251 (1.8)	280 (2.1)	307 (2.7)	324 (5.1)
Georgia	252 (1.5)	180 (3.1)	195 (3.1)	221 (2.0)	251 (1.2)	282 (2.2)	310 (3.1)	325 (1.9)
Hawaii	249 (0.8)	180 (2.3)	195 (1.6)	219 (1.3)	248 (1.2)	278 (1.4)	305 (1.6)	321 (2.9)
Idaho	270 (1.0)	208 (1.4)	222 (1.8)	245 (1.5)	270 (1.2)	296 (1.2)	319 (1.8)	332 (2.7)
Illinois	256 (2.0)	176 (4.2)	195 (5.4)	225 (2.8)	258 (2.3)	288 (1.7)	315 (2.9)	331 (2.8)
Indiana	263 (1.3)	198 (2.2)	212 (1.3)	236 (1.7)	263 (1.4)	290 (1.5)	317 (3.3)	334 (4.0)
Iowa	277 (1.5)	211 (2.1)	225 (2.0)	249 (1.9)	277 (1.1)	304 (2.1)	329 (2.9)	344 (2.4)
Kentucky	253 (1.5)	190 (2.5)	203 (2.8)	226 (1.7)	253 (1.8)	279 (1.3)	303 (3.0)	318 (2.0)
Louisiana	241 (1.5)	174 (3.8)	189 (2.4)	213 (1.9)	241 (1.9)	267 (1.8)	292 (2.2)	306 (2.6)
Maryland	256 (1.7)	181 (1.9)	196 (2.3)	224 (2.1)	258 (1.9)	288 (1.8)	31[illegible] (1.4)	331 (2.9)
Michigan	260 (1.3)	190 (2.7)	208 (1.8)	232 (2.3)	260 (1.4)	287 (2.4)	313 (2.4)	328 (2.5)
Minnesota	272 (1.1)	204 (2.7)	220 (1.4)	245 (1.4)	272 (1.2)	300 (2.0)	324 (2.0)	339 (2.3)
Montana	279 (1.4)	215 (3.4)	229 (2.1)	253 (1.8)	280 (1.6)	306 (2.2)	329 (2.8)	343 (3.3)
Nebraska	274 (1.4)	202 (4.5)	219 (2.8)	248 (1.5)	275 (1.5)	303 (1.2)	328 (2.6)	343 (2.5)
New Hampshire	272 (1.3)	210 (2.8)	225 (2.3)	248 (2.0)	272 (1.9)	298 (2.1)	321 (2.3)	335 (3.2)
New Jersey	267 (1.4)	197 (2.4)	212 (3.0)	238 (2.2)	267 (2.1)	296 (2.1)	322 (2.5)	339 (3.7)
New Mexico	253 (0.8)	189 (2.3)	203 (1.8)	226 (1.2)	252 (1.1)	280 (1.2)	304 (1.6)	318 (2.9)
New York	255 (1.6)	178 (3.2)	195 (3.0)	223 (2.1)	255 (2.4)	286 (1.4)	314 (2.5)	329 (2.7)
North Carolina	241 (1.1)	173 (2.6)	188 (1.8)	213 (1.6)	241 (1.5)	270 (1.7)	296 (2.4)	311 (2.4)
North Dakota	280 (1.9)	214 (3.6)	229 (3.0)	254 (2.6)	281 (3.6)	307 (2.3)	330 (1.9)	342 (2.7)
Ohio	259 (1.2)	189 (1.9)	204 (1.4)	231 (1.4)	260 (1.6)	288 (1.3)	313 (2.6)	329 (2.3)
Oklahoma	258 (1.5)	192 (2.1)	208 (2.0)	231 (2.0)	258 (1.7)	284 (1.7)	308 (2.7)	322 (2.6)
Oregon	269 (1.3)	200 (3.3)	215 (2.1)	240 (1.3)	269 (1.2)	298 (1.8)	324 (2.2)	339 (3.6)
Pennsylvania	265 (2.0)	189 (2.9)	206 (3.4)	235 (2.9)	266 (2.4)	295 (2.4)	321 (2.4)	337 (3.1)
Rhode Island	256 (0.8)	187 (1.8)	201 (1.2)	228 (1.0)	257 (1.2)	285 (2.2)	312 (1.7)	328 (1.9)
Texas	253 (1.4)	184 (2.1)	199 (2.1)	224 (1.8)	252 (1.7)	281 (1.3)	307 (1.9)	323 (2.6)
Virginia	259 (1.8)	190 (2.0)	205 (2.8)	229 (1.7)	258 (2.0)	288 (3.0)	315 (3.2)	333 (4.1)
West Virginia	252 (1.3)	191 (1.6)	204 (1.9)	227 (1.4)	252 (1.7)	277 (1.4)	301 (1.9)	316 (2.4)
Wisconsin	273 (1.7)	203 (5.3)	220 (3.5)	246 (1.9)	274 (1.8)	301 (2.2)	325 (2.7)	339 (3.4)
Wyoming	270 (0.9)	206 (1.2)	220 (2.3)	244 (1.2)	270 (1.7)	296 (1.2)	321 (1.3)	335 (2.5)
TERRITORIES								
Guam	227 (0.9)	163 (1.7)	175 (2.0)	198 (2.1)	226 (1.4)	253 (1.7)	278 (2.8)	295 (3.4)
Virgin Islands	214 (1.3)	160 (3.2)	171 (2.0)	191 (1.3)	214 (1.3)	237 (1.8)	257 (2.9)	270 (2.8)

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

FIGURE 11.7

Comparisons of Geometry Proficiency
Based on Appropriate Tests of Statistical Significance



Note: Reading across, from left to right, this chart shows whether the average proficiency of each state or territory is lower than, the same as, or higher than that of other participants.

*Significance determined by an application of the Bonferroni procedure based on 780 comparisons by comparing the difference between the two means with four times the square root of the sum of the squared standard errors.

For any given state:

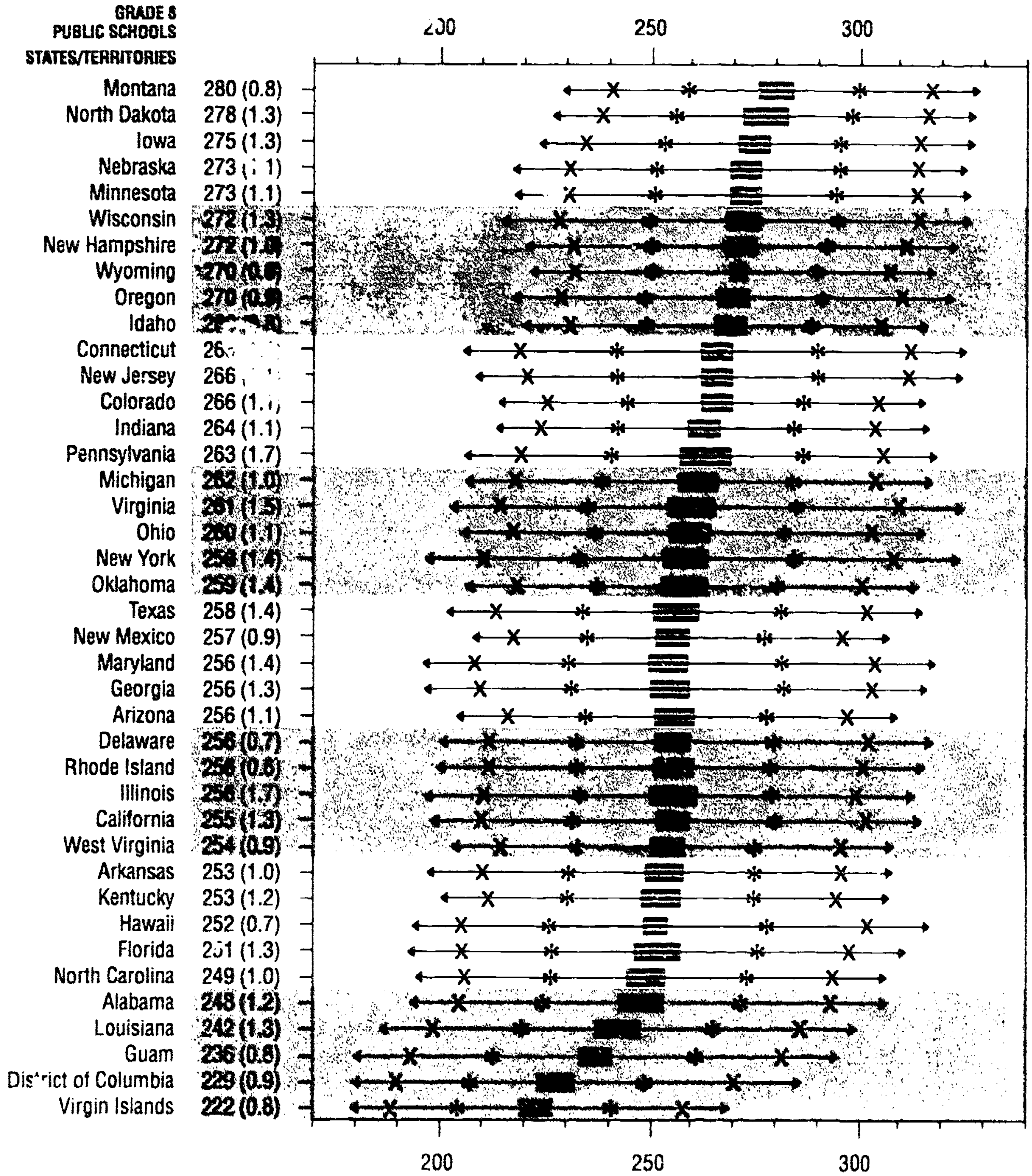
Overall average proficiency statistically significantly higher than comparison state.

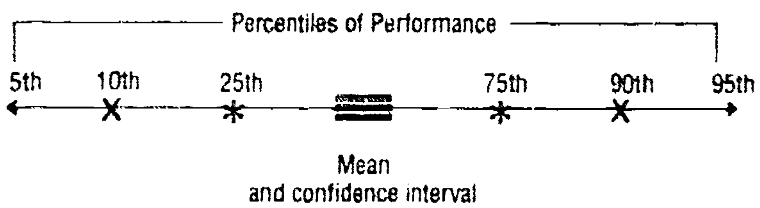
No statistically significant difference from comparison state.

Overall average proficiency statistically significantly lower than comparison state.

FIGURE 11.8

Distribution of Geometry Proficiency
Organized by Average Proficiency





The shaded box indicates a simultaneous confidence interval around the average overall geometry proficiency for the state based on the Bonferroni procedure for 780 comparisons (the average ±2.83 times its standard error). The remaining symbols indicate values of the 5th, 10th, 25th, 75th, 90th, and 95th percentiles of the distribution of overall geometry proficiency.

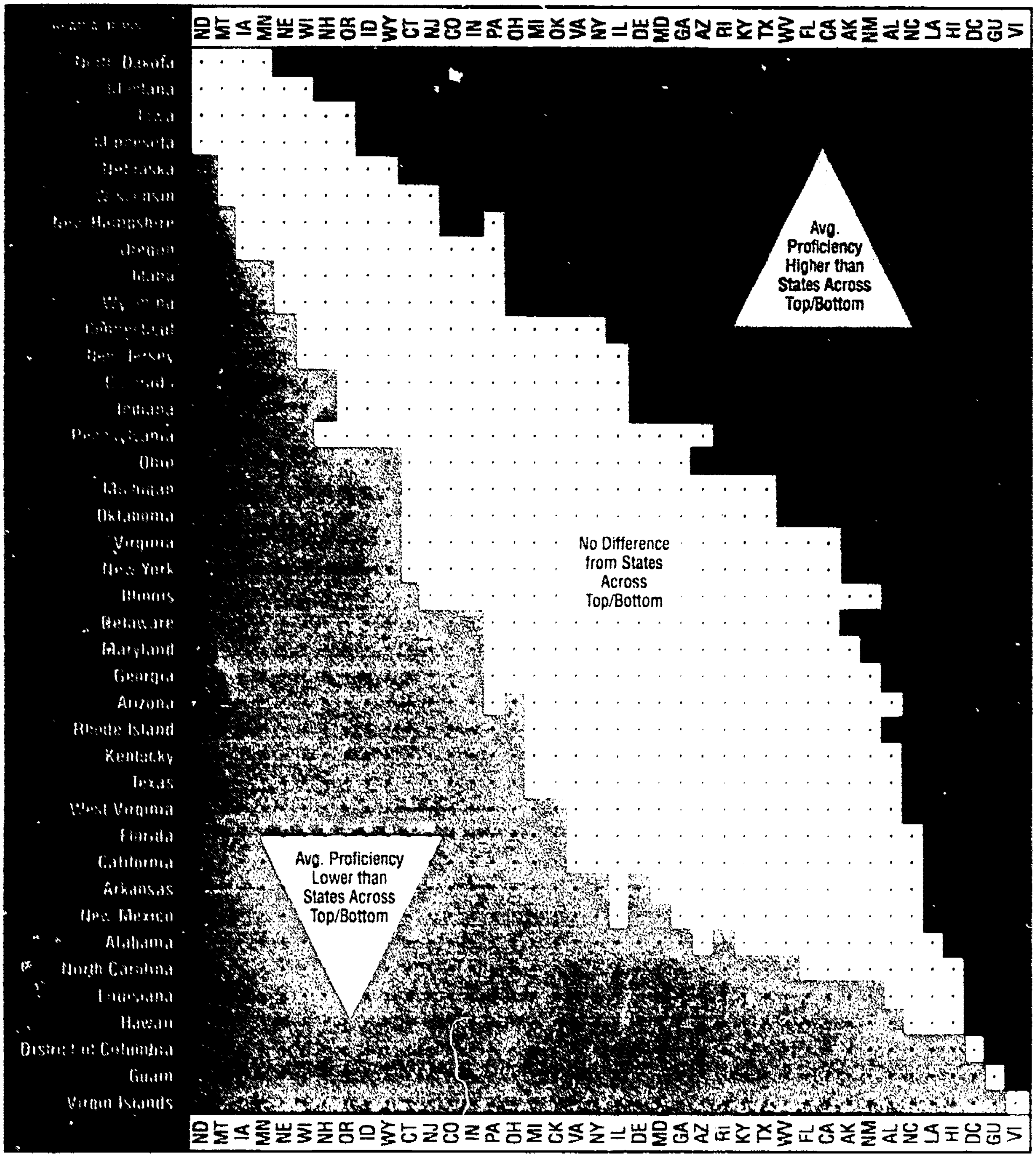
TABLE 11.6 | Percentiles of Proficiency in Geometry

GRADE 8 PUBLIC SCHOOLS	Average Proficiency	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
NATION	259 (1.4)	200 (4.0)	213 (2.0)	236 (2.3)	259 (1.5)	283 (1.5)	304 (2.5)	317 (2.5)
Northeast	268 (3.6)	212 (3.6)	224 (6.4)	245 (4.3)	268 (4.4)	290 (3.3)	310 (3.8)	323 (6.9)
Southeast	249 (2.6)	186 (6.8)	201 (6.3)	225 (2.7)	250 (2.9)	273 (5.9)	295 (3.8)	305 (2.1)
Central	262 (3.1)	205 (4.4)	217 (5.3)	239 (3.8)	262 (3.8)	285 (4.6)	305 (3.8)	318 (4.7)
West	260 (2.6)	202 (5.9)	215 (5.1)	238 (3.6)	260 (2.3)	284 (4.6)	305 (4.2)	318 (2.0)
STATES								
Alabama	248 (1.2)	193 (2.2)	205 (2.4)	225 (1.4)	248 (1.4)	272 (1.4)	293 (1.9)	308 (1.7)
Arizona	258 (1.1)	204 (2.3)	216 (1.8)	236 (1.6)	257 (1.3)	278 (1.2)	297 (2.5)	308 (2.2)
Arkansas	253 (1.0)	197 (1.9)	210 (2.0)	231 (1.5)	253 (0.9)	275 (1.5)	295 (1.7)	307 (2.2)
California	255 (1.3)	198 (2.3)	210 (1.9)	232 (1.9)	255 (1.6)	279 (1.7)	301 (2.6)	314 (2.2)
Colorado	266 (1.1)	214 (2.1)	226 (1.9)	245 (1.0)	266 (1.6)	287 (1.9)	305 (1.4)	315 (1.5)
Connecticut	266 (1.1)	206 (1.7)	219 (1.7)	243 (2.2)	267 (1.3)	290 (1.1)	312 (1.3)	325 (1.7)
Delaware	256 (0.7)	200 (2.1)	212 (1.9)	233 (1.2)	255 (1.4)	279 (1.2)	302 (1.7)	317 (2.6)
District of Columbia	229 (0.9)	179 (1.7)	189 (2.2)	207 (1.5)	227 (1.1)	249 (1.1)	270 (1.6)	285 (3.4)
Florida	251 (1.3)	192 (2.6)	205 (1.6)	226 (1.5)	250 (1.6)	276 (1.6)	297 (1.7)	310 (1.7)
Georgia	256 (1.3)	197 (3.1)	210 (2.1)	231 (2.0)	256 (1.4)	282 (1.5)	303 (1.5)	316 (2.5)
Hawaii	252 (0.7)	193 (1.5)	205 (1.5)	226 (1.3)	251 (1.2)	277 (1.3)	302 (2.0)	318 (2.2)
Idaho	269 (0.8)	220 (2.0)	231 (1.7)	250 (0.7)	270 (1.1)	289 (1.2)	306 (1.3)	315 (3.6)
Illinois	256 (1.7)	197 (3.3)	210 (2.2)	233 (2.2)	256 (1.8)	279 (2.6)	299 (2.2)	312 (2.8)
Indiana	264 (1.1)	214 (1.6)	225 (1.6)	243 (1.2)	264 (0.9)	285 (1.4)	304 (1.2)	316 (2.2)
Iowa	275 (1.3)	224 (1.3)	236 (1.6)	254 (1.4)	275 (1.0)	296 (1.4)	315 (2.9)	327 (1.1)
Kentucky	253 (1.2)	200 (2.5)	211 (1.2)	231 (1.5)	253 (1.7)	275 (1.4)	294 (1.4)	306 (1.3)
Louisiana	242 (1.3)	186 (2.0)	198 (2.1)	219 (1.7)	241 (1.1)	265 (1.6)	286 (2.2)	298 (2.8)
Maryland	256 (1.4)	196 (1.6)	208 (2.2)	231 (1.8)	256 (1.8)	282 (1.4)	304 (2.5)	318 (2.2)
Michigan	262 (1.0)	206 (1.6)	218 (1.4)	239 (1.0)	262 (1.0)	284 (1.4)	305 (1.9)	317 (2.5)
Minnesota	273 (1.1)	219 (1.8)	232 (1.9)	251 (0.9)	273 (1.3)	295 (1.3)	314 (1.4)	326 (1.8)
Montana	280 (0.8)	230 (2.5)	342 (2.0)	260 (1.6)	280 (0.6)	300 (1.1)	318 (1.4)	328 (2.2)
Nebraska	273 (1.1)	218 (2.4)	232 (1.6)	252 (1.2)	274 (0.9)	295 (1.7)	314 (1.4)	326 (1.4)
New Hampshire	272 (1.0)	221 (2.5)	232 (1.4)	251 (1.5)	272 (1.4)	292 (1.2)	312 (1.7)	324 (3.3)
New Jersey	265 (1.1)	209 (3.2)	221 (1.9)	242 (1.4)	265 (1.4)	290 (1.3)	312 (1.2)	324 (1.7)
New Mexico	257 (0.9)	207 (1.4)	218 (1.1)	236 (1.2)	256 (0.9)	277 (1.0)	296 (1.8)	307 (1.6)
New York	259 (1.4)	197 (3.2)	210 (3.3)	233 (1.2)	259 (2.9)	285 (1.1)	309 (1.1)	323 (2.0)
North Carolina	249 (1.0)	194 (1.5)	206 (1.7)	226 (1.1)	249 (1.1)	273 (1.3)	293 (1.5)	308 (2.1)
North Dakota	278 (1.3)	228 (3.4)	239 (2.2)	257 (1.7)	278 (1.5)	299 (2.1)	317 (2.7)	328 (2.1)
Ohio	260 (1.1)	206 (1.7)	217 (1.8)	237 (1.2)	260 (1.2)	282 (1.9)	303 (2.0)	315 (1.9)
Oklahoma	259 (1.4)	206 (2.1)	218 (1.7)	237 (1.4)	259 (1.3)	280 (1.8)	301 (1.8)	314 (1.4)
Oregon	270 (0.9)	218 (1.9)	229 (1.5)	249 (1.1)	270 (1.5)	291 (0.9)	310 (1.0)	322 (1.9)
Pennsylvania	263 (1.7)	208 (1.9)	220 (2.4)	241 (2.1)	264 (1.7)	287 (1.3)	306 (2.1)	318 (1.9)
Rhode Island	256 (0.8)	199 (1.7)	211 (1.8)	232 (0.9)	256 (0.9)	278 (1.0)	301 (1.3)	314 (2.2)
Texas	256 (1.4)	202 (2.1)	214 (1.6)	234 (2.3)	256 (1.9)	281 (1.4)	302 (2.4)	315 (2.7)
Virginia	261 (1.5)	203 (1.6)	214 (1.3)	235 (1.4)	259 (1.1)	285 (1.5)	310 (2.6)	324 (5.2)
West Virginia	254 (0.9)	203 (2.1)	214 (1.5)	232 (1.2)	253 (0.9)	275 (1.8)	295 (2.2)	307 (1.5)
Wisconsin	272 (1.3)	216 (2.1)	229 (2.5)	250 (1.4)	273 (1.2)	295 (1.0)	315 (2.0)	326 (2.5)
Wyoming	270 (0.6)	222 (1.4)	232 (1.3)	251 (0.8)	270 (1.0)	290 (0.9)	306 (2.1)	318 (1.2)
TERRITORIES								
Guam	236 (0.8)	179 (3.1)	191 (1.5)	212 (1.5)	236 (1.4)	260 (1.5)	281 (2.2)	294 (1.5)
Virgin Islands	222 (0.8)	176 (1.3)	186 (2.3)	204 (1.6)	222 (1.3)	241 (1.3)	257 (1.6)	[illegible] (2.2)

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

FIGURE 11.9

Comparisons of Data Analysis, Statistics, and Probability Proficiency
Based on Appropriate Tests of Statistical Significance



Note: Reading across, from left to right, this chart shows whether the average proficiency of each state or territory is lower than, the same as, or higher than that of other participants.

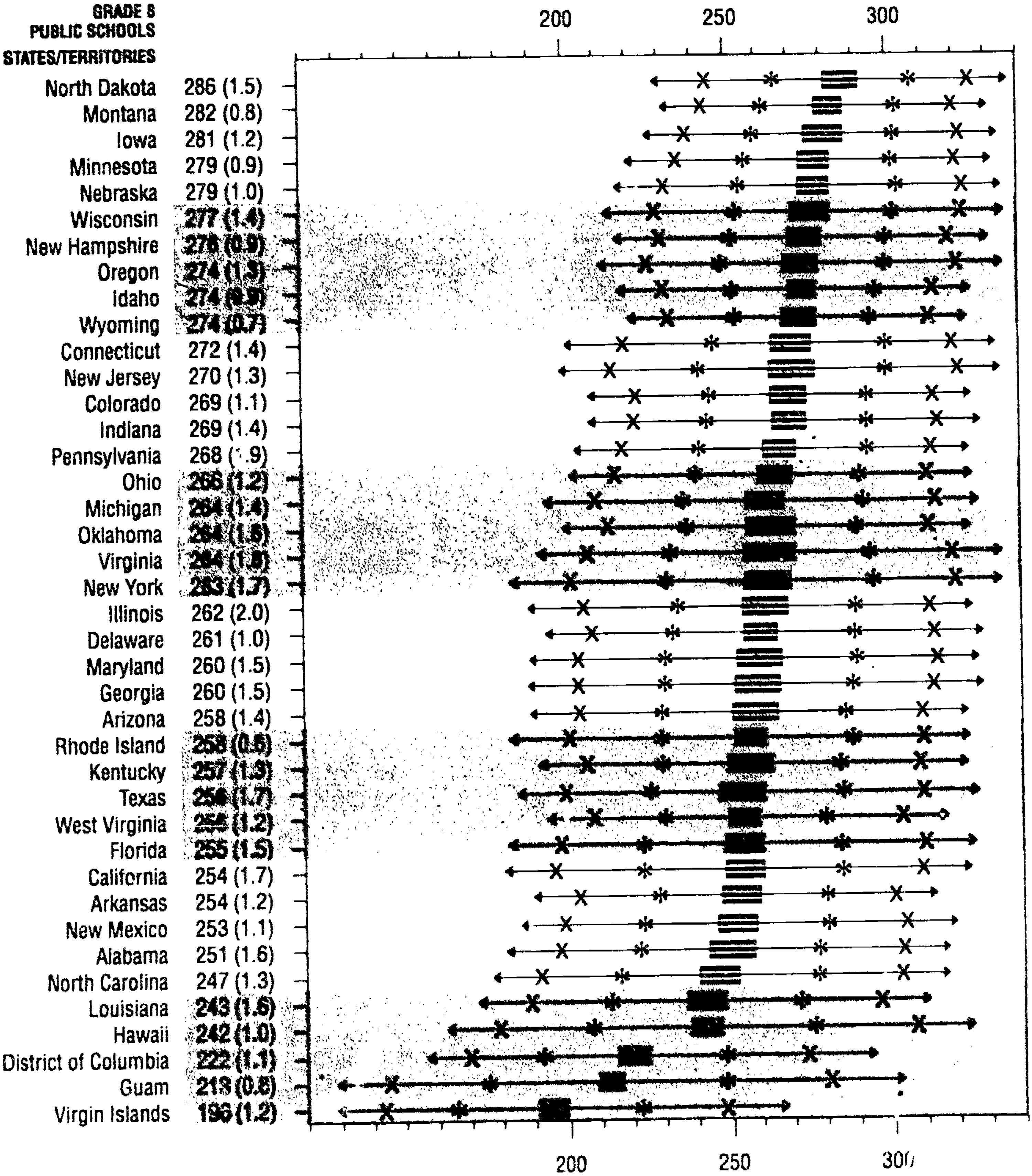
*Significance determined by an application of the Bonferroni procedure based on 780 comparisons by comparing the difference between the two means with four times the square root of the sum of the squared standard errors.

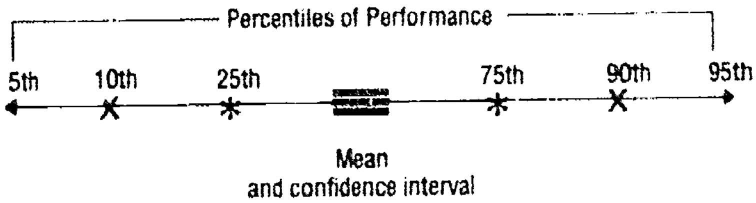
For any given state:

- Overall average proficiency statistically significantly higher than comparison state.
- No statistically significant difference from comparison state.
- Overall average proficiency statistically significantly lower than comparison state.

FIGURE 11.10

Distribution of Data Analysis, Statistics, and Probability Proficiency
Organized by Average Proficiency





The shaded box indicates a simultaneous confidence interval around the average overall data analysis proficiency for the state based on the Bonferroni procedure for 780 comparisons (the average ±2.83 times its standard error). The remaining symbols indicate values of the 5th, 10th, 25th, 75th, 90th, and 95th percentiles of the distribution of overall data analysis proficiency.

TABLE 11.7 | **Percentiles of Proficiency in Data Analysis, Statistics, and Probability**

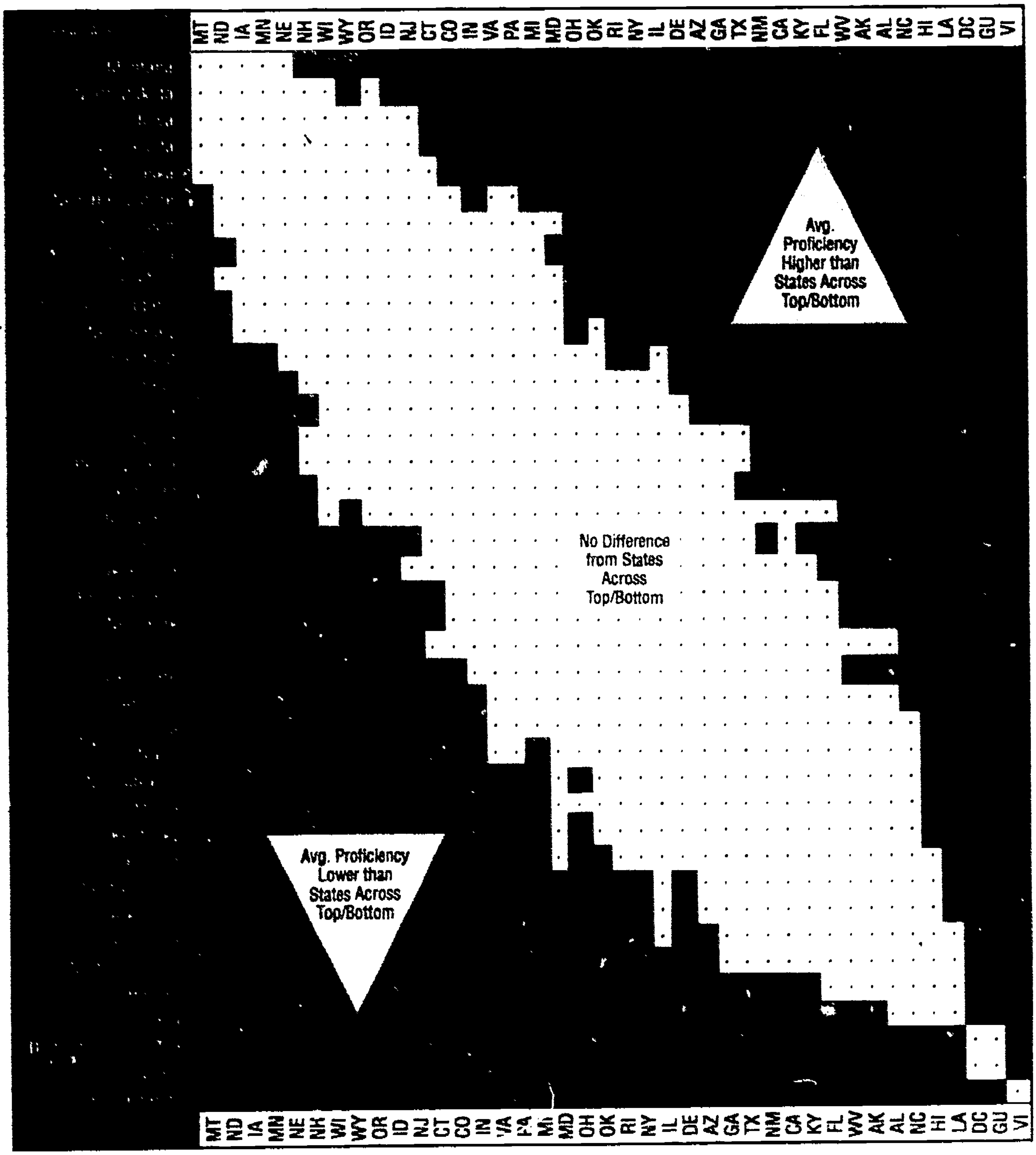
GRADE 8 PUBLIC SCHOOLS	Average Proficiency	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
NATION	262 (1.8)	189 (2.4)	207 (2.9)	234 (2.2)	264 (1.6)	291 (2.1)	314 (2.7)	327 (3.2)
Northeast	273 (3.6)	207 (7.1)	222 (9.7)	249 (3.0)	276 (5.5)	300 (3.0)	322 (3.5)	334 (8.4)
Southeast	250 (3.3)	178 (4.1)	192 (4.9)	220 (2.5)	252 (3.0)	281 (3.8)	304 (4.3)	319 (5.0)
Central	265 (3.2)	197 (5.9)	213 (6.5)	239 (5.1)	268 (3.7)	292 (2.2)	312 (5.1)	325 (4.2)
West	262 (3.6)	191 (5.4)	208 (5.3)	234 (3.1)	263 (4.0)	290 (3.5)	315 (5.8)	331 (7.2)
STATES								
Alabama	251 (1.8)	182 (3.2)	198 (3.5)	223 (2.2)	252 (1.9)	279 (1.8)	303 (2.5)	317 (2.9)
Arizona	258 (1.4)	190 (2.6)	205 (2.0)	231 (1.9)	259 (1.7)	286 (1.7)	310 (2.1)	323 (3.4)
Arkansas	254 (1.2)	191 (2.4)	205 (2.7)	229 (1.6)	255 (1.7)	280 (2.0)	301 (1.8)	314 (2.0)
California	254 (1.7)	182 (4.0)	197 (1.9)	224 (1.8)	256 (1.8)	285 (2.0)	310 (2.0)	324 (1.9)
Colorado	269 (1.1)	209 (2.8)	223 (1.0)	246 (2.1)	271 (1.4)	294 (1.4)	314 (2.5)	325 (1.4)
Connecticut	272 (1.4)	202 (2.2)	219 (2.0)	247 (1.9)	274 (1.4)	299 (1.3)	320 (1.2)	332 (1.0)
Delaware	261 (1.0)	195 (2.3)	209 (1.8)	233 (1.7)	261 (1.4)	290 (1.5)	314 (1.3)	328 (2.3)
District of Columbia	222 (1.1)	158 (2.8)	170 (1.2)	192 (1.3)	219 (1.7)	248 (1.2)	275 (1.8)	294 (3.9)
Florida	255 (1.5)	184 (1.9)	199 (2.2)	224 (1.3)	255 (1.3)	285 (1.7)	311 (2.0)	325 (1.8)
Georgia	260 (1.5)	190 (1.7)	205 (2.1)	231 (1.7)	261 (1.8)	289 (2.1)	314 (2.3)	328 (3.3)
Hawaii	242 (1.0)	164 (1.8)	179 (2.2)	208 (1.6)	242 (1.2)	276 (1.9)	307 (2.7)	324 (3.8)
Idaho	274 (0.9)	218 (4.2)	231 (1.4)	253 (1.0)	275 (1.7)	296 (1.2)	314 (1.7)	325 (2.3)
Illinois	262 (2.0)	190 (5.8)	207 (5.8)	236 (2.0)	264 (1.4)	290 (1.7)	312 (2.4)	325 (3.2)
Indiana	269 (1.4)	209 (3.7)	222 (2.0)	245 (2.1)	269 (1.3)	294 (1.8)	315 (1.1)	328 (1.9)
Iowa	281 (1.2)	227 (2.2)	239 (2.7)	259 (1.4)	280 (1.3)	302 (1.2)	322 (2.1)	333 (1.9)
Kentucky	257 (1.3)	193 (2.3)	207 (2.1)	230 (1.9)	257 (1.6)	285 (2.2)	308 (1.7)	322 (4.5)
Louisiana	243 (1.6)	174 (3.5)	189 (1.8)	214 (2.3)	243 (1.8)	272 (1.6)	296 (3.0)	310 (2.8)
Maryland	260 (1.5)	190 (2.3)	205 (3.1)	231 (2.3)	262 (1.6)	290 (1.5)	314 (1.4)	327 (1.8)
Michigan	264 (1.4)	195 (4.2)	210 (3.2)	237 (2.2)	266 (1.4)	292 (1.3)	315 (1.4)	327 (2.4)
Minnesota	279 (0.9)	221 (3.5)	236 (2.1)	257 (1.4)	280 (0.7)	302 (1.0)	321 (0.8)	332 (1.8)
Montana	282 (0.8)	232 (4.0)	244 (1.8)	262 (1.5)	283 (0.9)	302 (1.2)	321 (2.1)	331 (2.5)
Nebraska	279 (1.0)	219 (3.0)	232 (2.9)	256 (2.0)	280 (0.9)	303 (1.1)	323 (1.6)	335 (3.6)
New Hampshire	276 (0.9)	218 (2.1)	231 (1.9)	253 (1.1)	277 (1.3)	300 (1.4)	319 (3.0)	330 (3.2)
New Jersey	270 (1.3)	200 (3.5)	215 (2.6)	242 (1.9)	271 (1.8)	299 (1.2)	322 (1.2)	334 (0.8)
New Mexico	253 (1.1)	187 (2.0)	200 (2.2)	225 (1.7)	253 (2.0)	281 (1.2)	304 (3.[illegible])	319 (2.6)
New York	263 (1.7)	184 (2.8)	203 (2.6)	232 (2.8)	266 (1.9)	295 (1.7)	320 (3.6)	333 (2.3)
North Carolina	247 (1.3)	178 (5.4)	192 (1.7)	217 (2.1)	248 (1.8)	278 (1.8)	303 (2.8)	317 (2.1)
North Dakota	286 (1.5)	230 (2.7)	245 (2.1)	266 (1.9)	287 (1.5)	307 (1.3)	326 (2.0)	337 (2.1)
Ohio	266 (1.2)	203 (1.9)	217 (2.2)	241 (1.4)	267 (2.5)	291 (2.1)	312 (1.9)	324 (2.4)
Oklahoma	264 (1.8)	201 (2.9)	214 (2.3)	238 (1.5)	265 (2.5)	290 (2.2)	312 (2.0)	324 (5.1)
Oregon	274 (1.3)	213 (2.9)	227 (1.4)	250 (2.4)	275 (2.1)	299 (1.4)	322 (2.8)	335 (2.5)
Pennsylvania	266 (1.9)	204 (4.9)	219 (2.2)	243 (2.7)	269 (1.7)	294 (3.1)	314 (2.1)	325 (1.9)
Rhode Island	258 (0.8)	184 (2.2)	202 (3.7)	230 (1.2)	261 (1.3)	288 (1.5)	310 (1.8)	323 (1.9)
Texas	256 (1.7)	186 (2.6)	201 (1.9)	227 (2.9)	257 (2.4)	286 (1.9)	311 (3.4)	326 (1.9)
Virginia	264 (1.8)	193 (1.6)	208 (2.4)	233 (1.8)	264 (1.8)	294 (2.0)	319 (3.1)	334 (3.2)
West Virginia	256 (1.2)	195 (2.8)	209 (2.0)	231 (1.7)	255 (1.2)	280 (1.8)	303 (1.9)	316 (1.5)
Wisconsin	277 (1.4)	215 (2.4)	229 (2.5)	254 (2.4)	278 (1.7)	302 (1.1)	323 (2.4)	335 (1.3)
Wyoming	274 (0.7)	222 (1.7)	233 (1.0)	253 (1.0)	274 (0.9)	295 (0.5)	313 (1.1)	323 (2.1)
TERRITORIES								
Guam	213 (0.8)	130 (2.7)	146 (2.6)	176 (2.5)	212 (1.2)	249 (2.0)	281 (3.8)	302 (2.4)
Virgin Islands	195 (1.2)	130 (2.5)	144 (2.3)	167 (1.9)	195 (1.6)	222 (1.9)	246 (2.5)	267 (4.2)

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

277

FIGURE 11.11

Comparisons of Algebra and Functions Proficiency
Based on Appropriate Tests of Statistical Significance



Note: Reading across, from left to right, this chart shows whether the average proficiency of each state or territory is lower than, the same as, or higher than that of other participants.

*Significance determined by an application of the Bonferroni procedure based on 780 comparisons by comparing the difference between the two means with four times the square root of the sum of the squared standard errors.

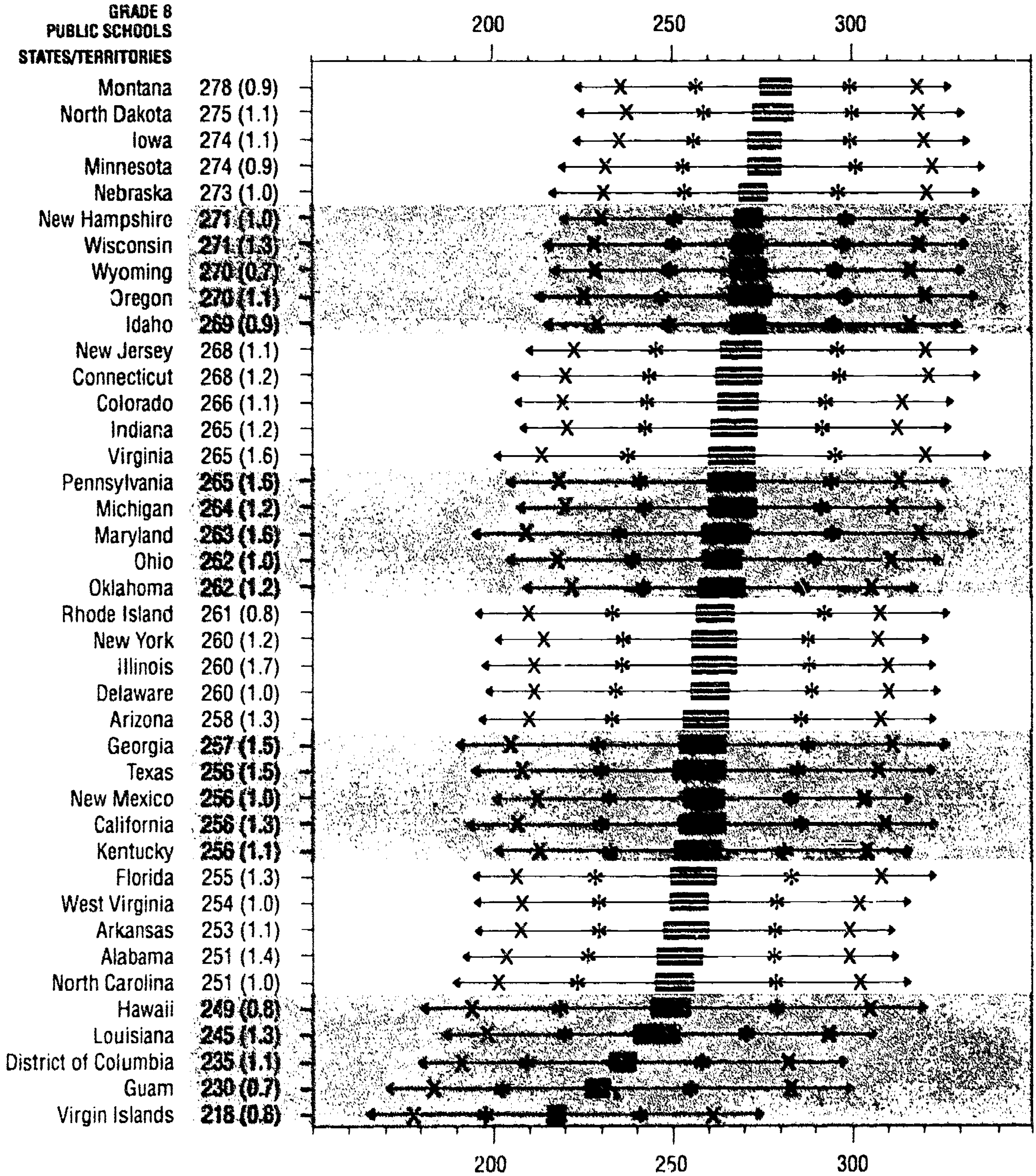
For any given state:

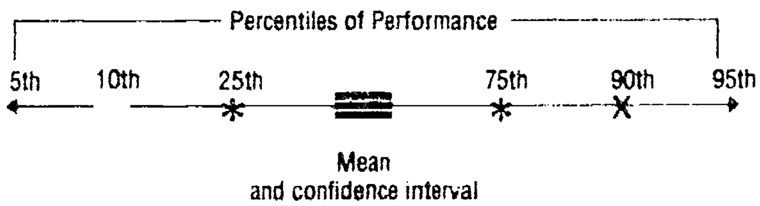
- Overall average proficiency statistically significantly higher than comparison state.
- No statistically significant difference from comparison state.
- Overall average proficiency statistically significantly lower than comparison state.

BEST COPY AVAILABLE

FIGURE 11.12

Distribution of Algebra and Functions Proficiency
Organized by Average Proficiency





The shaded box indicates a simultaneous confidence interval around the average overall algebra & functions proficiency for the state based on the Bonferroni procedure for 780 comparisons (the average ±2.83 times its standard error). The remaining symbols indicate values of the 5th, 10th, 25th, 75th, 90th, and 95th percentiles of the distribution of overall algebra & functions proficiency.

TABLE 11.8 | Percentiles of Proficiency in Algebra and Functions

GRADE 8 PUBLIC SCHOOLS	Average Proficiency	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
NATION	260 (1.3)	200 (2.5)	213 (2.4)	234 (1.9)	2[illegible] (1.2)	285 (1.5)	308 (2.6)	323 (2.3)
Northeast	267 (3.4)	207 (5.9)	220 (3.2)	241 (3.2)	2[illegible] (4.0)	291 (5.1)	313 (9.2)	326 (4.7)
Southeast	254 (2.7)	194 (4.2)	206 (8.4)	227 (4.4)	253 (1.8)	281 (4.6)	304 (5.0)	319 (5.7)
Central	263 (2.1)	208 (5.6)	219 (4.5)	239 (2.3)	264 (3.0)	288 (2.6)	307 (3.6)	320 (5.3)
West	259 (2.4)	199 (3.1)	211 (3.3)	233 (2.0)	258 (2.4)	284 (2.3)	309 (5.5)	325 (4.9)
STATES								
Alabama	251 (1.4)	194 (1.8)	205 (1.9)	227 (1.7)	251 (1.9)	276 (1.5)	298 (3.0)	311 (3.0)
Arizona	258 (1.3)	198 (2.3)	211 (2.8)	233 (1.7)	258 (1.4)	283 (1.1)	306 (1.8)	319 (3.4)
Arkansas	253 (1.1)	197 (1.8)	209 (1.7)	229 (0.9)	252 (1.5)	276 (1.3)	297 (2.7)	310 (1.6)
California	256 (1.3)	195 (2.7)	208 (1.9)	230 (1.6)	255 (1.8)	283 (2.7)	307 (2.5)	320 (2.2)
Colorado	266 (1.1)	207 (2.1)	219 (1.4)	242 (1.4)	266 (1.2)	290 (1.3)	310 (1.0)	323 (2.2)
Connecticut	268 (1.2)	206 (2.4)	220 (2.6)	242 (1.8)	268 (1.4)	293 (1.4)	316 (1.7)	329 (1.7)
Delaware	260 (1.0)	200 (2.8)	213 (1.7)	234 (2.2)	258 (1.3)	285 (1.3)	308 (2.2)	321 (1.8)
District of Columbia	235 (1.1)	181 (2.5)	192 (1.7)	210 (1.3)	233 (1.3)	257 (0.9)	280 (3.3)	295 (2.3)
Florida	255 (1.3)	197 (3.6)	208 (1.3)	228 (1.8)	253 (1.2)	280 (1.1)	308 (3.3)	321 (1.7)
Georgia	257 (1.5)	192 (0.7)	206 (0.9)	229 (1.4)	257 (1.7)	285 (2.0)	309 (3.8)	323 (2.4)
Hawaii	249 (0.8)	183 (3.2)	198 (2.2)	219 (1.5)	247 (0.9)	277 (1.3)	304 (1.4)	318 (3.5)
Idaho	269 (0.9)	215 (2.3)	228 (1.4)	248 (1.1)	269 (1.0)	291 (1.1)	311 (1.4)	324 (2.4)
Illinois	260 (1.7)	199 (2.8)	212 (2.4)	235 (2.3)	260 (1.4)	285 (1.7)	307 (2.4)	320 (2.7)
Indiana	265 (1.2)	209 (1.8)	221 (2.0)	242 (1.0)	265 (1.2)	289 (1.4)	310 (2.0)	323 (2.6)
Iowa	274 (1.1)	222 (2.4)	234 (1.7)	254 (1.0)	274 (1.3)	295 (1.3)	314 (1.1)	326 (2.8)
Kentucky	256 (1.1)	203 (2.4)	214 (1.8)	232 (1.4)	254 (1.5)	279 (1.5)	301 (2.4)	314 (2.8)
Louisiana	245 (1.3)	189 (2.1)	201 (1.8)	221 (1.5)	244 (1.7)	269 (2.2)	291 (2.2)	305 (3.0)
Maryland	263 (1.6)	196 (1.1)	210 (1.3)	234 (1.4)	263 (1.5)	291 (2.4)	316 (2.6)	330 (2.8)
Michigan	264 (1.2)	208 (1.8)	220 (2.1)	241 (2.3)	264 (1.2)	288 (1.0)	309 (1.7)	322 (1.6)
Minnesota	274 (0.9)	219 (1.5)	231 (1.7)	251 (1.4)	274 (0.8)	296 (0.7)	317 (2.2)	330 (1.7)
Montana	278 (0.9)	227 (2.1)	238 (1.8)	258 (2.0)	279 (1.1)	299 (1.9)	317 (1.8)	326 (1.5)
Nebraska	273 (1.0)	216 (3.0)	230 (1.9)	251 (1.3)	274 (1.1)	295 (1.8)	315 (1.6)	329 (2.8)
New Hampshire	271 (1.0)	219 (1.4)	230 (1.3)	249 (1.1)	271 (1.2)	294 (1.2)	314 (1.8)	326 (1.7)
New Jersey	266 (1.1)	210 (3.9)	222 (1.6)	244 (2.2)	266 (1.2)	292 (1.7)	316 (2.1)	328 (2.1)
New Mexico	256 (1.0)	202 (1.7)	213 (1.5)	232 (1.3)	255 (1.2)	280 (1.4)	301 (2.2)	314 (2.3)
New York	260 (1.2)	202 (2.7)	215 (1.5)	236 (1.7)	261 (1.1)	284 (1.5)	306 (1.9)	318 (2.7)
North Carolina	251 (1.0)	192 (1.3)	204 (1.5)	224 (1.0)	250 (1.6)	277 (1.7)	301 (2.1)	314 (1.3)
North Dakota	275 (1.1)	224 (4.8)	236 (2.7)	256 (1.4)	276 (1.4)	295 (1.2)	313 (2.2)	324 (2.1)
Ohio	262 (1.0)	206 (1.7)	218 (1.7)	238 (1.1)	261 (1.1)	286 (1.7)	308 (2.5)	321 (2.2)
Oklahoma	262 (1.2)	210 (1.8)	222 (2.8)	241 (1.3)	262 (1.1)	283 (1.2)	303 (1.5)	315 (2.2)
Oregon	270 (1.1)	213 (2.4)	225 (1.8)	245 (1.0)	269 (1.4)	294 (2.0)	315 (1.4)	326 (2.6)
Pennsylvania	265 (1.6)	205 (1.9)	219 (2.3)	240 (2.7)	2[illegible] (2.5)	290 (1.9)	311 (1.7)	323 (2.7)
Rhode Island	261 (0.8)	197 (1.3)	211 (1.9)	233 (1.1)	261 (0.8)	289 (0.9)	311 (1.3)	324 (2.1)
Texas	258 (1.5)	197 (3.1)	209 (2.5)	230 (1.7)	258 (1.7)	282 (1.9)	305 (2.0)	320 (2.3)
Virginia	265 (1.6)	202 (2.8)	214 (1.4)	237 (2.1)	264 (1.6)	291 (2.2)	317 (2.5)	332 (3.6)
West Virginia	254 (1.0)	197 (2.0)	209 (1.9)	229 (1.2)	252 (1.2)	277 (1.3)	300 (1.6)	314 (3.2)
Wisconsin	271 (1.3)	215 (3.3)	228 (2.7)	248 (1.6)	270 (1.4)	293 (1.2)	314 (2.2)	326 (4.2)
Wyoming	270 (0.7)	217 (2.7)	228 (1.4)	248 (1.1)	269 (0.9)	291 (0.6)	311 (1.7)	325 (1.0)
TERRITORIES								
Guam	230 (0.7)	172 (2.0)	184 (1.8)	204 (0.9)	228 (1.2)	254 (1.6)	2[illegible]1 (1.9)	297 (3.7)
Virgin Islands	216 (0.8)	167 (3.2)	179 (2.3)	197 (1.1)	217 (1.4)	239 (1.8)	2[illegible]0 (2.3)	273 (2.0)

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

230

Chapter 12

Mathematics Proficiency Results for Demographic Subpopulations at Grade 8 in the States

INTRODUCTION

One of the strongest and most frequently recommended reforms for mathematics education is that it reach all students, regardless of racial/ethnic background, gender, community, or family situation. However, the relationships between achievement and group membership shown in the NAEP state-level proficiency results indicate that this goal of equal access to quality mathematics education may be hard to achieve in the near future. A careful state-by-state study of the comparatively lower achievement by some groups, particularly Black and Hispanic students, those from disadvantaged communities, and to some extent females, suggests that there is considerable distance between actual performance and the goals formulated in *Everybody Counts*.[93]

The following sections provide average mathematics proficiency results for public-school eighth graders as classified by race/ethnicity, community type, parents' educational level, and gender for the overall mathematics scale as well as for each of the five content-area scales.

[93] *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*, Lynn Steen, editor (Washington, DC: National Research Council, National Academy Press, 1989).

PERFORMANCE BY RACE/ETHNICITY

Average overall mathematics proficiency levels by race/ethnicity are provided in TABLE 12.1, accompanied by the subpopulation proportions within the total population. The outcomes within a number of states reflect the national pattern, with Asian/Pacific Islander and White students tending to have higher average proficiency than American Indian, Hispanic, or Black students. However, Asian/Pacific Islander students did not always have higher proficiency than White students did. For states with substantial proportions of both Black and Hispanic student populations, sometimes Black students performed better, sometimes Hispanic students did, and sometimes there was no difference. A similar pattern held for states where results are provided for Hispanic and American Indian populations. In some states, there were too few respondents in particular race/ethnicity classifications to estimate proficiency accurately and, because of the sample sizes, certain differences were not statistically significant.[94]

In considering the average proficiency of White, Black, and Hispanic students across states in relation to their proportions in the state populations and in relation to the overall average proficiency of the states, some interesting patterns emerge. For example, New Jersey and Connecticut were not among the top-performing states overall, yet White public-school eighth graders in these states had relatively high proficiency levels. In comparison, 90 percent of West Virginia's eighth graders were White, yet their average proficiency level was relatively low compared to that of White public-school eighth graders in other participating states. For states where Black students comprised 20 percent or more of the eighth-grade public-school population, those in Delaware, Virginia, and Georgia had the highest proficiency levels. For states with substantial populations of Hispanic students (at least 15 percent of the eighth graders attending public schools), those with the highest achievement levels for Hispanic students were from Arizona, Colorado, Florida, New Mexico, and Texas.

---

[94] For results to be reported for any subgroup, a minimum sample size of 62 students was required (see Appendix C for details).

The percentages of students reaching the various anchor levels on the NAEP scale are presented in TABLE 12.2 and average proficiency in the content areas by race/ethnicity is shown in TABLE 12.3. These data highlight particular strengths and weaknesses across states. For example, compared to White public-school eighth graders in other states, those in North Dakota appeared particularly strong in the area of measurement. Compared to Black public-school eighth graders in other states, those in Rhode Island appeared to have particular difficulty in the area of data analysis, statistics, and probability. Scrutiny of these results across the states can yield much additional information about relative differences in content area performance by racial/ethnic groups.

PERFORMANCE BY TYPE OF COMMUNITY

TABLES 12.4, 12.5, and 12.6 show the mathematics proficiency results for eighth graders attending public schools by type of community. Similar to the national pattern, in each state, students attending public schools in advantaged urban communities had the highest average proficiency levels, and those attending public schools in disadvantaged urban communities tended to have the lowest. The average proficiency for eighth graders attending public schools in the remaining two types of communities was usually in between that of students attending public schools in the two extreme types of urban communities, but the relative standing for students in extreme rural communities as compared to those in other types of communities differed from state to state. In most states, there was either no difference in performance between these latter two groups, or those in "other" communities had the higher proficiency. However, in Nebraska, Wyoming, and Guam, public-school eighth graders in extreme rural communities had higher proficiency levels than did those students in "other" communities.

Only students attending public schools in advantaged urban communities attained Level 350. Of the states with at least 10 percent of their students in advantaged urban schools, public-school eighth graders in Pennsylvania, Georgia, Connecticut, and New Jersey had higher average proficiency than those in Hawaii, Alabama, and the District of Columbia. The average proficiency for the eighth graders living in other states where at least 10 percent of the students attended advantaged urban public schools was somewhere in between.

In a substantial number of states, 10 percent or more of the eighth graders attended public schools in disadvantaged urban communities. For these students, those living in West Virginia had the highest proficiency across the states, and those living in the District of Columbia had the lowest average proficiency. Of states where more than 20 percent of the eighth graders attended public schools in extreme rural communities, those in North Dakota, Iowa, Nebraska, Wisconsin, Montana, Wyoming, and Minnesota had the highest average proficiency levels. Those in Guam had the lowest average proficiency levels.

PERFORMANCE BY PARENTS' LEVEL OF EDUCATION

TABLES 12.7, 12.8, and 12.9 present the results by level of parents' education. The positive relationship between this variable and achievement was noticeable in every state. Of some interest is the finding that in 11 states and both territories, 10 percent or more of the public-school eighth graders reported that neither parent had graduated from high school. In no state did more than half the eighth graders report that at least one parent had graduated from college, although North Dakota came close with 49 percent.

PERFORMANCE BY GENDER

The results by gender are shown in TABLES 12.10, 12.11, and 12.12. In overall mathematics proficiency, statistically significant gender differences favoring males were found in Arizona, Colorado, Florida, Idaho, Indiana, Iowa, Montana, New Mexico, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, Wyoming, and the Virgin Islands. Gender differences favoring females were found in only one state -- Hawaii. In Delaware, Iowa, Nebraska, North Dakota, and Virginia, 1 percent of the males reached Level 350, showing considerable mathematics proficiency for eighth graders. No females in any state reached Level 350. The patterns for states and territories participating in the Trial State Assessment Program show the gender differences favoring eighth-grade males in public school mathematics education to be more pervasive than those suggested by the national results for public- and private-school eighth graders (also see Chapters Two and Three).

For the nation, across the five mathematics content areas, male eighth graders showed an advantage only in measurement. However, like the results on the overall mathematics scale, the results across the states showed more systematic differences favoring males. For example, in the area of numbers and operations, a dozen or so states showed eighth-grade males attending public schools outperforming their female counterparts, whereas only two -- Hawaii and the District of Columbia -- showed females outperforming males. Consistent with the national results, males made higher average proficiency than females did in the measurement area in most states. Only five states showed no gender differences in measurement -- Delaware, the District of Columbia, Hawaii, Illinois, and New Hampshire. In more than half the states, males also had higher proficiency levels in geometry, although in Hawaii and the District of Columbia, females had the higher geometry proficiency. In data analysis, statistics, and probability, males outperformed females in somewhat fewer than half the states, but only in Hawaii did females have higher average proficiency.

Across the states, there was generally little difference between the genders in algebra and functions proficiency. However, what differences there were indicated that females had higher average proficiency. Gender differences favoring females were found in a number of states -- Delaware, the District of Columbia, Hawaii, Maryland, New Hampshire, and North Carolina. The sole superior performance by males in algebra and functions was found in the Virgin Islands.

PERFORMANCE BY SCHOOL-LEVEL PERFORMANCE

To gain further insight into the relationship between overall public-school performance and student performance, NAEP categorized the schools in each of the states according to eighth graders' average overall mathematics proficiency and analyzed performance for students in the top one-third and for students in the bottom one-third of the schools within each state. Students' average proficiencies and the percentages performing at or above anchor points are presented for the top one-third performing public schools in each of the states in TABLE 12.13.

Performance varied considerably from state to state. For example, in the District of Columbia, average proficiency was 247, virtually at Level 250, and in Connecticut, Iowa, Montana, Nebraska, New Jersey, and North Dakota, it was at or above 290, or reasonably close to Level 300. For students with particular background characteristics, the percentages of eighth graders who were in these public schools are shown in TABLE 12.14. Across the states, from 31 to 53 percent of the White eighth graders were in the top performing one-third of the public schools. Of the participating states with a large enough population of Asian/Pacific Islander students for this analysis, from 33 to 69 percent of these students attended the better-performing public schools. For many states, sizable proportions (and sometimes all) of the students attending public schools in advantaged urban areas were in the top performing one-third. In contrast, in 22 participating states, no eighth graders attending disadvantaged urban public schools were in the top one-third. Across the states, from 32 to 54 percent of the eighth graders having at least one parent who had graduated from college were in the top one-third of the public schools. In most participating states, fewer than one-fourth of the students with neither parent having graduated from high school attended the better-performing schools.

The results for eighth graders in the bottom one-third of public schools are shown in TABLE 12.15. Here the percentages of eighth graders performing at or above various anchor points were particularly revealing. In all except 13 states, fewer than half the eighth graders performed at or above Level 250 (characterized as fifth-grade mathematics). Very few reached Level 300, which would indicate some understanding of the middle-school curriculum. From 25 to 38 percent of the eighth graders in each state attended these low-performing public schools, where mathematics achievement appears to be more commensurate with third- or fifth-grade content than with material generally introduced in the seventh grade.

The percentages of eighth-grade students with various backgrounds in these lower-performing public schools are shown in TABLE 12.16. Although some of the White public-school eighth graders in each state (from 12 to 37 percent) were in these schools, in 23 states, the majority of the Black public-school eighth graders were attending these lower-performing schools. In 19 states, the majority of public-school eighth-grade Hispanic students were attending these lower-performing public schools. In 22 states, no public-school eighth graders in advantaged urban schools were in the bottom one-third of the schools, whereas in 23 states, the majority of the public-school eighth graders in disadvantaged urban schools were in the lower-performing schools. For six states, 100 percent of students attending public schools in disadvantaged urban areas were in the lower-performing one-third of the schools. For most states, disproportionate percentages of public-school eighth graders whose parents had not graduated from high school were in lower-performing schools. Fewer than one-third of the students having at least one parent who had graduated from college were in these schools (except in Arkansas, where 34 percent attended these low-performing schools).

SUMMARY

Across the states, Black and Hispanic eighth graders and students in disadvantaged urban communities had considerably lower mathematics achievement than did their more advantaged counterparts. In some states with large urban areas (i.e., Connecticut and New Jersey), White public-school eighth graders and those attending public schools in advantaged urban areas performed comparatively better than did their peers in other states and territories participating in NAEP's 1990 Trial State Assessment. In comparison, in states where one-fifth of the public-school eighth graders were Black, these students had the highest achievement in Delaware, Virginia, and Georgia. In states where 15 percent of the public-school eighth graders were Hispanic, these students had the highest achievement in Arizona, Colorado, Florida, New Mexico, and Texas. Further, across the states, students whose parents had little education tended to have lower average achievement levels than those with well-educated parents.

In contrast to the national results at grade 8, some state-level results for eighth graders in public schools indicated a relatively consistent gender advantage for males. Arizona, Indiana, Iowa, Montana, New Mexico, Pennsylvania, Ohio, and Wyoming showed gender differences favoring males in all mathematics content areas except algebra and functions. Across all states, the gender gaps were particularly large in the area of measurement, which parallels the findings for the nation. However, in Hawaii, females had higher overall average proficiency than did males, and females in Delaware, the District of Columbia, Maryland, Minnesota, New Hampshire, and North Carolina had higher proficiency levels than males did in some content areas.

In each state, the eighth graders attending public schools in advantaged urban communities had the highest average proficiency levels. Those attending public schools in disadvantaged urban communities tended to have the lowest. For a number of states, the majority of Black and Hispanic public-school eighth graders and students attending public schools in disadvantaged urban communities were in the bottom-performing one-third of the schools. In all but 13 states, fewer than half the eighth graders in these lower-performing schools achieved at or above Level 250 (characterized as fifth-grade mathematics).

TABLE 12.1 | **Average Mathematics Proficiency by Race/Ethnicity**

GRADE 8 PUBLIC SCHOOLS	White: Percent of Students	White: Average Proficiency	Black: Percent of Students	Black: Average Proficiency	Hispanic: Percent of Students	Hispanic: Average Proficiency	Asian / Pacific Islander: Percent of Students	Asian / Pacific Islander: Average Proficiency	American Indian: Percent of Students	American Indian: Average Proficiency
NATION	70 (0.5)	269 (1.5)	16 (0.3)	236 (2.8)	10 (0.4)	243 (2.8)	2 (0.5)	280 (5.6)!	2 (0.7)	246 (5.3)!
Northeast	80 (4.2)	274 (3.0)	12 (4.2)	244 (7.6)!	5 (1.2)	*** (***)	3 (1.1)	*** (***)	1 (0.3)	*** (***)
Southeast	63 (3.0)	263 (3.0)	32 (3.0)	233 (4.8)	3 (0.8)	*** (***)	1 (0.4)	*** (***)	0 (0.1)	*** (***)
Central	79 (2.6)	272 (2.6)	13 (3.2)	232 (3.6)!	5 (1.0)	*** (***)	1 (0.4)	*** (***)	1 (0.4)	*** (***)
West	63 (1.9)	269 (3.2)	7 (2.0)	247 (6.9)!	21 (1.5)	244 (3.7)	4 (1.3)	*** (***)	4 (2.3)	*** (***)
STATES										
Alabama	64 (1.9)	263 (1.0)	29 (1.8)	233 (1.6)	5 (0.6)	225 (3.8)	1 (0.3)	*** (***)	1 (0.2)	*** (***)
Arizona	59 (1.6)	271 (1.1)	3 (0.4)	246 (3.0)	29 (1.3)	242 (1.4)	2 (0.3)	*** (***)	7 (1.5)	235 (1.7)!
Arkansas	72 (1.5)	265 (0.9)	22 (1.5)	230 (1.1)	4 (0.4)	232 (3.4)	1 (0.2)	*** (***)	2 (0.3)	*** (***)
California	45 (1.8)	271 (1.4)	7 (0.8)	233 (2.9)	35 (1.4)	236 (1.4)	12 (1.1)	271 (2.7)	2 (0.4)	*** (***)
Colorado	73 (1.3)	274 (1.0)	4 (1.0)	237 (3.4)!	19 (1.6)	247 (1.5)	2 (0.3)	*** (***)	2 (0.3)	*** (***)
Connecticut	77 (1.5)	278 (0.9)	10 (1.0)	241 (2.4)	10 (0.9)	236 (2.7)	2 (0.3)	*** (***)	1 (0.2)	*** (***)
Delaware	68 (1.0)	268 (0.7)	24 (0.9)	242 (1.5)	5 (0.5)	241 (3.8)	1 (0.2)	*** (***)	1 (0.3)	*** (***)
District of Columbia	3 (0.4)	*** (***)	84 (1.0)	229 (0.6)	10 (0.6)	219 (2.2)	1 (0.2)	*** (***)	2 (0.3)	*** (***)
Florida	60 (2.0)	265 (1.3)	20 (1.2)	231 (1.8)	17 (2.1)	246 (2.4)	2 (0.4)	273 (4.0)	1 (0.2)	*** (***)
Georgia	59 (1.8)	271 (1.4)	33 (1.7)	239 (1.4)	6 (0.6)	231 (3.1)	1 (0.2)	*** (***)	1 (0.1)	*** (***)
Hawaii	18 (0.8)	262 (1.8)	2 (0.3)	*** (***)	10 (0.6)	230 (2.2)	67 (1.0)	252 (0.7)	1 (0.2)	*** (***)
Idaho	90 (0.8)	274 (0.7)	0 (0.1)	*** (***)	8 (0.6)	249 (2.4)	1 (0.3)	*** (***)	2 (0.4)	254 (4.8)
Illinois	67 (1.9)	271 (1.4)	17 (1.9)	233 (3.8)	12 (1.4)	235 (3.3)	3 (0.5)	279 (4.1)	1 (0.2)	*** (***)
Indiana	84 (1.2)	271 (1.0)	9 (1.2)	241 (2.3)	4 (0.7)	246 (3.7)	1 (0.3)	*** (***)	1 (0.3)	*** (***)
Iowa	91 (0.7)	280 (1.1)	2 (0.7)	*** (***)	4 (0.4)	257 (3.8)	1 (0.2)	*** (***)	1 (0.3)	*** (***)
Kentucky	85 (1.1)	260 (1.2)	9 (1.0)	240 (2.1)	4 (0.5)	227 (3.2)	1 (0.2)	*** (***)	1 (0.2)	*** (***)
Louisiana	55 (2.1)	258 (1.4)	38 (1.9)	229 (1.3)	5 (0.6)	226 (3.1)	1 (0.2)	*** (***)	1 (0.3)	*** (***)
Maryland	59 (1.5)	273 (1.5)	28 (1.5)	237 (2.0)	7 (0.8)	238 (2.4)	4 (0.7)	291 (3.7)	1 (0.3)	*** (***)
Michigan	77 (1.4)	271 (0.9)	13 (1.1)	230 (1.4)	5 (0.6)	243 (3.2)	2 (0.4)	*** (***)	2 (0.5)	*** (***)
Minnesota	90 (0.9)	278 (0.8)	2 (0.5)	239 (4.9)!	3 (0.4)	240 (3.7)	3 (0.4)	266 (4.9)	2 (0.5)	*** (***)
Montana	87 (1.1)	284 (0.7)	0 (0.1)	*** (***)	3 (0.4)	263 (2.6)	1 (0.3)	*** (***)	8 (1.1)	258 (3.4)
Nebraska	83 (0.6)	279 (1.0)	5 (0.4)	236 (4.3)	5 (0.5)	253 (3.5)	1 (0.2)	*** (***)	1 (0.2)	*** (***)
New Hampshire	94 (0.6)	274 (0.9)	1 (0.2)	*** (***)	2 (0.4)	254 (3.7)	1 (0.2)	*** (***)	2 (0.2)	*** (***)
New Jersey	66 (2.0)	279 (1.1)	15 (2.0)	241 (2.3)	13 (1.0)	244 (2.3)	5 (0.6)	297 (3.8)	1 (0.2)	*** (***)
New Mexico	40 (1.3)	272 (1.1)	2 (0.4)	*** (***)	45 (1.3)	247 (0.9)	1 (0.3)	*** (***)	11 (0.8)	237 (1.6)
New York	60 (1.9)	273 (1.1)	17 (1.6)	236 (2.6)	17 (1.7)	237 (2.6)	4 (0.8)	279 (5.0)!	1 (0.3)	*** (***)
North Carolina	62 (1.7)	261 (1.3)	30 (1.3)	232 (1.1)	5 (0.5)	220 (2.5)	1 (0.2)	*** (***)	3 (0.9)	235 (4.3)!
North Dakota	91 (1.4)	284 (0.9)	1 (0.3)	*** (***)	3 (0.4)	251 (4.7)	1 (0.4)	*** (***)	5 (1.2)	242 (3.5)!
Ohio	82 (0.9)	269 (1.0)	11 (0.8)	233 (1.3)	3 (0.4)	239 (3.4)	1 (0.3)	*** (***)	1 (0.3)	*** (***)
Oklahoma	74 (1.6)	268 (1.2)	11 (1.2)	236 (1.9)	5 (0.7)	246 (3.7)	2 (0.4)	*** (***)	9 (1.0)	255 (2.4)
Oregon	85 (0.9)	274 (0.9)	1 (0.4)	*** (***)	7 (0.6)	253 (2.8)	3 (0.3)	278 (4.2)	4 (0.5)	254 (3.5)
Pennsylvania	81 (2.5)	272 (1.0)	12 (2.3)	238 (3.4)	5 (0.8)	230 (3.3)	1 (0.2)	*** (***)	1 (0.3)	*** (***)
Rhode Island	83 (0.6)	265 (0.8)	5 (0.5)	225 (2.4)	8 (0.5)	228 (2.3)	2 (0.3)	*** (***)	1 (0.2)	*** (***)
Texas	47 (2.1)	273 (1.1)	13 (1.3)	234 (1.7)	36 (2.1)	245 (1.7)	2 (0.6)	*** (***)	1 (0.2)	*** (***)
Virginia	68 (1.5)	271 (1.5)	23 (1.5)	241 (1.3)	5 (0.5)	243 (3.7)	4 (0.4)	298 (3.6)	1 (0.2)	*** (***)
West Virginia	90 (0.7)	257 (0.8)	3 (0.5)	233 (4.1)	4 (0.4)	231 (3.3)	1 (0.2)	*** (***)	2 (0.3)	*** (***)
Wisconsin	85 (1.2)	279 (1.0)	8 (1.1)	236 (4.2)	4 (0.3)	251 (5.0)	2 (0.3)	*** (***)	1 (0.2)	*** (***)
Wyoming	86 (0.8)	275 (0.6)	1 (0.2)	*** (***)	9 (0.6)	254 (2.3)	1 (0.2)	*** (***)	3 (0.4)	257 (2.8)
TERRITORIES										
Guam	7 (0.7)	256 (3.5)	1 (0.4)	*** (***)	19 (1.0)	209 (1.5)	72 (1.2)	235 (0.7)	1 (0.2)	*** (***)
Virgin Islands	2 (0.2)	*** (***)	77 (1.1)	220 (0.7)	20 (1.0)	208 (1.3)	0 (0.2)	*** (***)	1 (0.2)	*** (***)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. The percentages for race/ethnicity may not add to 100 percent because some students categorized themselves as "other." ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

266

TABLE 12.2 | **Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Race/Ethnicity**

GRADE 8 PUBLIC SCHOOLS	Level 200				
	White	Black	Hispanic	Asian / Pacific Islander	American Indian
NATION	99 (0.4)	89 (3.1)	93 (1.6)	97 (2.5)!	97 (6.7)!
Northeast	100 (0.0)	93 (3.0)!	*** (***)	*** (***)	*** (***)
Southeast	98 (1.3)	86 (5.3)	*** (***)	*** (***)	*** (***)
Central	100 (0.4)	91 (4.4)!	*** (***)	*** (***)	*** (***)
West	99 (0.8)	95 (3.0)!	93 (2.0)	*** (***)	*** (***)
STATES					
Alabama	**99 (0.3)**	**89 (1.7)**	**85 (4.3)**	***** (***)**	***** (***)**
Arizona	**100 (0.1)**	**98 (2.1)**	**94 (1.1)**	***** (***)**	**93 (2.1)!**
Arkansas	**99 (0.2)**	**91 (1.8)**	**89 (3.1)**	***** (***)**	***** (***)**
California	**100 (0.3)**	**87 (4.1)**	**90 (1.9)**	**99 (0.9)**	***** (***)**
Colorado	100 (0.2)	95 (3.2)!	96 (1.1)	*** (***)	*** (***)
Connecticut	100 (0.2)	93 (1.5)	90 (3.5)	*** (***)	*** (***)
Delaware	99 (0.3)	93 (1.6)	93 (2.8)	*** (***)	*** (***)
District of Columbia	*** (***)	87 (0.8)	74 (3.2)	*** (***)	*** (***)
Florida	99 (0.4)	89 (1.8)	93 (2.0)	98 (1.6)	*** (***)
Georgia	**99 (0.3)**	**93 (1.1)**	**83 (4.5)**	***** (***)**	***** (***)**
Hawaii	**98 (1.1)**	***** (***)**	**83 (2.8)**	**94 (0.7)**	***** (***)**
Idaho	**100 (0.2)**	***** (***)**	**97 (1.7)**	***** (***)**	**98 (2.1)**
Illinois	**99 (0.3)**	**88 (2.4)**	**89 (3.8)**	**99 (1.6)**	***** (***)**
Indiana	**100 (0.2)**	**96 (2.0)**	**96 (2.4)**	***** (***)**	***** (***)**
Iowa	100 (0.1)	*** (***)	97 (2.3)	*** (***)	*** (***)
Kentucky	99 (0.4)	95 (1.5)	90 (4.7)	*** (***)	*** (***)
Louisiana	99 (0.3)	88 (1.8)	81 (4.6)	*** (***)	*** (***)
Maryland	99 (0.4)	91 (1.5)	89 (2.5)	99 (1.0)	*** (***)
Michigan	100 (0.2)	90 (1.9)	94 (2.6)	*** (***)	*** (***)
Minnesota	**100 (0.2)**	**87 (6.5)!**	**92 (3.3)**	**98 (1.9)**	***** (***)**
Montana	**100 (0.1)**	***** (***)**	**99 (3.7)**	***** (***)**	**98 (0.9)**
Nebraska	**100 (0.2)**	**90 (4.8)**	**97 (2.2)**	***** (***)**	***** (***)**
New Hampshire	**100 (0.2)**	***** (***)**	**98 (2.1)**	***** (***)**	***** (***)**
New Jersey	**100 (0.1)**	**95 (1.7)**	**96 (1.4)**	**100 (0.5)**	***** (***)**
New Mexico	100 (0.3)	*** (***)	97 (1.0)	*** (***)	93 (2.1)
New York	99 (0.3)	90 (1.9)	89 (1.8)	98 (2.8)!	*** (***)
North Carolina	99 (0.4)	89 (1.3)	76 (4.3)	*** (***)	89 (5.4)!
North Dakota	100 (0.1)	*** (***)	98 (2.0)	*** (***)	94 (2.6)!
Ohio	99 (0.2)	90 (1.7)	93 (2.5)	*** (***)	*** (***)
Oklahoma	**99 (0.3)**	**94 (2.7)**	**96 (3.4)**	***** (***)**	**98 (1.4)**
Oregon	**100 (0.2)**	***** (***)**	**98 (1.1)**	**99 (1.8)**	**98 (1.4)**
Pennsylvania	**100 (0.1)**	**92 (2.0)**	**82 (3.9)**	***** (***)**	***** (***)**
Rhode Island	**98 (0.4)**	**78 (6.5)**	**83 (3.1)**	***** (***)**	***** (***)**
Texas	**99 (0.3)**	**93 (2.1)**	**95 (1.4)**	***** (***)**	***** (***)**
Virginia	99 (0.3)	94 (1.1)	90 (3.5)	100 (0.0)	*** (***)
West Virginia	99 (0.4)	93 (4.1)	87 (5.4)	*** (***)	*** (***)
Wisconsin	100 (0.1)	92 (3.1)	96 (1.9)	*** (***)	*** (***)
Wyoming	100 (0.1)	*** (***)	98 (1.3)	*** (***)	100 (0.8)
TERRITORIES					
Guam	**92 (3.0)**	***** (***)**	**80 (2.6)**	**86 (1.2)**	***** (***)**
Virgin Islands	***** (***)**	**80 (1.7)**	**81 (3.5)**	***** (***)**	***** (***)**

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent. Descriptions of mathematics proficiency at the four anchor levels are found in Chapter One. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 12.2 | **Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Race/Ethnicity (continued)**

GRADE 8 PUBLIC SCHOOLS	Level 250				
	White	Black	Hispanic	Asian / Pacific Islander	American Indian
NATION	74 (1.8)	30 (3.4)	41 (4.5)	80 (5.6)!	45(16.0)!
Northeast	78 (4.8)	39(10.9)!	*** (***)	*** (***)	*** (***)
Southeast	66 (3.6)	27 (5.1)	*** (***)	*** (***)	*** (***)
Central	78 (3.1)	23 (4.7)!	*** (***)	*** (***)	*** (***)
West	74 (3.3)	44(12.9)!	41 (5.4)	*** (***)	*** (***)
STATES					
Alabama	67 (1.7)	25 (2.2)	17 (4.5)	*** (***)	*** (***)
Arizona	77 (1.5)	41 (6.1)	37 (2.5)	*** (***)	27 (3.6)!
Arkansas	71 (1.5)	20 (1.8)	23 (7.4)	*** (***)	*** (***)
California	75 (1.7)	27 (3.7)	31 (2.4)	73 (3.4)	*** (***)
Colorado	81 (1.3)	31 (7.0)!	46 (3.0)	*** (***)	*** (***)
Connecticut	82 (1.2)	38 (4.3)	30 (4.2)	*** (***)	*** (***)
Delaware	70 (1.4)	38 (2.3)	36 (6.0)	*** (***)	*** (***)
District of Columbia	*** (***)	22 (1.0)	14 (2.4)	*** (***)	*** (***)
Florida	67 (2.0)	23 (2.5)	41 (4.0)	75 (6.1)	*** (***)
Georgia	75 (1.5)	34 (2.4)	29 (4.1)	*** (***)	*** (***)
Hawaii	61 (2.3)	*** (***)	24 (2.8)	50 (1.3)	*** (***)
Idaho	82 (0.9)	*** (***)	50 (4.7)	*** (***)	53 (6.8)
Illinois	78 (1.6)	27 (6.0)	31 (3.9)	66 (5.1)	*** (***)
Indiana	77 (1.4)	35 (4.0)	41 (7.8)	*** (***)	*** (***)
Iowa	86 (1.3)	*** (***)	57 (6.3)	*** (***)	*** (***)
Kentucky	62 (1.8)	33 (4.0)	19 (5.0)	*** (***)	*** (***)
Louisiana	61 (2.2)	19 (1.7)	21 (4.6)	*** (***)	*** (***)
Maryland	76 (1.7)	32 (3.0)	33 (3.8)	90 (3.4)	*** (***)
Michigan	77 (1.2)	20 (2.7)	43 (5.6)	*** (***)	*** (***)
Minnesota	85 (0.9)	34 (7.4)!	37 (5.8)	71 (5.8)	*** (***)
Montana	91 (0.7)	*** (***)	70 (7.0)	*** (***)	60 (6.8)
Nebraska	86 (1.2)	31 (8.4)	54 (7.1)	*** (***)	*** (***)
New Hampshire	80 (1.2)	*** (***)	56(10.8)	*** (***)	*** (***)
New Jersey	86 (1.2)	33 (3.2)	38 (3.6)	91 (3.2)	*** (***)
New Mexico	78 (1.6)	*** (***)	44 (1.6)	*** (***)	30 (3.5)
New York	80 (1.3)	29 (5.0)	32 (3.9)	78 (6.5)!	*** (***)
North Carolina	64 (1.9)	24 (1.8)	12 (3.6)	*** (***)	32 (5.8)!
North Dakota	92 (0.7)	*** (***)	52 (9.0)	*** (***)	36 (7.1)!
Ohio	74 (1.3)	24 (2.1)	33 (6.7)	*** (***)	*** (***)
Oklahoma	75 (1.6)	28 (3.4)	40 (6.1)	*** (***)	59 (5.0)
Oregon	79 (1.2)	*** (***)	50 (5.1)	83 (4.8)	57 (6.6)
Pennsylvania	78 (1.3)	29 (5.1)	23 (4.8)	*** (***)	*** (***)
Rhode Island	68 (0.9)	19 (3.3)	23 (3.6)	*** (***)	*** (***)
Texas	79 (1.6)	25 (2.7)	42 (2.3)	*** (***)	*** (***)
Virginia	73 (1.5)	36 (2.5)	40 (5.0)	94 (2.8)	*** (***)
West Virginia	59 (1.4)	24 (5.7)	25 (5.7)	*** (***)	*** (***)
Wisconsin	86 (1.1)	27 (6.5)	55 (5.5)	*** (***)	*** (***)
Wyoming	83 (1.0)	*** (***)	57 (4.8)	*** (***)	65 (5.8)
TERRITORIES					
Guam	60 (5.4)	*** (***)	8 (1.7)	30 (1.1)	*** (***)
Virgin Islands	*** (***)	12 (1.1)	8 (1.8)	*** (***)	*** (***)

2:1

TABLE 12.2 | **Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Race/Ethnicity (continued)**

GRADE 8 PUBLIC SCHOOLS	Level 300				
	White	Black	Hispanic	Asian / Pacific Islander	American Indian
NATION	15 (1.5)	2 (1.3)	3 (1.1)	31 (6.2)!	1 (2.3)!
Northeast	18 (2.5)	3 (4.1)!	*** (***)	*** (***)	*** (***)
Southeast	11 (2.7)	2 (1.6)	*** (***)	*** (***)	*** (***)
Central	14 (2.8)	1 (1.0)!	*** (***)	*** (***)	*** (***)
West	16 (3.2)	6 (5.0)!	3 (1.6)	*** (***)	*** (***)
STATES					
Alabama	10 (0.9)	1 (0.5)	2 (1.3)	*** (***)	*** (***)
Arizona	15 (1.4)	3 (1.5)	2 (0.7)	*** (***)	1 (0.6)!
Arkansas	9 (0.9)	0 (0.2)	1 (1.5)	*** (***)	*** (***)
California	16 (1.8)	1 (1.1)	2 (0.5)	20 (3.4)	*** (***)
Colorado	18 (1.2)	1 (1.0)!	2 (0.8)	*** (***)	*** (***)
Connecticut	22 (1.1)	3 (1.5)	2 (1.3)	*** (***)	*** (***)
Delaware	16 (1.2)	3 (1.2)	5 (2.8)	*** (***)	*** (***)
District of Columbia	*** (***)	1 (0.4)	1 (0.7)	*** (***)	*** (***)
Florida	14 (1.5)	2 (0.7)	7 (1.1)	22 (5.3)	*** (***)
Georgia	17 (1.6)	2 (0.5)	1 (1.4)	*** (***)	*** (***)
Hawaii	15 (2.3)	*** (***)	2 (1.1)	11 (0.6)	*** (***)
Idaho	16 (0.9)	*** (***)	3 (1.4)	*** (***)	5 (3.8)
Illinois	15 (1.5)	1 (0.8)	2 (0.8)	24 (5.2)	*** (***)
Indiana	15 (1.2)	1 (0.5)	5 (2.2)	*** (***)	*** (***)
Iowa	22 (1.5)	*** (***)	8 (2.6)	*** (***)	*** (***)
Kentucky	9 (1.0)	1 (0.8)	0 (0.0)	*** (***)	*** (***)
Louisiana	6 (1.0)	0 (0.2)	1 (0.8)	*** (***)	*** (***)
Maryland	19 (1.6)	2 (0.8)	4 (1.4)	44 (6.0)	*** (***)
Michigan	16 (1.2)	0 (0.1)	3 (1.8)	*** (***)	*** (***)
Minnesota	22 (1.2)	5 (2.8)!	3 (2.5)	13 (5.7)	*** (***)
Montana	26 (1.6)	*** (***)	4 (2.9)	*** (***)	5 (2.2)
Nebraska	23 (1.3)	1 (1.9)	4 (2.7)	*** (***)	*** (***)
New Hampshire	18 (1.2)	*** (***)	4 (3.1)	*** (***)	*** (***)
New Jersey	23 (1.8)	3 (0.8)	4 (1.2)	55 (6.9)	*** (***)
New Mexico	17 (1.8)	*** (***)	2 (0.6)	*** (***)	1 (0.7)
New York	18 (1.5)	2 (0.8)	3 (1.1)	32 (5.3)!	*** (***)
North Carolina	10 (1.0)	1 (0.5)	1 (1.1)	*** (***)	1 (1.6)!
North Dakota	26 (1.8)	*** (***)	5 (4.4)	*** (***)	0 (0.7)!
Ohio	14 (1.0)	1 (0.9)	2 (1.7)	*** (***)	*** (***)
Oklahoma	12 (1.3)	0 (0.9)	3 (1.3)	*** (***)	4 (2.5)
Oregon	20 (1.1)	*** (***)	8 (2.3)	28 (6.3)	3 (2.1)
Pennsylvania	17 (1.2)	2 (1.3)	2 (2.0)	*** (***)	*** (***)
Rhode Island	14 (0.9)	1 (0.8)	2 (1.0)	*** (***)	*** (***)
Texas	18 (1.5)	1 (0.5)	3 (0.7)	*** (***)	*** (***)
Virginia	19 (1.9)	2 (0.7)	6 (2.6)	40 (5.4)	*** (***)
West Virginia	8 (0.8)	2 (3.3)	1 (1.0)	*** (***)	*** (***)
Wisconsin	22 (1.5)	1 (0.7)	3 (1.7)	*** (***)	*** (***)
Wyoming	16 (0.8)	*** (***)	5 (1.6)	*** (***)	3 (2.4)
TERRITORIES					
Guam	8 (2.3)	*** (***)	0 (0.4)	3 (0.4)	*** (***)
Virgin Islands	*** (***)	1 (0.2)	0 (0.0)	*** (***)	*** (***)

TABLE 12.2 | **Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Race/Ethnicity (continued)**

GRADE 8 PUBLIC SCHOOLS	Level 350				
	White	Black	Hispanic	Asian / Pacific Islander	American Indian
NATION	0 (0.2)	0 (0.0)	0 (0.0)	1 (1.4)!	0 (0.0)
Northeast	0 (0.6)	0 (0.0)	*** (***)	*** (***)	*** (***)
Southeast	0 (0.0)	0 (0.0)	*** (***)	*** (***)	*** (***)
Central	0 (0.3)	0 (0.0)	*** (***)	*** (***)	*** (***)
West	0 (0.6)	0 (0.0)	0 (0.0)	*** (***)	*** (***)
STATES					
Alabama	**0 (0.1)**	**0 (0.0)**	**0 (0.0)**	***** (***)**	***** (***)**
Arizona	**0 (0.2)**	**0 (0.0)**	**0 (0.0)**	***** (***)**	**0 (0.0)**
Arkansas	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	***** (***)**	***** (***)**
California	**0 (0.2)**	**0 (0.0)**	**0 (0.0)**	**0 (0.3)**	***** (***)**
Colorado	0 (0.1)	0 (0.0)	0 (0.0)	*** (***)	*** (***)
Connecticut	0 (0.1)	0 (0.0)	0 (0.0)	*** (***)	*** (***)
Delaware	1 (0.3)	0 (0.0)	0 (0.0)	*** (***)	*** (***)
District of Columbia	*** (***)	0 (0.0)	0 (0.0)	*** (***)	*** (***)
Florida	0 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	*** (***)
Georgia	**0 (0.2)**	**0 (0.1)**	**0 (0.0)**	***** (***)**	***** (***)**
Hawaii	**0 (0.4)**	***** (***)**	**0 (0.0)**	**0 (0.2)**	***** (***)**
Idaho	**0 (0.1)**	***** (***)**	**0 (0.0)**	***** (***)**	**0 (0.0)**
Illinois	**0 (0.1)**	**0 (0.0)**	**0 (0.0)**	**0 (0.3)**	***** (***)**
Indiana	**0 (0.1)**	**0 (0.0)**	**0 (0.8)**	***** (***)**	***** (***)**
Iowa	0 (0.2)	*** (***)	0 (0.0)	*** (***)	*** (***)
Kentucky	0 (0.0)	0 (0.0)	0 (0.0)	*** (***)	*** (***)
Louisiana	0 (0.1)	0 (0.0)	0 (0.0)	*** (***)	*** (***)
Maryland	0 (0.2)	0 (0.0)	0 (0.2)	1 (1.3)	*** (***)
Michigan	0 (0.1)	0 (0.0)	0 (0.0)	*** (***)	*** (** ;
Minnesota	**0 (0.1)**	**0 (0.0)**	**0 (0.0)**	**1 (1.3)**	***** (***)**
Montana	**0 (0.2)**	***** (***)**	**0 (0.0)**	***** (***)**	**0 (0.0)**
Nebraska	**0 (0.2)**	**0 (0.0)**	**0 (0.0)**	***** (***)**	***** (***)**
New Hampshire	**0 (0.2)**	***** (***)**	**0 (0.0)**	***** (***)**	***** (***)**
New Jersey	**0 (0.2)**	**0 (0.0)**	**0 (0.5)**	**1 (1.8)**	***** (***)**
New Mexico	0 (0.1)	*** (***)	0 (0.1)	*** (***)	0 (0.0)
New York	0 (0.2)	0 (0.0)	0 (0.0)	1 (1.1)!	*** (***)
North Carolina	0 (0.0)	0 (0.0)	0 (0.0)	*** (***)	0 (0.0)
North Dakota	1 (0.4)	*** (***)	0 (0.0)	*** (***)	0 (0.0)
Ohio	0 (0.1)	0 (0.0)	0 (0.0)	*** (***)	*** (***)
Oklahoma	**0 (0.1)**	**0 (0.0)**	**0 (0.0)**	***** (***)**	**0 (0.0)**
Oregon	**0 (0.1)**	***** (***)**	**0 (0.2)**	**0 (0.0)**	**0 (0.0)**
Pennsylvania	**0 (0.1)**	**0 (0.0)**	**0 (0.0)**	***** (***)**	***** (***)**
Rhode Island	**0 (0.1)**	**0 (0.0)**	**0 (0.0)**	***** (***)**	***** (***)**
Texas	**0 (0.1)**	**0 (0.0)**	**0 (0.0)**	***** (***)**	***** (***)**
Virginia	1 (0.3)	0 (0.2)	0 (0.0)	6 (4.0)	*** (***)
West Virginia	0 (0.0)	0 (0.0)	0 (0.0)	*** (***)	*** (***)
Wisconsin	0 (0.2)	0 (0.0)	0 (0.0)	*** (***)	*** (***)
Wyoming	0 (0.1)	*** (***)	0 (0.0)	*** (***)	0 (0.0)
TERRITORIES					
Guam	**0 (0.0)**	***** (***)**	**0 (0.0)**	**0 (0.1)**	***** (***)**
Virgin Islands	***** (***)**	**0 (0.0)**	**0 (0.0)**	***** (***)**	***** (***)**

TABLE 12.3 | **Average Proficiency in Mathematics Content Areas by Race/Ethnicity**

GRADE 8 PUBLIC SCHOOLS	Numbers and Operations				
	White	Black	Hispanic	Asian / Pacific Islander	American Indian
NATION	273 (1.6)	244 (3.1)	248 (2.7)	284 (5.9)!	249 (7.8)!
Northeast	275 (3.1)	250 (5.4)!	*** (***)	*** (***)	*** (***)
Southeast	268 (3.0)	242 (5.1)	*** (***)	*** (***)	*** (***)
Central	276 (2.9)	241 (6.5)!	*** (***)	*** (***)	*** (***)
West	271 (3.2)	250 (6.8)!	248 (3.5)	*** (***)	*** (***)
STATES					
Alabama	268 (1.2)	242 (1.9)	233 (4.1)	*** (***)	*** (***)
Arizona	275 (1.2)	250 (3.7)	248 (1.4)	*** (***)	237 (1.9)!
Arkansas	270 (0.9)	240 (1.3)	240 (3.9)	*** (***)	*** (***)
California	273 (1.5)	237 (3.4)	241 (1.8)	275 (2.8)	*** (***)
Colorado	276 (1.0)	242 (3.8)!	249 (1.8)	*** (***)	*** (***)
Connecticut	281 (0.9)	248 (2.6)	241 (2.7)	*** (***)	*** (***)
Delaware	272 (0.9)	249 (1.5)	247 (4.8)	*** (***)	*** (***)
District of Columbia	*** (***)	237 (0.8)	227 (2.1)	*** (***)	*** (***)
Florida	269 (1.3)	240 (1.8)	251 (2.4)	280 (5.1)	*** (***)
Georgia	273 (1.4)	247 (1.3)	238 (2.9)	*** (***)	*** (***)
Hawaii	268 (1.9)	*** (***)	238 (2.1)	257 (0.9)	*** (***)
Idaho	276 (0.7)	*** (***)	256 (2.8)	*** (***)	257 (5.7)
Illinois	275 (1.5)	242 (3.8)	241 (3.2)	283 (4.6)	*** (***)
Indiana	274 (1.1)	247 (2.7)	253 (3.8)	*** (***)	*** (***)
Iowa	284 (1.1)	*** (***)	262 (4.3)	*** (***)	*** (***)
Kentucky	263 (1.3)	247 (2.3)	235 (3.7)	*** (***)	*** (***)
Louisiana	263 (1.3)	240 (1.1)	232 (3.3)	*** (***)	*** (***)
Maryland	275 (1.4)	244 (2.0)	243 (2.2)	294 (3.7)	*** (***)
Michigan	274 (1.0)	237 (2.2)	251 (3.4)	*** (***)	*** (***)
Minnesota	282 (1.0)	242 (4.6)!	245 (4.7)	271 (5.0)	*** (***)
Montana	285 (1.0)	*** (***)	267 (3.1)	*** (***)	258 (2.8)
Nebraska	282 (1.0)	246 (5.3)	259 (3.9)	*** (***)	*** (***)
New Hampshire	275 (1.1)	*** (***)	257 (3.8)	*** (***)	*** (***)
New Jersey	282 (1.1)	248 (2.1)	251 (2.2)	301 (3.8)	*** (***)
New Mexico	273 (1.3)	*** (***)	250 (1.1)	*** (***)	238 (2.0)
New York	275 (1.2)	243 (2.7)	241 (2.6)	281 (4.6)!	*** (***)
North Carolina	264 (1.4)	240 (1.2)	225 (2.7)	*** (***)	242 (4.0)!
North Dakota	289 (1.1)	*** (***)	258 (4.9)	*** (***)	248 (3.2)!
Ohio	273 (1.0)	240 (1.6)	246 (3.9)	*** (***)	*** (***)
Oklahoma	272 (1.3)	243 (1.9)	252 (3.7)	*** (***)	260 (2.6)
Oregon	276 (1.0)	*** (***)	257 (2.6)	260 (5.4)	253 (3.4)
Pennsylvania	275 (1.0)	246 (3.4)	237 (3.1)	*** (***)	*** (***)
Rhode Island	269 (0.7)	232 (2.2)	235 (2.4)	*** (***)	*** (***)
Texas	275 (1.1)	244 (2.2)	249 (1.8)	*** (***)	*** (***)
Virginia	274 (1.6)	248 (1.6)	246 (3.8)	299 (3.3)	*** (***)
West Virginia	261 (0.9)	241 (5.2)	237 (3.3)	*** (***)	*** (***)
Wisconsin	282 (1.0)	244 (4.2)	256 (3.6)	*** (***)	*** (***)
Wyoming	277 (0.8)	*** (***)	257 (2.7)	*** (***)	262 (3.1)
TERRITORIES					
Guam	263 (3.7)	*** (***)	218 (1.8)	243 (0.7)	*** (***)
Virgin Islands	*** (***)	230 (0.8)	216 (1.2)	*** (***)	*** (***)

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Descriptions of the content area scales are found in Chapter Three. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 12.3 | **Average Proficiency in Mathematics Content Areas by Race/Ethnicity (continued)**

GRADE 8 PUBLIC SCHOOLS	Measurement				
	White	Black	Hispanic	Asian / Pacific Islander	American Indian
NATION	267 (2.0)	227 (3.6)	238 (3.4)	278 (6.3)!	247 (8.8)!
Northeast	272 (4.6)	233 (9.4)!	*** (***)	*** (***)	*** (***)
Southeast	258 (4.2)	222 (5.8)	*** (***)	*** (***)	*** (***)
Central	271 (3.7)	223 (3.5)!	*** (***)	*** (***)	*** (***)
West	267 (3.9)	240(10.7)!	239 (4.2)	*** (***)	*** (***)
STATES					
Alabama	260 (1.3)	224 (1.7)	212 (3.8)	*** (***)	*** (***)
Arizona	268 (1.6)	241 (4.8)	239 (2.0)	*** (***)	238 (3.3)!
Arkansas	264 (1.3)	222 (1.7)	227 (5.5)	*** (***)	*** (***)
California	269 (1.7)	219 (4.8)	232 (1.9)	265 (3.8)	*** (***)
Colorado	273 (1.4)	229 (4.4)!	243 (1.8)	*** (***)	*** (***)
Connecticut	277 (1.3)	232 (3.0)	234 (3.4)	*** (***)	*** (***)
Delaware	267 (1.1)	235 (2.7)	231 (4.8)	*** (***)	*** (***)
District of Columbia	*** (***)	219 (0.8)	215 (2.8)	*** (***)	*** (***)
Florida	263 (1.5)	223 (2.5)	242 (2.7)	268 (5.7)	*** (***)
Georgia	267 (1.7)	229 (1.9)	224 (4.3)	*** (***)	*** (***)
Hawaii	260 (2.4)	*** (***)	231 (2.4)	250 (1.0)	*** (***)
Idaho	273 (1.0)	*** (***)	246 (3.8)	*** (***)	251 (5.9)
Illinois	270 (1.7)	219 (4.8)	228 (3.7)	276 (7.7)	*** (***)
Indiana	268 (1.2)	232 (3.7)	243 (5.7)	*** (***)	*** (***)
Iowa	279 (1.5)	*** (***)	250 (5.2)	*** (***)	*** (***)
Kentucky	257 (1.5)	230 (2.3)	224 (5.5)	*** (***)	*** (***)
Louisiana	256 (1.5)	219 (1.8)	226 (3.9)	*** (***)	*** (***)
Maryland	271 (1.8)	228 (2.3)	230 (3.5)	292 (4.5)	*** (***)
Michigan	268 (1.2)	218 (1.9)	233 (4.4)	*** (***)	*** (***)
Minnesota	275 (1.1)	228 (7.8)!	228 (4.7)	252 (6.3)	*** (***)
Montana	283 (1.4)	*** (***)	257 (8.8)	*** (***)	253 (4.4)
Nebraska	279 (1.4)	224 (4.9)	244 (4.6)	*** (***)	*** (***)
New Hampshire	273 (1.3)	*** (***)	259 (5.0)	*** (***)	*** (***)
New Jersey	278 (1.8)	233 (3.1)	238 (2.8)	296 (5.1)	*** (***)
New Mexico	271 (1.4)	*** (***)	241 (1.2)	*** (***)	236 (2.8)
New York	270 (1.4)	222 (3.5)	231 (3.7)	274 (7.1)!	*** (***)
North Carolina	255 (1.6)	219 (1.4)	210 (3.6)	*** (***)	225 (8.2)!
North Dakota	284 (1.6)	*** (***)	239 (7.1)	*** (***)	234 (5.3)!
Ohio	265 (1.2)	226 (2.1)	226 (5.5)	*** (***)	*** (***)
Oklahoma	264 (1.6)	224 (2.8)	239 (5.2)	*** (***)	251 (3.2)
Oregon	272 (1.3)	*** (***)	245 (3.9)	274 (6.7)	249 (6.2)
Pennsylvania	272 (1.4)	231 (4.7)	219 (6.2)	*** (***)	*** (***)
Rhode Island	263 (0.9)	217 (4.1)	224 (3.0)	*** (***)	*** (***)
Texas	269 (1.5)	222 (2.8)	240 (2.0)	*** (***)	*** (***)
Virginia	268 (1.7)	232 (2.1)	241 (4.8)	292 (5.5)	*** (***)
West Virginia	254 (1.2)	230 (5.1)	226 (5.4)	*** (***)	*** (***)
Wisconsin	279 (1.4)	222 (5.5)	252 (5.9)	*** (***)	*** (***)
Wyoming	273 (0.9)	*** (***)	251 (3.6)	*** (***)	248 (4.1)
TERRITORIES					
Guam	254 (4.8)	*** (***)	207 (2.9)	229 (1.0)	*** (***)
Virgin Islands	*** (***)	218 (1.6)	208 (2.0)	*** (***)	*** (***)

285

TABLE 12.3 | **Average Proficiency in Mathematics Content Areas by Race/Ethnicity (continued)**

GRADE 8 PUBLIC SCHOOLS	Geometry				
	White	Black	Hispanic	Asian / Pacific Islander	American Indian
NATION	267 (1.5)	234 (2.8)	243 (3.2)	275 (5.9)!	248 (8.6)!
Northeast	272 (3.1)	243 (9.9)!	*** (***)	*** (***)	*** (***)
Southeast	259 (3.5)	228 (4.2)	*** (***)	*** (***)	*** (***)
Central	268 (3.0)	231 (4.2)!	*** (***)	*** (***)	*** (***)
West	267 (3.0)	249 (5.7)!	245 (4.4)	*** (***)	*** (***)
STATES					
Alabama	258 (1.3)	230 (1.8)	222 (4.3)	*** (***)	*** (***)
Arizona	266 (1.2)	248 (3.8)	240 (1.5)	*** (***)	241 (2.8)!
Arkansas	262 (1.2)	227 (1.6)	230 (4.3)	*** (***)	*** (***)
California	267 (1.7)	235 (3.0)	239 (1.8)	271 (2.7)	*** (***)
Colorado	271 (1.2)	237 (3.6)!	250 (1.8)	*** (***)	*** (***)
Connecticut	274 (1.0)	236 (2.5)	239 (2.8)	*** (***)	*** (***)
Delaware	263 (0.9)	240 (1.6)	242 (5.2)	*** (***)	*** (***)
District of Columbia	*** (***)	228 (0.8)	215 (2.9)	*** (***)	*** (***)
Florida	260 (1.2)	229 (1.9)	241 (2.9)	264 (4.4)	*** (***)
Georgia	269 (1.3)	237 (1.6)	232 (3.7)	*** (***)	*** (***)
Hawaii	262 (2.1)	*** (***)	232 (2.8)	254 (0.8)	*** (***)
Idaho	271 (0.8)	*** (***)	248 (3.1)	*** (***)	254 (5.1)
Illinois	265 (1.5)	230 (3.8)	235 (3.5)	274 (3.9)	*** (***)
Indiana	267 (1.0)	243 (1.8)	247 (4.3)	*** (***)	*** (***)
Iowa	276 (1.3)	*** (***)	255 (3.6)	*** (***)	*** (***)
Kentucky	256 (1.1)	237 (2.9)	224 (4.5)	*** (***)	*** (***)
Louisiana	254 (1.5)	225 (1.5)	228 (4.2)	*** (***)	*** (***)
Maryland	269 (1.5)	233 (1.9)	236 (3.2)	286 (4.9)	*** (***)
Michigan	268 (0.9)	232 (1.7)	243 (4.1)	*** (***)	*** (***)
Minnesota	275 (1.0)	235 (5.7)!	241 (3.6)	267 (4.9)	*** (***)
Montana	263 (0.9)	*** (***)	261 (3.1)	*** (***)	256 (3.1)
Nebraska	277 (1.1)	230 (5.2)	252 (4.2)	*** (***)	*** (***)
New Hampshire	272 (1.0)	*** (***)	255 (5.5)	*** (***)	*** (***)
New Jersey	275 (1.4)	239 (3.1)	245 (2.3)	296 (4.0)	*** (***)
New Mexico	269 (1.3)	*** (***)	248 (1.2)	*** (***)	248 (2.1)
New York	272 (1.3)	233 (3.0)	239 (2.3)	278 (6.8)!	*** (***)
North Carolina	259 (1.2)	233 (1.4)	222 (3.0)	*** (***)	236 (4.4)!
North Dakota	280 (1.3)	*** (***)	248 (6.0)	*** (***)	248 (3.4)!
Ohio	264 (1.1)	231 (1.8)	241 (3.9)	*** (***)	*** (***)
Oklahoma	264 (1.3)	233 (2.7)	245 (5.0)	*** (***)	254 (2.7)
Oregon	272 (0.9)	*** (***)	255 (3.5)	279 (3.6)	257 (3.9)
Pennsylvania	269 (1.0)	232 (3.5)	231 (4.0)	*** (***)	*** (***)
Rhode Island	261 (0.7)	223 (2.7)	228 (2.5)	*** (***)	*** (***)
Texas	272 (1.2)	234 (2.0)	247 (2.1)	*** (***)	*** (***)
Virginia	268 (1.6)	236 (1.4)	245 (4.0)	293 (4.0)	*** (***)
West Virginia	256 (0.9)	231 (4.2)	233 (3.8)	*** (***)	*** (***)
Wisconsin	277 (1.2)	235 (4.1)	252 (3.4)	*** (***)	*** (***)
Wyoming	272 (0.6)	*** (***)	254 (2.3)	*** (***)	258 (3.3)
TERRITORIES					
Guam	254 (3.3)	*** (***)	216 (1.9)	240 (1.1)	*** (***)
Virgin Islands	*** (***)	225 (0.9)	213 (1.8)	*** (***)	*** (***)

TABLE 12.3 | **Average Proficiency in Mathematics Content Areas by Race/Ethnicity (continued)**

GRADE 8 PUBLIC SCHOOLS	Data Analysis, Statistics, and Probability				
	White	Black	Hispanic	Asian / Pacific Islander	American Indian
NATION	272 (1.8)	231 (3.8)	239 (3.4)	282 (6.9)!	242 (5.2)!
Northeast	279 (3.1)	244 (8.2)!	*** (***)	*** (***)	*** (***)
Southeast	263 (3.4)	227 (6.5)	*** (***)	*** (***)	*** (***)
Central	273 (3.1)	225 (7.0)!	*** (***)	*** (***)	*** (***)
West	272 (4.4)	244 (8.7)!	240 (4.7)	*** (***)	*** (***)
STATES					
Alabama	264 (1.4)	226 (2.8)	219 (6.4)	*** (***)	*** (***)
Arizona	273 (1.4)	238 (4.5)	238 (1.7)	*** (***)	223 (2.7)!
Arkansas	265 (1.2)	220 (1.5)	230 (4.1)	*** (***)	*** (***)
California	274 (1.9)	231 (3.9)	230 (2.1)	286 (3.2)	*** (***)
Colorado	277 (1.1)	237 (4.1)!	247 (2.0)	*** (***)	*** (***)
Connecticut	281 (1.2)	244 (3.2)	223 (4.1)	*** (***)	*** (***)
Delaware	270 (1.0)	240 (2.1)	235 (4.5)	*** (***)	*** (***)
District of Columbia	*** (***)	220 (1.1)	208 (3.5)	*** (***)	*** (***)
Florida	267 (1.6)	223 (2.4)	244 (3.1)	268 (5.3)	*** (***)
Georgia	275 (1.6)	237 (1.6)	228 (4.4)	*** (***)	*** (***)
Hawaii	261 (2.3)	*** (***)	215 (3.3)	242 (1.1)	*** (***)
Idaho	277 (0.9)	*** (***)	246 (3.4)	*** (***)	252 (6.0)
Illinois	276 (1.8)	226 (4.2)	231 (4.5)	279 (5.7)	*** (***)
Indiana	273 (1.2)	239 (3.0)	243 (5.3)	*** (***)	*** (***)
Iowa	282 (1.3)	*** (***)	263 (5.0)	*** (***)	*** (***)
Kentucky	261 (1.4)	238 (2.8)	218 (2.7)	*** (***)	*** (***)
Louisiana	260 (1.8)	220 (2.0)	217 (4.1)	*** (***)	*** (***)
Maryland	275 (1.7)	234 (2.5)	238 (3.2)	288 (4.7)	*** (***)
Michigan	273 (1.2)	221 (1.9)	240 (4.1)	*** (***)	*** (***)
Minnesota	282 (0.8)	245 (5.8)!	240 (4.5)	261 (5.2)	*** (***)
Montana	265 (0.7)	*** (***)	268 (3.7)	*** (***)	258 (4.5)
Nebraska	263 (1.1)	236 (3.9)	251 (4.2)	*** (***)	*** (***)
New Hampshire	277 (1.0)	*** (***)	243 (6.1)	*** (***)	*** (***)
New Jersey	283 (1.1)	236 (2.9)	236 (3.3)	295 (4.2)	*** (***)
New Mexico	273 (1.4)	*** (***)	242 (1.4)	*** (***)	226 (2.2)
New York	279 (1.4)	234 (3.7)	232 (4.0)	285 (7.5)!	*** (***)
North Carolina	262 (1.8)	224 (1.9)	210 (4.2)	*** (***)	226 (5.4)!
North Dakota	289 (1.1)	*** (***)	263 (7.0)	*** (***)	242 (5.5)!
Ohio	272 (1.3)	227 (2.3)	235 (4.5)	*** (***)	*** (***)
Oklahoma	271 (1.5)	233 (3.5)	244 (4.9)	*** (***)	252 (3.3)
Oregon	277 (1.2)	*** (***)	251 (3.8)	278 (5.0)	258 (4.7)
Pennsylvania	274 (1.2)	234 (4.1)	228 (4.0)	*** (***)	*** (***)
Rhode Island	265 (0.8)	211 (4.3)	217 (3.7)	*** (***)	*** (***)
Texas	275 (1.7)	227 (2.3)	240 (2.2)	*** (***)	*** (***)
Virginia	273 (1.8)	237 (1.5)	234 (4.5)	295 (4.6)	*** (***)
West Virginia	258 (1.1)	230 (5.4)	227 (5.1)	*** (***)	*** (***)
Wisconsin	283 (1.2)	237 (8.2)	252 (3.7)	*** (***)	*** (***)
Wyoming	276 (0.7)	*** (***)	257 (2.9)	*** (***)	260 (4.0)
TERRITORIES					
Guam	246 (8.7)	*** (***)	182 (2.1)	218 (1.1)	*** (***)
Virgin Islands	*** (***)	200 (1.5)	181 (2.7)	*** (***)	*** (***)

297

TABLE 12.3 | **Average Proficiency in Mathematics Content Areas by Race/Ethnicity (continued)**

GRADE 8 PUBLIC SCHOOLS	Algebra and Functions				
	White	Black	Hispanic	Asian / Pacific Islander	American Indian
NATION	268 (1.4)	237 (2.7)	243 (3.1)	278 (6.7)!	242 (4.9)!
Northeast	271 (3.0)	242 (9.2)!	*** (***)	*** (***)	*** (***)
Southeast	264 (3.4)	235 (4.5)	*** (***)	*** (***)	*** (***)
Central	269 (2.3)	231 (1.9)!	*** (***)	*** (***)	*** (***)
West	267 (2.8)	248 (7.4)!	243 (4.0)	*** (***)	*** (***)
STATES					
Alabama	261 (1.2)	233 (2.1)	230 (4.5)	*** (***)	*** (***)
Arizona	269 (1.2)	247 (3.3)	241 (1.9)	*** (***)	232 (2.1)!
Arkansas	261 (1.2)	231 (1.8)	225 (4.0)	*** (***)	*** (***)
California	270 (1.5)	236 (3.5)	236 (1.5)	274 (2.8)	*** (***)
Colorado	273 (1.1)	237 (3.9)!	242 (1.8)	*** (***)	*** (***)
Connecticut	275 (1.0)	242 (2.6)	238 (3.2)	*** (***)	*** (***)
Delaware	267 (1.2)	240 (1.9)	244 (4.2)	*** (***)	*** (***)
District of Columbia	*** (***)	234 (1.0)	222 (3.3)	*** (***)	*** (***)
Florida	264 (1.4)	232 (2.1)	247 (2.5)	279 (4.7)	*** (***)
Georgia	269 (1.7)	240 (1.6)	231 (3.7)	*** (***)	*** (***)
Hawaii	257 (2.0)	*** (***)	228 (2.8)	250 (1.0)	*** (***)
Idaho	272 (0.9)	*** (***)	244 (2.9)	*** (***)	252 (5.4)
Illinois	270 (1.5)	235 (3.8)	237 (4.2)	279 (4.3)	*** (***)
Indiana	269 (1.1)	237 (2.9)	241 (5.1)	*** (***)	*** (***)
Iowa	276 (1.2)	*** (***)	252 (4.2)	*** (***)	*** (***)
Kentucky	259 (1.2)	242 (2.9)	229 (3.1)	*** (***)	*** (***)
Louisiana	257 (1.5)	230 (1.7)	223 (4.3)	*** (***)	*** (***)
Maryland	274 (1.8)	241 (2.1)	240 (3.1)	296 (4.2)	*** (***)
Michigan	271 (1.0)	233 (1.9)	243 (3.7)	*** (***)	*** (***)
Minnesota	276 (0.9)	240 (6.0)!	239 (4.2)	270 (6.2)	*** (***)
Montana	281 (0.9)	*** (***)	260 (3.6)	*** (***)	255 (4.4)
Nebraska	276 (1.2)	234 (5.0)	253 (3.4)	*** (***)	*** (***)
New Hampshire	272 (1.0)	*** (***)	252 (5.9)	*** (***)	*** (***)
New Jersey	278 (1.2)	241 (2.8)	243 (2.6)	295 (3.8)	*** (***)
New Mexico	272 (1.6)	*** (***)	248 (1.2)	*** (***)	235 (1.8)
New York	271 (1.2)	242 (2.3)	238 (2.8)	278 (4.1)!	*** (***)
North Carolina	262 (1.3)	233 (1.2)	222 (3.4)	*** (***)	237 (4.4)!
North Dakota	278 (0.9)	*** (***)	243 (5.7)	*** (***)	234 (4.7)!
Ohio	267 (1.0)	235 (1.8)	238 (3.7)	*** (***)	*** (***)
Oklahoma	267 (1.1)	239 (2.5)	245 (4.1)	*** (***)	255 (3.3)
Oregon	272 (1.1)	*** (***)	252 (3.5)	275 (4.5)	256 (4.9)
Pennsylvania	270 (1.2)	239 (3.7)	226 (3.9)	*** (***)	*** (***)
Rhode Island	266 (0.9)	233 (4.0)	229 (3.7)	*** (***)	*** (***)
Texas	272 (1.4)	236 (2.1)	242 (2.1)	*** (***)	*** (***)
Virginia	271 (1.5)	245 (1.9)	248 (4.6)	299 (4.5)	*** (***)
West Virginia	256 (1.0)	230 (4.2)	228 (3.3)	*** (***)	*** (***)
Wisconsin	275 (1.2)	237 (3.5)	244 (3.8)	*** (***)	*** (***)
Wyoming	273 (0.8)	*** (***)	250 (2.6)	*** (***)	252 (4.4)
TERRITORIES					
Guam	254 (3.7)	*** (***)	208 (2.0)	234 (0.9)	*** (***)
Virgin Islands	*** (***)	220 (0.9)	212 (2.0)	*** (***)	*** (***)

TABLE 12.4 | **Average Mathematics Proficiency by Type of Community**

GRADE 8 PUBLIC SCHOOLS	Advantaged Urban		Disadvantaged Urban		Extreme Rural		Other	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	10 (3.3)	281 (3.8)!	10 (2.8)	249 (3.5)!	10 (3.0)	256 (4.1)!	70 (4.4)	261 (1.8)
Northeast	23 (7.3)	278 (8.0)!	8 (5.7)	244(10.9)!	14(10.3)	*** (***)	55(11.2)	272 (3.8)
Southeast	0 (0.0)	0 (0.0)	2 (2.3)	*** (***)	9 (5.3)	248(13.9)!	89 (5.8)	253 (3.0)
Central	3 (3.1)	*** (***)	10 (4.3)	236 (3.8)!	8 (6.0)	*** (***)	79 (7.7)	268 (3.4)
West	14 (8.5)	282 (3.1)!	19 (7.5)	256 (5.8)!	10 (3.8)	253 (7.3)!	58(10.1)	259 (3.6)
STATES								
Alabama	10 (2.8)	288 (4.7)!	12 (3.0)	245 (3.4)!	12 (3.5)	245 (3.5)!	66 (5.3)	252 (1.8)
Arizona	18 (2.7)	275 (1.9)!	18 (4.0)	248 (3.6)!	8 (3.0)	246 (5.3)!	63 (4.7)	259 (2.0)
Arkansas	5 (2.1)	270 (5.0)!	6 (2.1)	230 (5.5)!	24 (3.3)	255 (1.9)	65 (4.4)	257 (1.1)
California	18 (4.5)	278 (3.5)!	18 (4.5)	242 (4.1)!	0 (0.0)	0 (0.0)	65 (5.9)	258 (1.8)
Colorado	29 (3.9)	280 (1.7)	6 (2.4)	248 (4.4)!	15 (3.0)	266 (2.6)	50 (4.9)	265 (1.7)
Connecticut	33 (3.4)	286 (1.5)	14 (2.4)	237 (3.0)	0 (0.0)	0 (0.0)	53 (3.7)	269 (1.2)
Delaware	8 (0.1)	284 (1.0)	0 (0.0)	0 (0.0)	21 (0.2)	259 (1.5)	71 (0.2)	259 (0.9)
District of Columbia	17 (0.2)	258 (2.5)	67 (0.2)	224 (0.8)	0 (0.0)	0 (0.0)	17 (0.1)	233 (2.1)
Florida	15 (3.7)	271 (1.9)!	18 (3.2)	240 (2.2)	8 (1.9)	249 (2.7)!	59 (4.6)	256 (2.1)
Georgia	14 (3.4)	288 (2.2)!	8 (2.5)	245 (4.8)!	18 (3.3)	252 (2.6)	60 (5.0)	256 (1.6)
Hawaii	10 (0.1)	269 (2.4)	16 (0.2)	234 (1.6)	0 (0.0)	0 (0.0)	74 (0.2)	253 (0.6)
Idaho	4 (0.1)	*** (***)	3 (0.1)	*** (***)	27 (1.9)	269 (1.1)	67 (1.8)	272 (1.0)
Illinois	21 (3.7)	281 (2.6)	21 (3.2)	236 (5.0)	14 (3.3)	264 (3.8)!	43 (5.1)	263 (2.2)
Indiana	13 (3.5)	280 (4.1)!	8 (3.0)	244 (5.3)!	17 (2.5)	268 (2.5)	62 (5.3)	266 (1.3)
Iowa	6 (2.1)	296 (5.2)!	4 (2.3)	259 (1.8)!	37 (3.9)	279 (1.4)	53 (4.8)	277 (1.7)
Kentucky	7 (2.2)	268 (2.9)!	10 (2.8)	246 (3.1)!	33 (3.9)	253 (1.5)	49 (5.0)	259 (1.5)
Louisiana	8 (3.1)	267 (3.6)!	23 (4.1)	235 (3.9)	14 (3.3)	236 (2.9)!	54 (5.8)	250 (1.8)
Maryland	28 (4.0)	277 (3.8)	18 (3.4)	232 (3.8)	4 (1.6)	255 (2.5)!	50 (4.4)	261 (2.3)
Michigan	17 (3.7)	282 (2.2)!	13 (3.4)	235 (3.5)!	13 (2.5)	267 (2.4)	56 (4.8)	267 (1.7)
Minnesota	24 (3.3)	277 (1.7)	0 (0.0)	0 (0.0)	29 (4.6)	276 (1.6)	47 (5.3)	279 (1.3)
Montana	2 (0.1)	*** (***)	0 (0.0)	0 (0.0)	31 (2.8)	277 (1.7)	66 (2.8)	282 (0.8)
Nebraska	9 (0.8)	286 (2.8)	4 (0.1)	*** (***)	39 (3.1)	278 (1.9)	49 (2.9)	272 (1.2)
New Hampshire	8 (0.5)	280 (3.6)	0 (0.0)	0 (0.0)	3 (0.6)	276 (5.1)	89 (0.8)	274 (0.8)
New Jersey	30 (4.5)	288 (2.8)	18 (2.5)	237 (2.5)	0 (0.0)	0 (0.0)	52 (4.8)	270 (1.7)
New Mexico	5 (0.1)	285 (3.5)	7 (0.1)	256 (2.9)	18 (0.9)	253 (1.8)	70 (0.9)	255 (0.9)
New York	15 (3.6)	281 (2.2)!	29 (4.6)	238 (2.4)	3 (1.2)	274 (1.8)!	53 (5.4)	270 (1.5)
North Carolina	4 (2.2)	269 (6.5)!	4 (1.8)	242(10.7)!	17 (3.3)	243 (2.3)	75 (4.3)	251 (1.1)
North Dakota	9 (0.4)	285 (1.8)	3 (0.4)	*** (***)	37 (2.5)	280 (2.5)	50 (2.3)	282 (1.2)
Ohio	14 (3.3)	280 (2.5)!	13 (1.7)	241 (3.8)	10 (2.2)	267 (2.5)!	63 (4.2)	264 (1.2)
Oklahoma	11 (2.9)	280 (2.8)!	9 (2.9)	250 (2.7)!	22 (3.5)	256 (3.2)	59 (5.2)	265 (1.4)
Oregon	10 (2.6)	280 (2.8)!	8 (2.7)	260 (2.3)!	13 (3.1)	269 (4.5)!	68 (4.1)	271 (1.2)
Pennsylvania	12 (2.4)	288 (2.7)	14 (3.3)	244 (6.0)!	7 (2.7)	268 (2.8)!	67 (4.3)	268 (1.4)
Rhode Island	19 (0.4)	277 (1.7)	17 (1.7)	244 (2.1)	0 (0.0)	0 (0.0)	63 (1.4)	259 (0.7)
Texas	15 (3.4)	276 (2.4)!	17 (3.8)	245 (2.3)!	9 (2.8)	262 (3.3)!	59 (5.3)	257 (1.9)
Virginia	25 (3.9)	283 (3.8)	4 (1.3)	244 (4.2)!	11 (1.7)	247 (2.7)	60 (4.3)	261 (1.7)
West Virginia	0 (0.0)	0 (0.0)	11 (2.7)	258 (2.2)!	19 (4.0)	255 (1.0)!	70 (4.8)	255 (1.2)
Wisconsin	7 (2.4)	290 (3.2)!	10 (2.2)	241 (3.8)!	24 (3.2)	278 (1.3)	60 (4.1)	277 (1.3)
Wyoming	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	27 (0.8)	276 (1.1)	73 (0.8)	273 (0.8)
TERRITORIES								
Guam	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	26 (0.1)	234 (1.3)	74 (0.1)	230 (0.7)
Virgin Islands	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	19 (0.2)	207 (0.9)	81 (0.2)	220 (0.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 12.5 | **Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Type of Community**

GRADE 8 PUBLIC SCHOOLS	Level 200				Level 250			
	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other
NATION	100 (0.0)	95 (1.5)!	97 (2.8)!	97 (1.0)	83 (4.6)!	48 (5.0)!	58 (6.2)!	64 (2.3)
Northeast	100 (0.0)	93 (2.7)!	*** (***)	99 (0.8)	82 (9.5)!	39(11.9)!	*** (***)	76 (4.4)
Southeast	0 (0.0)	*** (***)	90(13.5)!	94 (2.2)	0 (0.0)	*** (***)	48(17.4)!	53 (3.9)
Central	*** (***)	92 (3.0)!	*** (***)	99 (0.9)	*** (***)	31 (8.7)!	*** (***)	73 (4.2)
West	100 (0.0)	96 (2.0)!	98 (1.3)!	96 (1.7)	83 (3.3)!	57 (8.0)!	52(12.8)!	62 (5.0)
STATES								
Alabama	99 (0.6)!	93 (1.7)!	93 (2.3)!	96 ([illegible])	67 (5.9)!	42 (5.7)!	43 (5.2)!	53 (2.6)
Arizona	99 (0.4)!	95 (1.7)!	95 (3.0)!	97 (0.7)	80 (2.3)!	46 (5.7)!	45 (8.3)!	61 (3.0)
Arkansas	98 (1.1)!	91 (4.1)!	98 (0.7)	97 (0.5)	73 (4.0)!	34 (8.4)!	57 (3.5)	59 (2.0)
California	100 (0.4)!	92 (2.7)!	0 (0.0)	96 (0.9)	80 (3.5)!	37 (6.5)!	0 (0.0)	56 (2.4)
Colorado	100 (0.2)	97 (2.3)!	99 (0.5)	99 (0.5)	85 (2.2)	47 (4.7)!	73 (5.2)	70 (2.6)
Connecticut	100 (0.1)	91 (2.5)	0 (0.0)	99 (0.5)	89 (1.9)	32 (4.5)	0 (0.0)	74 (1.6)
Delaware	99 (0.9)	0 (0.0)	98 (0.5)	97 (0.6)	82 (5.0)	0 (0.0)	60 (2.9)	58 (1.4)
District of Columbia	98 (1.0)	82 (1.3)	0 (0.0)	90 (2.2)	54 (2.1)	16 (1.2)	0 (0.0)	25 (4.0)
Florida	99 (0.7)!	92 (1.5)	96 (1.5)!	96 (1.1)	75 (2.8)!	33 (3.4)	48 (3.7)!	56 (2.6)
Georgia	100 (0.3)!	95 (3.2)!	94 (1.9)	96 (0.7)	83 (2.1)!	43 (5.4)!	51 (3.1)	57 (2.5)
Hawaii	98 (1.0)	85 (2.5)	0 (0.0)	94 (0.8)	66 (2.0)	[illegible] (2.7)	0 (0.0)	51 (1.3)
Idaho	*** (***)	*** (***)	100 (0.2)	99 (0.3)	*** (***)	*** (***)	77 (1.9)	80 (1.3)
Illinois	100 (0.5)	86 (3.6)	99 (1.0)!	98 (0.7)	85 (3.0)	34 (6.3)	70 (5.3)!	68 (3.1)
Indiana	99 (0.4)!	96 (3.9)!	99 (0.6)	99 (0.3)	84 (3.5)!	39 (8.1)!	71 (4.5)	73 (2.0)
Iowa	100 (0.0)	98 (1.0)!	100 (0.1)	100 (0.2)	95 (2.6)!	59 (6.5)!	86 (1.7)	84 (2.0)
Kentucky	99 (0.8)!	96 (1.5)!	98 (0.9)	98 (0.5)	69 (5.0)!	42 (3.3)!	54 (2.7)	60 (2.1)
Louisiana	96 (1.3)!	88 (3.0)	91 (2.5)!	97 (0.8)	71 (4.9)!	29 (5.6)	29 (4.3)!	48 (2.7)
Maryland	99 (0.7)	88 (2.9)	95 (2.4)!	96 (0.8)	77 (4.2)	26 (5.5)	55 (4.6)!	63 (3.1)
Michigan	100 (0.1)!	91 (3.2)!	99 (0.4)	99 (0.5)	88 (2.1)!	27 (6.4)!	73 (3.3)	72 (2.5)
Minnesota	99 (0.6)	0 (0.0)	100 (0.3)	100 (0.2)	82 (1.8)	0 (0.0)	84 (1.9)	85 (1.7)
Montana	*** (***)	0 (0.0)	100 (0.3)	100 (0.1)	*** (***)	0 (0.0)	86 (2.4)	89 (0.9)
Nebraska	100 (0.6)	*** (***)	100 (0.1)	98 (0.5)	90 (4.3)	*** (***)	86 (2.5)	77 (1.8)
New Hampshire	100 (0.0)	0 (0.0)	100 (0.9)	100 (0.2)	83 (4.2)	0 (0.0)	81 (5.2)	80 (1.2)
New Jersey	100 (0.2)	93 (1.7)	0 (0.0)	99 (0.4)	88 (2.1)	30 (4.5)	0 (0.0)	74 (2.5)
New Mexico	100 (0.0)	97 (1.2)	97 (1.0)	97 (0.6)	92 (4.8)	58 (6.4)	54 (3.6)	54 (1.5)
New York	100 (0.0)	90 (2.0)	100 (0.0)	98 (0.5)	85 (2.7)!	31 (3.6)	80 (6.1)!	75 (2.1)
North Carolina	95 (2.4)!	89 (8.3)!	92 (1.2)	95 (0.6)	70 (9.4)!	40(14.8)!	41 (3.7)	50 (1.6)
North Dakota	100 (0.0)	*** (***)	99 (0.5)	100 (0.2)	93 (3.2)	*** (***)	86 (3.2)	90 (1.5)
Ohio	100 (0.5)!	92 (2.3)	99 (0.7)!	99 (0.3)	87 (2.9)!	35 (5.1)	74 (4.7)!	67 (1.8)
Oklahoma	100 (0.3)!	97 (2.0)!	97 (1.6)	99 (0.4)	90 (2.7)!	49 (4.7)!	60 (4.8)	69 (2.1)
Oregon	100 (0.2)!	99 (1.3)!	99 (1.0)!	99 (0.2)	84 (3.4)!	63 (4.0)!	72 (5.3)!	76 (1.8)
Pennsylvania	100 (0.0)	91 (2.6)!	100 (0.9)!	99 (0.3)	92 (2.2)	39 (8.5)!	74 (4.1)!	72 (2.1)
Rhode Island	99 (0.3)	90 (2.3)	0 (0.0)	96 (0.3)	79 (1.7)	42 (4.5)	0 (0.0)	60 (1.1)
Texas	100 (0.0)	96 (1.2)!	99 (1.4)!	97 (1.0)	82 (2.9)!	38 (3.4)!	65 (5.1)!	58 (2.4)
Virginia	100 (0.4)	95 (3.3)!	94 (1.9)	98 (0.5)	83 (2.6)	40 (5.5)!	44 (2.8)	61 (2.3)
West Virginia	0 (0.0)	99 (0.7)!	98 (1.0)!	98 (0.5)	0 (0.0)	62 (4.7)!	58 (2.2)!	55 (1.9)
Wisconsin	100 (0.0)	91 (3.0)!	100 (0.0)	100 (0.2)	92 (2.8)!	37 (5.8)!	90 (1.8)	82 (1.6)
Wyoming	0 (0.0)	0 (0.0)	100 (0.2)	100 (0.2)	0 (0.0)	0 (0.0)	84 (1.7)	81 (1.4)
TERRITORIES								
Guam	0 (0.0)	0 (0.0)	82 (2.1)	81 (1.2)	0 (0.0)	0 (0.0)	31 (1.7)	27 (1.1)
Virgin Islands	0 (0.0)	0 (0.0)	81 (3.4)	79 (1.7)	0 (0.0)	0 (0.0)	4 (0.9)	12 (1.0)

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent. Descriptions of mathematics proficiency at the four anchor levels are found in Chapter One. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 12.5 | **Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Type of Community (continued)**

GRADE 8 PUBLIC SCHOOLS	Level 300				Level 350			
	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other
NATION	26 (4.8)!	7 (2.1)!	6 (2.3)!	12 (1.2)	1 (1.3)!	0 (0.3)!	0 (0.0)	0 (0.1)
Northeast	22 (8.7)!	6 (4.9)!	*** (***)	18 (2.6)	0 (0.9)!	0 (0.0)	*** (***)	0 (0.6)
Southeast	0 (0.0)	*** (***)	4 (4.2)!	9 (1.9)	0 (0.0)	*** (***)	0 (0.0)	0 (0.0)
Central	*** (***)	1 (1.0)!	*** (***)	13 (2.9)	*** (***)	0 (0.0)	*** (***)	0 (0.3)
West	31 (3.1)!	9 (3.5)!	6 (4.8)!	10 (1.8)	2 (3.5)!	0 (0.6)!	0 (0.0)	0 (0.0)
STATES								
Alabama	19 (3.6)!	6 (1.6)!	3 (1.3)!	6 (0.7)	0 (0.3)!	0 (0.0)	0 (0.0)	0 (0.1)
Arizona	18 (3.5)!	4 (1.8)!	3 (1.7)!	9 (1.4)	0 (0.2)!	0 (0.5)!	0 (0.0)	0 (0.1)
Arkansas	19 (4.5)!	2 (0.9)!	4 (1.2)	8 (1.0)	0 (0.4)!	0 (0.0)	0 (0.0)	0 (0.0)
California	25 (3.9)!	4 (1.6)!	0 (0.0)	9 (1.2)	1 (0.4)!	0 (0.0)	0 (0.0)	0 (0.1)
Colorado	24 (1.8)	3 (3.2)!	10 (2.6)	12 (1.1)	0 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)
Connecticut	31 (2.0)	2 (1.0)	0 (0.0)	15 (1.2)	1 (0.2)	0 (0.0)	0 (0.0)	0 (0.1)
Delaware	36 (3.2)	0 (0.0)	8 (1.8)	12 (1.2)	2 (1.4)	0 (0.0)	0 (0.0)	0 (0.2)
District of Columbia	12 (2.7)	1 (0.4)	0 (0.0)	1 (0.8)	1 (0.9)	0 (0.0)	0 (0.0)	0 (0.4)
Florida	18 (2.5)!	3 (1.1)	6 (2.6)!	11 (1.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.1)
Georgia	34 (4.1)!	2 (1.7)!	8 (1.8)	9 (1.1)	1 (0.7)!	0 (0.0)	0 (0.2)	0 (0.1)
Hawaii	23 (3.5)	2 (0.7)	0 (0.0)	11 (0.8)	0 (0.8)	0 (0.0)	0 (0.0)	0 (0.2)
Idaho	*** (***)	*** (***)	11 (1.1)	16 (1.1)	*** (***)	*** (***)	0 (0.0)	0 (0.1)
Illinois	28 (3.0)	2 (1.0)	10 (2.3)!	10 (1.8)	1 (0.4)	0 (0.0)	0 (0.0)	0 (0.2)
Indiana	25 (5.5)!	2 (1.1)!	12 (2.4)	14 (1.3)	1 (0.7)!	0 (0.0)	0 (0.1)	0 (0.1)
Iowa	43 (8.6)!	10 (2.8)!	19 (2.1)	21 (2.1)	3 (2.1)!	0 (0.0)	0 (0.2)	0 (0.2)
Kentucky	16 (2.4)!	5 (2.2)!	5 (1.1)	9 (1.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.1)
Louisiana	14 (2.8)!	2 (0.8)	1 (0.4)!	4 (0.8)	0 (0.5)!	0 (0.0)	0 (0.0)	0 (0.0)
Maryland	27 (3.2)	2 (1.2)	7 (3.8)!	13 (1.8)	1 (0.5)	0 (0.0)	0 (0.5)!	0 (0.1)
Michigan	27 (3.3)!	1 (0.7)!	12 (3.8)	13 (1.5)	0 (0.3)!	0 (0.0)	0 (0.2)	0 (0.0)
Minnesota	22 (2.3)	0 (0.0)	18 (2.1)	23 (1.9)	0 (0.3)	0 (0.0)	0 (0.4)	0 (0.2)
Montana	*** (***)	0 (0.0)	18 (1.7)	26 (1.7)	*** (***)	0 (0.0)	0 (0.1)	0 (0.2)
Nebraska	31 (3.2)	*** (***)	21 (2.9)	18 (1.4)	0 (0.3)	*** (***)	0 (0.3)	0 (0.3)
New Hampshire	27 (3.3)	0 (0.0)	24 (7.8)	17 (1.1)	1 (0.8)	0 (0.0)	0 (0.0)	0 (0.2)
New Jersey	33 (4.7)	1 (0.5)	0 (0.0)	16 (1.7)	1 (0.5)	0 (0.0)	0 (0.0)	0 (0.1)
New Mexico	31(12.6)	7 (2.7)	3 (0.9)	8 (0.8)	0 (0.0)	0 (0.0)	0 (0.2)	0 (0.1)
New York	25 (3.1)!	6 (2.3)	22 (4.0)!	14 (1.4)	1 (0.3)!	0 (0.1)	0 (0.0)	0 (0.2)
North Carolina	22 (4.5)!	7 (4.0)!	3 (1.4)	7 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
North Dakota	30 (5.6)	*** (***)	24 (3.0)	24 (2.3)	1 (1.4)	*** (***)	0 (0.2)	1 (0.7)
Ohio	22 (2.8)!	5 (1.7)	10 (2.0)!	12 (1.2)	0 (0.3)!	0 (0.0)	0 (0.2)!	0 (0.1)
Oklahoma	20 (3.8)!	3 (1.9)!	5 (2.4)	11 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.1)
Oregon	28 (3.6)!	8 (2.5)!	19 (4.7)!	17 (1.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.1)
Pennsylvania	34 (4.2)	6 (2.5)!	13 (2.4)!	13 (1.4)	1 (0.5)	0 (0.0)	0 (0.0)	0 (0.1)
Rhode Island	24 (2.2)	6 (1.7)	0 (0.0)	10 (1.1)	1 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)
Texas	20 (3.3)!	6 (1.3)!	10 (2.5)!	9 (1.1)	0 (0.3)!	0 (0.0)	0 (0.0)	0 (0.1)
Virginia	30 (4.9)	4 (2.0)!	6 (1.7)	12 (1.5)	2 (1.3)	0 (0.0)	0 (0.0)	0 (0.1)
West Virginia	0 (0.0)	5 (1.3)!	5 (0.9)!	8 (0.9)	0 (0.0)	0 (0.2)!	0 (0.0)	0 (0.0)
Wisconsin	34 (7.5)!	3 (1.8)!	18 (1.8)	22 (1.9)	2 (1.4)!	0 (0.2)!	0 (0.0)	0 (0.2)
Wyoming	0 (0.0)	0 (0.0)	17 (1.7)	15 (0.9)	0 (0.0)	0 (0.0)	0 (0.1)	0 (0.1)
TERRITORIES								
Guam	0 (0.0)	0 (0.0)	4 (1.0)	2 (0.4)	0 (0.0)	0 (0.0)	0 (0.1)	0 (0.1)
Virgin Islands	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

TABLE 12.6 | **Average Proficiency in Mathematics Content Areas by Type of Community**

GRADE 8 PUBLIC SCHOOLS	Numbers and Operations				Measurement			
	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other
NATION	283 (3.2)!	255 (3.1)!	258 (4.3)!	266 (1.9)	281 (3.2)!	242 (4.9)!	254 (4.2)!	257 (2.4)
Northeast	282 (6.5)!	251 (7.2)!	*** (***)	274 (3.7)	279 (6.8)!	236(13.6)!	*** (***)	268 (6.5)
Southeast	0 (0.0)	*** (***)	254 (9.8)!	259 (3.3)	0 (0.0)	*** (***)	241(17.1)!	246 (4.0)
Central	*** (***)	245 (2.2)!	*** (***)	273 (3.5)	*** (***)	228 (5.9)!	*** (***)	266 (4.3)
West	284 (3.6)!	260 (5.4)!	254 (8.6)!	262 (3.5)	283 (2.7)!	250 (8.9)!	254 (4.6)!	255 (4.2)
STATES								
Alabama	273 (4.9)!	253 (3.2)!	252 (3.0)!	258 (1.8)	264 (5.1)!	234 (4.4)!	240 (4.7)!	248 (2.1)
Arizona	279 (2.4)!	252 (3.4)!	249 (5.8)!	264 (2.0)	276 (3.8)!	248 (3.9)!	246 (4.5)!	258 (2.2)
Arkansas	275 (4.0)!	248 (5.0)!	261 (1.8)	263 (1.0)	267 (5.7)!	234 (8.5)!	254 (3.2)	255 (1.5)
California	279 (4.0)!	246 (4.4)!	0 (0.0)	259 (1.8)	275 (3.6)!	237 (4.4)!	0 (0.0)	252 (2.1)
Colorado	281 (1.8)	250 (4.8)!	269 (2.4)	267 (1.7)	278 (2.5)	245 (5.2)!	263 (2.9)	264 (2.0)
Connecticut	288 (1.5)	242 (3.6)	0 (0.0)	273 (1.3)	286 (2.3)	231 (3.8)	0 (0.0)	268 (2.1)
Delaware	287 (1.9)	0 (0.0)	264 (1.8)	263 (1.0)	286 (3.0)	0 (0.0)	258 (2.2)	254 (1.1)
District of Columbia	262 (2.5)	233 (0.8)	0 (0.0)	240 (2.2)	248 (3.8)	214 (1.0)	0 (0.0)	224 (2.4)
Florida	274 (1.7)!	247 (2.5)	254 (2.8)!	261 (1.9)	257 (2.8)!	235 (3.0)	250 (2.7)!	252 (2.5)
Georgia	267 (2.5)!	251 (4.8)!	257 (2.5)	260 (1.5)	260 (3.6)!	236 (5.1)!	246 (2.7)	250 (2.0)
Hawaii	274 (3.4)	241 (2.1)	0 (0.0)	258 (1.1)	263 (2.3)	230 (2.3)	0 (0.0)	252 (1.1)
Idaho	*** (***)	*** (***)	272 (1.1)	275 (1.2)	*** (***)	*** (***)	267 (1.8)	270 (1.3)
Illinois	285 (2.9)	244 (5.0)	269 (3.5)!	266 (2.2)	279 (3.9)	225 (5.4)	264 (4.3)!	260 (2.8)
Indiana	282 (4.4)!	249 (5.2)!	270 (2.8)	272 (1.4)	279 (5.0)!	240 (6.0)!	262 (3.2)	264 (1.7)
Iowa	298 (5.9)!	267 (3.2)!	283 (1.5)	281 (1.8)	303 (5.9)!	252 (3.0)!	277 (2.5)	276 (2.3)
Kentucky	270 (3.1)!	252 (2.8)!	257 (2.0)	263 (1.6)	263 (3.4)!	241 (3.9)!	250 (2.3)	255 (1.8)
Louisiana	270 (3.9)!	245 (3.2)	245 (2.9)!	255 (1.7)	265 (4.1)!	227 (4.9)	231 (3.7)!	246 (2.1)
Maryland	278 (3.6)	240 (3.7)	259 (3.8)!	264 (2.1)	274 (4.3)	221 (4.9)	255 (5.4)!	257 (2.9)
Michigan	286 (2.0)!	241 (3.8)!	270 (2.7)	271 (1.8)	281 (3.0)!	225 (4.4)!	264 (3.3)	263 (2.1)
Minnesota	280 (1.9)	0 (0.0)	280 (2.1)	282 (1.4)	272 (2.1)	0 (0.0)	272 (2.2)	275 (1.7)
Montana	*** (***)	0 (0.0)	280 (1.7)	283 (1.1)	*** (***)	0 (0.0)	275 (2.3)	282 (1.7)
Nebraska	288 (4.0)	*** (***)	282 (1.8)	275 (1.2)	281 (3.8)	*** (***)	278 (3.0)	270 (1.8)
New Hampshire	280 (4.0)	0 (0.0)	278 (5.2)	275 (1.1)	269 (5.6)	0 (0.0)	276 (7.0)	273 (1.4)
New Jersey	269 (2.3)	246 (2.2)	0 (0.0)	273 (1.9)	263 (4.3)	226 (3.4)	0 (0.0)	268 (2.0)
New Mexico	285 (4.7)	258 (2.7)	254 (2.2)	257 (1.0)	289 (5.2)	255 (5.4)	250 (2.6)	251 (1.0)
New York	281 (2.2)!	243 (2.4)	275 (4.0)!	272 (1.6)	283 (3.2)!	229 (3.5)	269 (3.0)!	264 (1.9)
North Carolina	276 (6.5)!	250 (6.3)!	250 (2.2)	255 (1.2)	260 (7.3)!	233(10.6)!	233 (2.6)	243 (1.3)
North Dakota	289 (2.9)	*** (***)	285 (2.3)	286 (1.2)	283 (3.7)	*** (***)	279 (3.7)	280 (2.4)
Ohio	283 (3.1)!	247 (3.3)	272 (2.7)!	269 (1.2)	276 (2.6)!	234 (4.9)	265 (3.9)!	260 (1.5)
Oklahoma	262 (2.5)!	255 (2.3)!	263 (3.3)	269 (1.5)	260 (4.0)!	244 (4.4)!	251 (3.5)	260 (1.8)
Oregon	279 (3.5)!	261 (1.9)!	273 (4.4)!	273 (1.3)	280 (3.9)!	255 (4.5)!	264 (5.4)!	269 (1.4)
Pennsylvania	291 (2.2)	250 (5.3)!	270 (2.7)!	270 (1.4)	290 (4.3)	237 (7.9)!	269 (4.2)!	266 (1.9)
Rhode Island	278 (2.0)	249 (1.9)	0 (0.0)	263 (0.7)	278 (1.8)	239 (2.6)	0 (0.0)	254 (1.3)
Texas	278 (2.5)!	250 (2.5)!	267 (3.5)!	261 (1.8)	273 (3.8)!	239 (3.0)!	259 (4.5)!	252 (1.9)
Virginia	286 (3.6)	252 (2.9)!	253 (2.3)	264 (1.7)	280 (4.3)	237 (6.1)!	241 (3.9)	256 (2.0)
West Virginia	0 (0.0)	263 (2.1)!	260 (1.3)!	259 (1.2)	0 (0.0)	252 (3.1)!	254 (1.6)!	252 (1.6)
Wisconsin	291 (2.5)!	249 (3.5)!	282 (1.1)	280 (1.4)	288 (5.0)!	229 (4.8)!	279 (2.4)	276 (1.7)
Wyoming	0 (0.0)	0 (0.0)	278 (1.4)	276 (1.0)	0 (0.0)	0 (0.0)	274 (1.6)	271 (1.3)
TERRITORIES								
Guam	0 (0.0)	0 (0.0)	243 (1.5)	236 (0.8)	0 (0.0)	0 (0.0)	226 (1.3)	227 (1.2)
Virgin Islands	0 (0.0)	0 (0.0)	217 (1.3)	229 (0.8)	0 (0.0)	0 (0.0)	206 (3.3)	218 (1.4)

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Descriptions of the content area scales are found in Chapter Three. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 12.6 | **Average Proficiency in Mathematics Content Areas by Type of Community (continued)**

GRADE 8 PUBLIC SCHOOLS	Geometry				Data Analysis, Statistics, and Probability			
	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other
NATION	277 (5.2)!	248 (3.7)!	253 (4.5)!	259 (1.7)	285 (4.8)!	247 (4.6)!	257 (5.0)!	261 (2.2)
Northeast	275 (9.6)!	242(13.5)!	*** (***)	272 (3.3)	282 (8.5)!	245(11.8)!	*** (***)	277 (3.9)
Southeast	0 (0.0)	*** (***)	244(18.4)!	249 (2.7)	0 (0.0)	*** (***)	245(13.7)!	251 (3.8)
Central	*** (***)	236 (6.7)!	*** (***)	264 (3.7)	*** (***)	231 (5.0)!	*** (***)	267 (4.1)
West	279 (8.9)!	256 (4.5)!	252 (9.4)!	258 (3.4)	288 (4.1)!	255 (8.3)!	253 (8.8)!	259 (4.2)
STATES								
Alabama	**265 (4.5)!**	**243 (3.3)!**	**241 (4.1)!**	**248 (1.7)**	**271 (5.3)!**	**241 (5.3)!**	**241 (4.7)!**	**251 (2.4)**
Arizona	**268 (2.0)!**	**246 (3.5)!**	**247 (5.1)!**	**256 (1.9)**	**278 (2.1)!**	**247 (4.8)!**	**240 (7.5)!**	**256 (2.4)**
Arkansas	**271 (5.7)!**	**237 (5.7)!**	**252 (2.0)**	**254 (1.3)**	**274 (7.6)!**	**231 (6.9)!**	**253 (2.4)**	**255 (1.3)**
California	**276 (3.6)!**	**243 (4.1)!**	**0 (0.0)**	**255 (1.8)**	**280 (4.2)!**	**236 (5.8)!**	**0 (0.0)**	**254 (2.3)**
Colorado	278 (1.8)	248 (4.6)!	265 (3.0)	263 (1.7)	281 (2.0)	248 (5.1)!	269 (3.4)	267 (2.0)
Connecticut	281 (1.6)	237 (2.3)	0 (0.0)	266 (1.4)	289 (2.0)	232 (4.1)	0 (0.0)	272 (1.5)
Delaware	279 (2.9)	0 (0.0)	254 (2.0)	254 (0.9)	287 (2.8)	0 (0.0)	258 (1.7)	259 (1.2)
District of Columbia	257 (1.8)	222 (1.1)	0 (0.0)	230 (2.5)	256 (4.0)	213 (1.2)	0 (0.0)	225 (2.9)
Florida	266 (2.7)!	235 (1.8)	245 (3.9)!	252 (2.0)	273 (3.0)!	235 (2.9)	248 (2.6)!	256 (2.6)
Georgia	**263 (2.5)!**	**243 (5.2)!**	**250 (3.4)**	**256 (1.6)**	**293 (2.9)!**	**246 (4.3)!**	**253 (2.8)**	**258 (2.0)**
Hawaii	**270 (3.0)**	**235 (1.6)**	**0 (0.0)**	**253 (0.9)**	**267 (3.9)**	**220 (2.3)**	**0 (0.0)**	**248 (1.1)**
Idaho	***** (***)**	***** (***)**	**267 (1.5)**	**269 (1.1)**	***** (***)**	***** (***)**	**271 (1.3)**	**274 (1.3)**
Illinois	**276 (2.8)**	**234 (4.3)**	**258 (2.8)!**	**257 (2.3)**	**285 (3.4)**	**231 (6.7)**	**266 (5.2)!**	**265 (2.5)**
Indiana	**277 (4.0)!**	**246 (3.9)!**	**263 (2.5)**	**265 (1.3)**	**283 (4.6)!**	**240 (6.7)!**	**268 (3.2)**	**271 (1.6)**
Iowa	292 (4.8)!	256 (2.2)!	275 (1.9)	274 (1.8)	296 (3.7)!	259 (3.9)!	281 (1.7)	280 (2.1)
Kentucky	263 (3.0)!	242 (3.7)!	250 (1.9)	255 (1.6)	274 (4.3)!	244 (3.5)!	253 (1.7)	260 (1.7)
Louisiana	265 (3.7)!	230 (4.1)	231 (3.0)!	246 (1.9)	268 (4.8)!	227 (4.8)	231 (4.2)!	248 (2.3)
Maryland	274 (4.0)	228 (3.4)	250 (2.1)!	256 (2.4)	277 (3.4)	231 (4.9)	253 (4.8)!	262 (2.5)
Michigan	276 (2.1)!	237 (4.2)!	265 (2.4)	264 (1.7)	285 (2.5)!	226 (4.7)!	269 (4.0)	268 (2.1)
Minnesota	**273 (1.8)**	**0 (0.0)**	**273 (2.1)**	**276 (1.6)**	**282 (1.8)**	**0 (0.0)**	**278 (1.7)**	**282 (1.7)**
Montana	***** (***)**	**0 (0.0)**	**276 (1.7)**	**281 (1.1)**	***** (***)**	**0 (0.0)**	**279 (2.2)**	**284 (0.9)**
Nebraska	**279 (2.5)**	***** (***)**	**276 (2.2)**	**270 (1.4)**	**287 (3.9)**	***** (***)**	**282 (1.9)**	**274 (1.4)**
New Hampshire	**281 (4.8)**	**0 (0.0)**	**278 (4.3)**	**272 (1.0)**	**281 (3.9)**	**0 (0.0)**	**283 (5.7)**	**277 (1.0)**
New Jersey	**281 (3.4)**	**237 (2.9)**	**0 (0.0)**	**266 (1.8)**	**269 (2.8)**	**230 (3.8)**	**0 (0.0)**	**271 (2.1)**
New Mexico	281 (3.6)	258 (2.8)	256 (1.5)	255 (1.3)	287 (4.9)	249 (4.6)	248 (2.7)	251 (1.3)
New York	278 (2.8)!	237 (2.6)	278 (4.3)!	268 (1.6)	287 (2.9)!	235 (3.1)	279 (3.2)!	274 (2.1)
North Carolina	265 (6.6)!	242(11.7)!	241 (2.7)	251 (1.3)	267 (6.9)!	233(13.5)!	241 (3.0)	249 (1.5)
North Dakota	284 (2.4)	*** (***)	277 (2.5)	278 (1.6)	293 (3.2)	*** (***)	283 (3.3)	287 (1.7)
Ohio	277 (2.8)!	238 (3.7)	262 (2.7)!	260 (1.4)	284 (3.0)!	238 (5.0)	270 (3.7)!	267 (1.4)
Oklahoma	**277 (2.8)!**	**246 (2.9)!**	**253 (3.4)**	**261 (1.7)**	**284 (4.6)!**	**249 (5.0)!**	**256 (4.6)**	**266 (1.7)**
Oregon	**280 (2.8)!**	**261 (3.5)!**	**266 (3.6)!**	**269 (1.2)**	**282 (3.1)!**	**261 (2.7)!**	**271 (6.4)!**	**274 (1.5)**
Pennsylvania	**284 (3.2)**	**242 (6.2)!**	**267 (3.7)!**	**265 (1.5)**	**292 (2.8)**	**242 (6.5)!**	**271 (2.7)!**	**269 (1.8)**
Rhode Island	**274 (2.3)**	**241 (2.2)**	**0 (0.0)**	**255 (0.8)**	**276 (1.8)**	**238 (3.2)**	**0 (0.0)**	**258 (0.9)**
Texas	**276 (2.6)!**	**245 (2.3)!**	**260 (3.2)!**	**257 (1.9)**	**280 (3.0)!**	**240 (3.2)!**	**259 (4.5)!**	**258 (2.6)**
Virginia	281 (4.0)	239 (5.2)!	243 (3.1)	257 (1.9)	286 (4.1)	243 (6.7)!	245 (3.6)	260 (2.1)
West Virginia	0 (0.0)	257 (2.9)!	252 (1.3)!	254 (1.2)	0 (0.0)	258 (2.5)!	254 (1.6)!	256 (1.6)
Wisconsin	286 (5.2)!	238 (3.9)!	276 (1.8)	275 (1.4)	299 (4.0)!	242 ([illegible])!	282 (1.7)	279 (1.4)
Wyoming	0 (0.0)	0 (0.0)	274 (1.4)	270 (0.7)	0 (0.0)	0 (0.0)	278 (1.5)	274 (0.9)
TERRITORIES								
Guam	**0 (0.0)**	**0 (0.0)**	**241 (2.1)**	**234 (0.9)**	**0 (0.0)**	**0 (0.0)**	**216 (2.0)**	**212 (1.0)**
Virgin Islands	**0 (0.0)**	**0 (0.0)**	**215 (2.0)**	**224 (0.8)**	**0 (0.0)**	**0 (0.0)**	**179 (1.9)**	**200 (1.4)**

3 3

TABLE 12.6 | **Average Proficiency in Mathematics Content Areas by Type of Community (continued)**

GRADE 8 PUBLIC SCHOOLS	Algebra and Functions			
	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other
NATION	277 (4.8)!	247 (3.2)!	256 (4.8)!	260 (1.7)
Northeast	273(10.1)!	243(12.6)!	*** (***)	271 (3.4)
Southeast	0 (0.0)	*** (***)	251(14.7)!	255 (3.0)
Central	*** (***)	234 (4.7)!	*** (***)	265 (2.8)
West	279 (2.9)!	254 (4.6)!	251 (8.5)!	258 (3.5)
STATES				
Alabama	266 (4.7)!	245 (3.7)!	246 (3.3)!	251 (2.1)
Arizona	271 (2.2)!	245 (4.1)!	245 (6.4)!	258 (2.1)
Arkansas	262 (5.4)!	235 (6.0)!	250 (2.3)	255 (1.4)
California	277 (3.3)!	242 (3.6)!	0 (0.0)	256 (1.6)
Colorado	276 (2.0)	246 (4.6)!	263 (3.1)	264 (1.9)
Connecticut	284 (1.6)	237 (3.3)	0 (0.0)	267 (1.5)
Delaware	280 (2.5)	0 (0.0)	256 (1.9)	258 (1.1)
District of Columbia	262 (2.9)	228 (1.4)	0 (0.0)	237 (3.1)
Florida	272 (2.4)!	239 (3.2)	247 (3.1)!	257 (2.2)
Georgia	267 (2.8)!	244 (5.5)!	250 (3.0)	255 (1.6)
Hawaii	267 (2.9)	235 (1.7)	0 (0.0)	250 (1.0)
Idaho	*** (***)	*** (***)	265 (1.5)	270 (1.1)
Illinois	279 (2.4)	236 (4.6)	263 (4.1)!	263 (2.3)
Indiana	280 (4.0)!	241 (6.8)!	266 (3.0)	266 (1.5)
Iowa	292 (6.4)!	257 (2.8)!	274 (1.3)	274 (1.8)
Kentucky	270 (2.7)!	248 (3.1)!	252 (1.2)	258 (1.5)
Louisiana	267 (3.9)!	235 (3.9)	235 (2.6)!	249 (2.1)
Maryland	281 (4.2)	236 (3.9)	255 (2.0)!	263 (2.5)
Michigan	282 (2.8)!	239 (3.1)!	266 (1.9)	267 (1.9)
Minnesota	276 (2.2)	0 (0.0)	273 (1.8)	277 (1.3)
Montana	*** (***)	0 (0.0)	274 (1.8)	280 (1.1)
Nebraska	291 (2.9)	*** (***)	273 (2.2)	280 (1.4)
New Hampshire	277 (2.8)	0 (0.0)	278 (5.5)	272 (0.9)
New Jersey	265 (2.6)	237 (2.6)	0 (0.0)	269 (1.6)
New Mexico	284 (4.5)	256 (3.9)	252 (2.1)	255 (1.1)
New York	277 (2.5)!	241 (2.1)	270 (3.8)!	268 (1.6)
North Carolina	271 (7.1)!	242(12.0)!	245 (2.4)	252 (1.0)
North Dakota	279 (2.4)	*** (***)	273 (2.4)	277 (1.4)
Ohio	278 (2.5)!	243 (3.7)	265 (2.3)!	262 (1.1)
Oklahoma	278 (3.4)!	251 (2.8)!	255 (2.6)	264 (1.5)
Oregon	261 (2.3)!	259 (3.5)!	267 (4.6)!	266 (1.4)
Pennsylvania	266 (2.8)	245 (5.9)!	266 (3.6)!	266 (1.5)
Rhode Island	277 (2.4)	246 (2.8)	0 (0.0)	260 (1.1)
Texas	275 (2.6)!	244 (2.8)!	261 (3.7)!	255 (2.2)
Virginia	283 (3.9)	243 (4.8)!	249 (3.2)	262 (1.8)
West Virginia	0 (0.0)	255 (2.4)!	253 (1.6)!	253 (1.3)
Wisconsin	288 (3.7)!	241 (4.3)!	273 (1.9)	272 (1.4)
Wyoming	0 (0.0)	0 (0.0)	273 (1.5)	271 (1.1)
TERRITORIES				
Guam	0 (0.0)	0 (0.0)	234 (1.2)	229 (0.9)
Virgin Islands	0 (0.0)	0 (0.0)	205 (1.2)	221 (0.9)

TABLE 12.7 | **Average Mathematics Proficiency by Parents' Highest Level of Education**

GRADE 8 PUBLIC SCHOOLS	Did Not Finish High School		Graduated High School		Some Education After High School		Graduated College	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	10 (0.8)	243 (2.0)	25 (1.2)	254 (1.5)	17 (0.9)	266 (1.7)	39 (1.9)	274 (1.6)
Northeast	7 (2.2)	*** (***)	23 (3.3)	258 (2.3)	15 (3.0)	268 (2.4)	49 (5.8)	282 (3.6)
Southeast	14 (2.1)	237 (3.3)	27 (1.6)	245 (4.1)	18 (1.7)	260 (3.7)	32 (3.3)	269 (3.8)
Central	7 (0.9)	*** (***)	33 (2.1)	261 (2.5)	19 (0.9)	270 (3.6)	35 (1.8)	273 (3.5)
West	10 (1.3)	246 (4.4)	19 (2.5)	250 (2.2)	16 (1.2)	268 (3.0)	42 (4.0)	273 (2.6)
STATES								
Alabama	12 (0.8)	239 (1.7)	30 (1.0)	248 (1.7)	18 (0.7)	259 (1.6)	34 (1.5)	262 (2.0)
Arizona	9 (0.6)	240 (1.9)	22 (0.9)	250 (1.5)	20 (0.9)	266 (1.7)	37 (1.2)	272 (1.5)
Arkansas	12 (0.6)	245 (1.6)	32 (0.9)	249 (1.1)	17 (0.8)	266 (1.5)	31 (1.1)	266 (1.2)
California	11 (0.7)	239 (2.1)	17 (0.9)	245 (1.8)	18 (0.7)	263 (1.9)	38 (1.6)	271 (1.7)
Colorado	7 (0.7)	243 (2.3)	19 (0.9)	254 (1.4)	19 (0.9)	271 (1.2)	47 (1.6)	277 (1.2)
Connecticut	5 (0.4)	242 (2.3)	23 (1.2)	256 (1.8)	16 (0.8)	269 (1.7)	47 (1.6)	284 (1.0)
Delaware	8 (0.6)	243 (2.3)	31 (1.0)	249 (1.5)	17 (0.8)	265 (1.8)	38 (0.9)	275 (1.3)
District of Columbia	8 (0.7)	225 (1.9)	31 (1.0)	224 (1.1)	17 (0.8)	237 (1.5)	34 (1.2)	238 (1.7)
Florida	9 (0.9)	236 (2.3)	26 (0.9)	245 (1.4)	18 (0.7)	263 (1.6)	37 (1.3)	267 (1.6)
Georgia	11 (0.9)	243 (1.6)	29 (1.1)	248 (1.5)	18 (0.9)	267 (1.5)	36 (1.8)	271 (2.0)
Hawaii	5 (0.5)	234 (2.8)	27 (0.9)	240 (1.2)	18 (0.7)	260 (1.8)	38 (1.0)	262 (1.3)
Idaho	6 (0.5)	252 (2.3)	19 (0.7)	262 (1.4)	22 (0.9)	275 (1.1)	48 (1.3)	279 (1.0)
Illinois	6 (0.8)	242 (2.9)	25 (1.5)	251 (1.8)	19 (0.9)	263 (1.6)	39 (1.6)	273 (2.1)
Indiana	8 (0.7)	251 (2.5)	31 (1.1)	260 (1.2)	21 (0.9)	272 (1.5)	35 (1.4)	278 (1.6)
Iowa	5 (0.6)	259 (2.5)	27 (1.0)	270 (1.3)	21 (0.9)	282 (1.5)	42 (1.3)	285 (1.4)
Kentucky	16 (1.1)	240 (1.6)	32 (1.1)	252 (1.1)	18 (0.8)	269 (1.5)	26 (1.7)	268 (1.9)
Louisiana	13 (0.8)	234 (1.9)	33 (1.1)	241 (1.5)	19 (0.9)	254 (1.2)	28 (1.2)	254 (2.0)
Maryland	7 (0.7)	243 (2.4)	27 (1.3)	248 (1.5)	17 (0.7)	262 (1.9)	43 (1.8)	274 (1.7)
Michigan	6 (0.6)	247 (2.4)	27 (1.0)	255 (1.3)	20 (0.8)	268 (1.6)	39 (1.5)	274 (1.4)
Minnesota	4 (0.3)	254 (3.2)	27 (1.0)	264 (1.4)	22 (0.8)	283 (1.1)	42 (1.2)	285 (1.1)
Montana	5 (0.7)	269 (2.3)	23 (1.3)	271 (1.8)	23 (0.9)	283 (1.7)	45 (1.9)	287 (1.0)
Nebraska	4 (0.5)	251 (4.7)	27 (1.1)	267 (1.4)	20 (0.7)	277 (1.3)	43 (1.0)	286 (1.2)
New Hampshire	6 (0.6)	255 (2.4)	25 (0.8)	261 (1.1)	19 (0.9)	276 (1.5)	48 (0.9)	283 (1.1)
New Jersey	7 (0.5)	250 (2.1)	24 (1.1)	259 (1.8)	16 (1.0)	270 (2.0)	45 (1.5)	281 (1.3)
New Mexico	11 (0.8)	240 (1.4)	27 (1.1)	247 (1.3)	19 (0.8)	262 (1.2)	33 (1.0)	272 (1.5)
New York	8 (0.7)	242 (2.6)	22 (0.9)	253 (1.7)	17 (0.9)	264 (2.0)	40 (1.2)	273 (1.4)
North Carolina	11 (0.7)	232 (1.5)	32 (1.0)	241 (1.3)	17 (0.8)	258 (1.3)	33 (1.3)	264 (1.6)
North Dakota	4 (0.7)	255 (3.5)	24 (1.3)	273 (2.4)	19 (0.8)	283 (1.9)	49 (1.3)	288 (1.3)
Ohio	7 (0.7)	247 (2.1)	32 (1.1)	257 (1.2)	20 (0.8)	269 (1.3)	36 (1.7)	274 (1.3)
Oklahoma	8 (0.6)	250 (2.5)	28 (1.3)	252 (1.4)	21 (0.9)	266 (1.5)	40 (1.7)	273 (1.6)
Oregon	6 (0.6)	250 (2.5)	19 (0.6)	258 (1.4)	21 (0.6)	276 (1.3)	47 (1.4)	280 (1.1)
Pennsylvania	6 (0.8)	247 (2.8)	34 (1.2)	256 (1.5)	20 (0.9)	271 (1.5)	35 (1.4)	281 (1.9)
Rhode Island	8 (0.8)	239 (2.0)	28 (1.0)	251 (1.1)	15 (0.7)	266 (1.8)	41 (1.0)	274 (0.9)
Texas	17 (1.1)	243 (1.6)	23 (1.1)	248 (1.8)	15 (0.6)	266 (1.7)	34 (1.5)	274 (1.4)
Virginia	10 (0.7)	240 (2.0)	27 (1.0)	251 (1.3)	16 (0.8)	267 (1.5)	40 (1.5)	280 (2.1)
West Virginia	12 (0.9)	240 (1.5)	38 (1.3)	250 (0.9)	17 (0.8)	263 (1.5)	27 (1.5)	270 (1.3)
Wisconsin	5 (0.5)	253 (3.9)	31 (1.1)	269 (1.3)	23 (0.9)	277 (1.3)	34 (1.4)	284 (1.6)
Wyoming	5 (0.4)	257 (2.3)	23 (1.0)	262 (1.1)	23 (0.8)	276 (0.9)	43 (1.0)	280 (0.8)
TERRITORIES								
Guam	10 (0.7)	218 (2.1)	30 (1.2)	226 (1.4)	11 (0.6)	247 (2.3)	27 (1.1)	242 (1.4)
Virgin Islands	15 (1.0)	209 (2.5)	29 (1.5)	220 (1.4)	10 (0.7)	227 (2.8)	21 (1.4)	220 (1.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. The percentages for parents' highest level of education may not add to 100 percent because some students responded "I don't know." ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students.

3 5

TABLE 12.8 | **Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Parents' Highest Level of Education**

GRADE 8 PUBLIC SCHOOLS	Level 200				Level 250			
	Did Not Finish High School	Graduated High School	Some Education After High School	Graduated College	Did Not Finish High School	Graduated High School	Some Education After High School	Graduated College
NATION	96 (1.9)	97 (0.8)	99 (0.7)	99 (0.7)	37 (4.6)	56 (2.7)	71 (2.6)	78 (2.0)
Northeast	*** (***)	99 (0.9)	99 (1.4)	99 (0.4)	*** (***)	62 (5.9)	71 (4.5)	86 (4.6)
Southeast	93 (3.5)	93 (2.4)	97 (2.5)	97 (2.6)	28 (6.9)	45 (5.4)	61 (6.3)	72 (3.5)
Central	*** (***)	98 (1.2)	100 (0.4)	99 (0.9)	*** (***)	66 (4.1)	75 (5.1)	79 (3.9)
West	96 (3.2)	97 (1.6)	99 (0.7)	99 (0.7)	44 (6.8)	51 (4.4)	75 (4.1)	76 (3.6)
STATES								
Alabama	**93 (1.4)**	**94 (1.5)**	**98 (1.0)**	**98 (0.8)**	**34 (3.1)**	**44 (2.8)**	**64 (3.0)**	**84 (2.9)**
Arizona	**94 (1.8)**	**98 (0.8)**	**99 (0.8)**	**99 (0.3)**	**35 (3.6)**	**49 (3.5)**	**72 (2.8)**	**77 (2.0)**
Arkansas	**96 (1.3)**	**97 (0.9)**	**99 (0.5)**	**98 (0.7)**	**43 (3.0)**	**49 (2.4)**	**73 (2.7)**	**70 (1.8)**
California	**92 (2.4)**	**93 (1.9)**	**98 (0.8)**	**98 (0.7)**	**33 (3.7)**	**45 (2.9)**	**67 (3.3)**	**74 (2.0)**
Colorado	94 (1.3)	98 (0.8)	100 (0.2)	100 (0.2)	40 (4.7)	56 (2.8)	79 (2.0)	84 (1.7)
Connecticut	96 (2.2)	96 (1.0)	99 (0.7)	96 (0.4)	37 (4.6)	59 (3.0)	76 (2.5)	86 (1.2)
Delaware	97 (1.8)	96 (1.3)	99 (0.5)	99 (0.7)	37 (4.4)	48 (3.0)	69 (3.3)	76 (2.1)
District of Columbia	85 (4.0)	82 (1.7)	93 (1.3)	89 (1.3)	15 (3.2)	15 (1.6)	32 (2.8)	31 (1.7)
Florida	89 (3.2)	94 (1.3)	99 (0.7)	98 (0.7)	33 (3.9)	41 (2.5)	66 (2.4)	68 (2.3)
Georgia	**94 (1.4)**	**95 (0.9)**	**98 (0.5)**	**98 (0.7)**	**41 (3.4)**	**45 (2.5)**	**72 (2.9)**	**72 (2.1)**
Hawaii	**85 (3.7)**	**91 (1.4)**	**97 (1.1)**	**98 (0.7)**	**30 (4.5)**	**37 (1.9)**	**61 (2.8)**	**61 (1.7)**
Idaho	**90 (2.0)**	**99 (0.3)**	**100 (0.0)**	**100 (0.2)**	**52 (4.4)**	**69 (3.0)**	**85 (2.1)**	**88 (1.3)**
Illinois	**91 (2.8)**	**94 (1.3)**	**98 (1.1)**	**98 (0.5)**	**42 (4.4)**	**55 (2.4)**	**68 (2.7)**	**78 (2.7)**
Indiana	**96 (1.3)**	**99 (0.4)**	**99 (0.7)**	**100 (0.3)**	**50 (5.8)**	**64 (1.9)**	**77 (2.3)**	**83 (1.8)**
Iowa	99 (1.4)	100 (0.3)	100 (0.1)	100 (0.0)	62 (5.1)	78 (2.7)	90 (2.1)	90 (1.1)
Kentucky	95 (1.5)	98 (0.8)	100 (0.4)	99 (0.9)	35 (3.0)	53 (2.3)	75 (2.4)	72 (2.6)
Louisiana	89 (2.7)	93 (1.2)	98 (0.8)	96 (1.0)	28 (3.0)	37 (2.5)	55 (2.6)	54 (2.7)
Maryland	93 (2.1)	93 (1.2)	98 (1.0)	98 (0.5)	39 (4.7)	45 (2.4)	66 (3.0)	74 (1.8)
Michigan	97 (2.0)	97 (0.7)	99 (0.5)	99 (0.3)	46 (5.5)	56 (2.5)	75 (2.4)	78 (1.9)
Minnesota	**97 (2.3)**	**99 (0.5)**	**100 (0.0)**	**100 (0.3)**	**59 (6.7)**	**72 (2.1)**	**92 (1.5)**	**89 (1.4)**
Montana	**100 (0.2)**	**100 (0.3)**	**100 (0.1)**	**100 (0.1)**	**79 (3.7)**	**82 (3.0)**	**89 (1.9)**	**93 (1.2)**
Nebraska	**94 (4.2)**	**99 (0.6)**	**100 (0.8)**	**100 (0.3)**	**57 (8.4)**	**73 (2.7)**	**87 (2.1)**	**89 (1.3)**
New Hampshire	**96 (2.0)**	**99 (0.7)**	**100 (0.0)**	**100 (0.1)**	**57 (6.3)**	**66 (2.5)**	**86 (2.4)**	**90 (1.4)**
New Jersey	**99 (1.3)**	**98 (0.7)**	**99 (0.5)**	**99 (0.3)**	**49 (4.5)**	**61 (2.8)**	**77 (2.8)**	**83 (1.4)**
New Mexico	96 (1.8)	98 (1.1)	99 (0.4)	100 (0.1)	33 (2.7)	46 (2.5)	66 (3.0)	77 (2.2)
New York	93 (2.6)	96 (1.3)	97 (1.2)	98 (0.8)	38 (4.4)	55 (2.9)	69 (2.9)	76 (1.7)
North Carolina	90 (1.9)	92 (1.4)	98 (0.8)	98 (0.6)	25 (2.6)	38 (2.0)	62 (2.9)	66 (2.3)
North Dakota	99 (0.9)	99 (0.8)	100 (0.1)	100 (0.0)	60 (7.5)	83 (2.9)	92 (1.9)	94 (1.1)
Ohio	96 (2.1)	98 (0.6)	100 (0.2)	99 (0.5)	44 (4.9)	59 (2.3)	77 (1.9)	77 (1.5)
Oklahoma	**97 (1.8)**	**98 (0.8)**	**99 (1.1)**	**99 (0.5)**	**52 (4.4)**	**53 (3.1)**	**72 (2.8)**	**79 (1.9)**
Oregon	**98 (1.4)**	**99 (0.7)**	**100 (0.2)**	**100 (0.1)**	**49 (5.0)**	**59 (2.8)**	**85 (2.0)**	**85 (1.2)**
Pennsylvania	**95 (2.4)**	**94 (0.9)**	**99 (0.6)**	**99 (0.3)**	**49 (5.0)**	**58 (2.7)**	**76 (3.0)**	**83 (2.3)**
Rhode Island	**91 (1.7)**	**95 (0.8)**	**98 (0.7)**	**99 (0.3)**	**34 (3.8)**	**52 (1.8)**	**70 (2.8)**	**77 (1.4)**
Texas	**95 (1.1)**	**96 (1.1)**	**98 (0.7)**	**99 (0.8)**	**40 (2.9)**	**47 (2.5)**	**72 (2.5)**	**77 (2.0)**
Virginia	94 (1.8)	97 (0.8)	99 (0.7)	99 (0.4)	35 (4.7)	50 (2.3)	71 (2.5)	80 (1.7)
West Virginia	95 (1.7)	97 (0.6)	100 (0.4)	99 (0.4)	33 (2.9)	50 (1.7)	66 (2.9)	75 (2.1)
Wisconsin	97 (2.6)	99 (0.4)	100 (0.3)	99 (0.4)	56 (5.3)	76 (2.0)	86 (1.7)	88 (1.5)
Wyoming	100 (0.7)	99 (0.4)	100 (0.1)	100 (0.1)	63 (5.1)	70 (1.8)	89 (1.7)	88 (1.1)
TERRITORIES								
Guam	**70 (3.1)**	**78 (2.4)**	**93 (2.3)**	**88 (1.5)**	**14 (2.2)**	**23 (1.8)**	**46 (3.5)**	**40 (2.8)**
Virgin Islands	**83 (5.0)**	**77 (2.9)**	**87 (4.1)**	**78 (3.3)**	**7 (1.9)**	**12 (1.9)**	**18 (3.7)**	**11 (2.4)**

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent. Descriptions of mathematics proficiency at the four anchor levels are found in Chapter One. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students.

TABLE 12.8 | **Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Parents' Highest Level of Education (continued)**

GRADE 8 PUBLIC SCHOOLS	Level 300				Level 350			
	Did Not Finish High School	Graduated High School	Some Education After High School	Graduated College	Did Not Finish High School	Graduated High School	Some Education After High School	Graduated College
NATION	1 (0.9)	5 (1.5)	12 (1.4)	21 (1.9)	0 (0.0)	0 (0.0)	0 (0.4)	0 (0.4)
Northeast	*** (***)	6 (2.8)	13 (2.7)	26 (4.3)	*** (***)	0 (0.0)	0 (0.0)	0 (0.9)
Southeast	1 (0.5)	3 (1.7)	8 (2.3)	19 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Central	*** (***)	8 (3.9)	14 (3.4)	17 (3.7)	*** (***)	0 (0.0)	0 (0.7)	0 (0.6)
West	2 (2.3)	2 (1.3)	15 (2.8)	21 (3.5)	0 (0.0)	0 (0.0)	0 (1.4)	1 (0.5)
STATES								
Alabama	**0 (0.2)**	**2 (0.9)**	**8 (1.4)**	**14 (1.9)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.1)**
Arizona	**1 (0.9)**	**4 (1.1)**	**11 (1.9)**	**18 (1.9)**	**0 (0.0)**	**0 (0.0)**	**0 (0.4)**	**0 (0.2)**
Arkansas	**1 (0.7)**	**2 (0.6)**	**9 (1.9)**	**14 (1.5)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.1)**
California	**2 (1.3)**	**2 (0.6)**	**11 (1.7)**	**20 (2.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.4)**	**0 (0.2)**
Colorado	2 (2.0)	4 (1.5)	14 (1.7)	21 (1.3)	0 (0.0)	0 (0.0)	0 (0.1)	0 (0.1)
Connecticut	1 (0.9)	6 (0.9)	13 (1.9)	31 (1.4)	0 (0.0)	0 (0.1)	0 (0.3)	1 (0.2)
Delaware	1 (0.6)	4 (0.7)	11 (2.3)	25 (1.9)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)
District of Columbia	0 (0.0)	0 (0.2)	1 (0.9)	6 (1.3)	0 (0.0)	0 (0.0)	0 (0.4)	0 (0.4)
Florida	2 (1.0)	4 (1.0)	12 (1.6)	18 (1.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.1)
Georgia	**1 (0.9)**	**5 (0.9)**	**14 (2.1)**	**21 (2.5)**	**0 (0.0)**	**0 (0.0)**	**0 (0.5)**	**0 (0.3)**
Hawaii	**6 (2.2)**	**4 (0.8)**	**12 (1.9)**	**17 (1.8)**	**0 (0.3)**	**0 (0.0)**	**0 (0.2)**	**1 (0.4)**
Idaho	**2 (1.5)**	**7 (1.8)**	**14 (1.9)**	**21 (1.7)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.2)**
Illinois	**2 (1.1)**	**5 (1.0)**	**9 (2.3)**	**21 (2.1)**	**0 (0.0)**	**0 (0.1)**	**0 (0.3)**	**0 (0.2)**
Indiana	**4 (1.7)**	**6 (1.2)**	**16 (1.9)**	**23 (2.3)**	**0 (0.0)**	**0 (0.0)**	**0 (0.2)**	**0 (0.3)**
Iowa	5 (1.8)	11 (1.5)	24 (2.1)	29 (2.2)	0 (0.0)	0 (0.2)	0 (0.2)	1 (0.4)
Kentucky	1 (0.7)	4 (1.0)	14 (2.0)	15 (1.8)	0 (0.0)	0 (0.0)	0 (0.1)	0 (0.2)
Louisiana	1 (0.8)	1 (0.5)	6 (1.2)	7 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.2)
Maryland	4 (1.8)	4 (1.0)	10 (1.9)	25 (1.9)	0 (0.0)	0 (0.1)	0 (0.0)	1 (0.3)
Michigan	2 (1.0)	6 (1.2)	13 (1.9)	21 (1.6)	0 (0.0)	0 (0.0)	0 (0.2)	0 (0.2)
Minnesota	**5 (2.8)**	**8 (1.7)**	**25 (2.0)**	**30 (1.7)**	**0 (0.0)**	**0 (0.0)**	**0 (0.3)**	**0 (0.3)**
Montana	**9 (2.8)**	**11 (1.7)**	**26 (3.1)**	**32 (1.9)**	**1 (1.1)**	**0 (0.0)**	**0 (0.5)**	**0 (0.2)**
Nebraska	**2 (1.4)**	**11 (1.4)**	**19 (2.5)**	**32 (2.0)**	**0 (0.0)**	**0 (0.1)**	**0 (0.5)**	**1 (0.4)**
New Hampshire	**4 (2.3)**	**7 (1.1)**	**16 (2.4)**	**26 (1.7)**	**0 (0.0)**	**0 (0.0)**	**0 (0.1)**	**0 (0.3)**
New Jersey	**4 (2.0)**	**8 (1.4)**	**14 (2.1)**	**31 (2.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.1)**	**1 (0.4)**
New Mexico	2 (1.1)	2 (0.9)	8 (1.2)	18 (2.2)	0 (0.0)	0 (0.0)	0 (0.1)	0 (0.2)
New York	1 (1.0)	5 (0.9)	13 (2.1)	22 (2.1)	0 (0.6)	0 (0.2)	0 (0.2)	0 (0.[illegible])
North Carolina	0 (0.6)	3 (0.7)	6 (1.1)	15 (1.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
North Dakota	2 (3.8)	14 (3.2)	25 (3.5)	32 (2.4)	0 (0.0)	0 (0.3)	0 (0.0)	1 (0.8)
Ohio	3 (1.4)	6 (0.9)	12 (1.7)	21 (1.9)	0 (0.0)	0 (0.0)	0 (0.2)	0 (0.1)
Oklahoma	**2 (1.4)**	**3 (0.9)**	**10 (2.4)**	**17 (2.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.2)**
Oregon	**2 (1.5)**	**7 (1.8)**	**20 (2.1)**	**26 (1.8)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.2)**
Pennsylvania	**2 (1.6)**	**5 (0.8)**	**14 (1.7)**	**28 (2.4)**	**0 (0.0)**	**0 (0.0)**	**0 (0.2)**	**1 (0.4)**
Rhode Island	**2 (1.3)**	**4 (1.0)**	**12 (1.9)**	**22 (1.5)**	**0 (0.0)**	**0 (0.0)**	**0 (0.1)**	**0 (0.2)**
Texas	**1 (0.8)**	**4 (1.0)**	**11 (2.0)**	**21 (1.8)**	**0 (0.0)**	**0 (0.0)**	**0 (0.3)**	**0 (0.2)**
Virginia	1 (0.9)	4 (0.7)	13 (1.8)	29 (2.9)	0 (0.0)	0 (0.1)	0 (0.4)	2 (0.6)
West Virginia	1 (0.7)	2 (0.8)	11 (2.0)	16 (1.5)	0 (0.0)	0 (0.0)	0 (0.1)	0 (0.0)
Wisconsin	4 (1.9)	12 (1.9)	19 (2.0)	32 (2.3)	0 (0.0)	0 (0.1)	0 (0.2)	1 (0.4)
Wyoming	2 (1.7)	6 (1.3)	14 (1.6)	23 (1.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.2)
TERRITORIES								
Guam	**1 (0.8)**	**2 (0.7)**	**5 (2.3)**	**5 (1.3)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.3)**
Virgin Islands	**0 (0.0)**	**0 (0.4)**	**1 (0.8)**	**1 (0.8)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**

3 7

TABLE 12.9 | **Average Proficiency in Mathematics Content Areas by Parents' Highest Level of Education**

GRADE 8 PUBLIC SCHOOLS	Numbers and Operations				Measurement			
	Did Not Finish High School	Graduated High School	Some Education After High School	Graduated College	Did Not Finish High School	Graduated High School	Some Education After High School	Graduated College
NATION	247 (2.4)	259 (1.8)	270 (1.5)	278 (1.8)	237 (3.6)	248 (2.1)	264 (2.7)	272 (2.0)
Northeast	*** (***)	260 (2.7)	267 (2.3)	285 (3.8)	*** (***)	255 (5.1)	261 (5.7)	279 (5.5)
Southeast	243 (4.5)	252 (4.7)	265 (3.5)	275 (3.9)	227 (6.1)	235 (5.3)	257 (6.3)	264 (4.6)
Central	*** (***)	269 (2.5)	275 (3.2)	277 (4.2)	*** (***)	258 (3.8)	270 (5.7)	270 (4.4)
West	248 (4.2)	254 (2.5)	272 (2.7)	275 (2.7)	242 (6.2)	245 (3.0)	268 (5.3)	271 (3.0)
STATES								
Alabama	**248 (1.4)**	**254 (1.8)**	**264 (1.8)**	**268 (2.2)**	**236 (3.0)**	**241 (2.2)**	**257 (2.1)**	**258 (2.3)**
Arizona	**248 (2.1)**	**255 (1.7)**	**271 (2.0)**	**276 (1.6)**	**234 (3.4)**	**247 (2.0)**	**262 (2.3)**	**271 (1.9)**
Arkansas	**253 (1.8)**	**256 (1.1)**	**270 (1.9)**	**272 (1.2)**	**241 (2.7)**	**248 (1.9)**	**265 (2.4)**	**264 (1.5)**
California	**243 (2.3)**	**248 (1.9)**	**267 (2.1)**	**274 (1.8)**	**234 (2.9)**	**238 (2.4)**	**261 (2.3)**	**268 (1.9)**
Colorado	244 (3.4)	257 (1.7)	274 (1.3)	279 (1.2)	240 (3.6)	250 (2.3)	270 (2.4)	276 (1.7)
Connecticut	248 (2.8)	259 (1.7)	274 (2.0)	287 (0.9)	241 (3.8)	252 (2.4)	267 (2.4)	284 (1.5)
Delaware	251 (2.4)	254 (1.9)	268 (2.1)	279 (1.5)	239 (4.5)	246 (2.1)	264 (2.5)	272 (1.6)
District of Columbia	233 (2.5)	232 (1.2)	245 (1.8)	244 (1.6)	218 (3.8)	215 (1.4)	226 (2.1)	228 (2.3)
Florida	243 (2.8)	251 (1.5)	268 (1.6)	271 (1.5)	232 (3.5)	240 (1.7)	260 (2.7)	264 (1.9)
Georgia	**247 (1.9)**	**253 (1.6)**	**270 (1.5)**	**275 (1.7)**	**237 (2.4)**	**239 (2.1)**	**261 (2.5)**	**266 (2.6)**
Hawaii	**240 (3.2)**	**247 (1.5)**	**265 (2.3)**	**267 (1.4)**	**233 (4.4)**	**240 (1.4)**	**259 (2.4)**	**261 (1.6)**
Idaho	**256 (2.4)**	**265 (1.6)**	**277 (1.7)**	**282 (1.0)**	**244 (4.1)**	**261 (2.1)**	**273 (2.1)**	**279 (1.6)**
Illinois	**247 (3.3)**	**256 (1.6)**	**268 (1.7)**	**277 (2.3)**	**236 (4.2)**	**248 (2.1)**	**258 (2.1)**	**271 (2.7)**
Indiana	**254 (3.1)**	**264 (1.3)**	**276 (1.7)**	**281 (1.8)**	**248 (4.1)**	**255 (1.6)**	**268 (2.1)**	**276 (2.1)**
Iowa	262 (3.4)	275 (1.5)	287 (1.6)	289 (1.5)	252 (4.3)	268 (2.0)	281 (2.4)	285 (2.2)
Kentucky	246 (1.9)	256 (1.3)	273 (1.8)	272 (2.0)	234 (3.2)	250 (1.8)	266 (2.0)	264 (2.1)
Louisiana	243 (1.9)	248 (1.4)	261 (1.4)	260 (1.9)	229 (2.7)	236 (2.2)	251 (1.9)	247 (2.3)
Maryland	250 (2.9)	251 (1.5)	266 (2.1)	276 (1.6)	237 (3.3)	240 (2.1)	256 (2.4)	272 (2.2)
Michigan	250 (2.9)	259 (1.5)	273 (1.8)	278 (1.5)	243 (4.1)	250 (1.8)	264 (2.1)	271 (1.8)
Minnesota	**258 (3.6)**	**268 (1.6)**	**286 (1.4)**	**288 (1.4)**	**249 (5.5)**	**258 (2.0)**	**264 (1.6)**	**281 (1.3)**
Montana	**272 (3.4)**	**274 (2.1)**	**284 (2.0)**	**289 (1.4)**	**265 (3.9)**	**266 (2.7)**	**283 (2.3)**	**288 (1.6)**
Nebraska	**258 (3.0)**	**271 (1.6)**	**281 (1.5)**	**288 (1.2)**	**240 (7.2)**	**265 (2.0)**	**275 (2.1)**	**286 (1.8)**
New Hampshire	**256 (2.8)**	**263 (1.5)**	**277 (1.7)**	**284 (1.2)**	**258 (3.8)**	**259 (2.3)**	**273 (2.7)**	**283 (1.6)**
New Jersey	**256 (2.8)**	**265 (1.7)**	**273 (2.1)**	**285 (1.5)**	**245 (3.9)**	**256 (2.4)**	**268 (2.4)**	**280 (1.6)**
New Mexico	245 (1.8)	249 (1.6)	265 (1.3)	274 (1.7)	233 (3.2)	246 (2.1)	256 (1.5)	271 (1.9)
New York	245 (2.7)	255 (1.6)	267 (2.1)	276 (1.5)	233 (3.8)	245 (2.4)	259 (2.9)	269 (2.0)
North Carolina	240 (1.9)	247 (1.3)	262 (1.4)	268 (1.7)	221 (2.3)	233 (1.7)	250 (1.7)	256 (2.0)
North Dakota	263 (4.7)	278 (2.3)	289 (2.4)	292 (1.5)	245 (5.6)	274 (3.8)	280 (2.6)	287 (2.4)
Ohio	251 (2.2)	261 (1.2)	274 (1.3)	279 (1.6)	238 (3.5)	253 (1.9)	265 (2.2)	270 (1.8)
Oklahoma	**256 (3.0)**	**258 (1.6)**	**271 (1.8)**	**277 (1.7)**	**241 (3.9)**	**248 (2.1)**	**262 (2.1)**	**269 (2.2)**
Oregon	**252 (2.8)**	**261 (1.4)**	**278 (1.7)**	**281 (1.2)**	**248 (3.6)**	**253 (1.9)**	**275 (2.1)**	**280 (1.6)**
Pennsylvania	**253 (2.9)**	**260 (1.5)**	**273 (1.5)**	**283 (1.9)**	**242 (4.3)**	**253 (2.2)**	**269 (2.4)**	**281 (2.7)**
Rhode Island	**245 (2.4)**	**254 (1.3)**	**271 (2.0)**	**277 (1.0)**	**233 (2.9)**	**248 (1.6)**	**264 (2.5)**	**271 (1.4)**
Texas	**248 (1.8)**	**253 (1.7)**	**270 (1.7)**	**276 (1.5)**	**239 (2.0)**	**243 (1.9)**	**259 (2.6)**	**269 (1.7)**
Virginia	245 (2.5)	256 (1.4)	270 (1.5)	283 (2.0)	232 (2.5)	246 (1.7)	265 (2.5)	275 (2.4)
West Virginia	247 (2.0)	254 (1.3)	267 (1.9)	274 (1.5)	235 (2.2)	247 (1.4)	258 (2.4)	268 (2.2)
Wisconsin	257 (3.6)	273 (1.2)	281 (1.3)	287 (1.6)	249 (5.8)	267 (1.9)	276 (2.1)	284 (2.3)
Wyoming	260 (2.6)	266 (1.3)	278 (1.1)	283 (1.0)	253 (4.3)	257 (1.8)	275 (1.7)	280 (1.2)
TERRITORIES								
Guam	**229 (2.7)**	**234 (1.5)**	**255 (2.4)**	**249 (1.8)**	**212 (2.9)**	**222 (1.5)**	**240 (4.3)**	**239 (1.8)**
Virgin Islands	**220 (3.3)**	**228 (1.6)**	**238 (2.9)**	**228 (2.3)**	**208 (3.4)**	**213 (3.0)**	**225 (2.6)**	**218 (2.2)**

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Descriptions of the content area scales are found in Chapter Three. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students.

308

TABLE 12.9 | **Average Proficiency in Mathematics Content Areas by Parents' Highest Level of Education (continued)**

GRADE 8 PUBLIC SCHOOLS	Geometry				Data Analysis, Statistics, and Probability			
	Did Not Finish High School	Graduated High School	Some Education After High School	Graduated College	Did Not Finish High School	Graduated High School	Some Education After High School	Graduated College
NATION	242 (2.2)	252 (1.6)	262 (2.0)	270 (1.6)	240 (3.1)	253 (2.2)	269 (2.4)	276 (2.2)
Northeast	*** (***)	258 (3.2)	267 (3.4)	277 (3.8)	*** (***)	264 (4.6)	273 (3.4)	287 (3.5)
Southeast	237 (4.1)	242 (3.3)	253 (4.2)	263 (3.6)	234 (4.7)	242 (5.4)	260 (3.9)	267 (4.6)
Central	*** (***)	257 (3.4)	264 (4.9)	270 (4.3)	*** (***)	260 (3.2)	273 (4.7)	273 (4.5)
West	246 (4.9)	251 (3.6)	264 (3.9)	271 (2.3)	246 (6.2)	249 (3.2)	271 (4.9)	276 (4.3)
STATES								
Alabama	**235 (1.6)**	**241 (1.6)**	**253 (1.9)**	**259 (2.0)**	**233 (2.7)**	**242 (2.3)**	**260 (2.2)**	**264 (2.4)**
Arizona	**241 (2.1)**	**249 (1.5)**	**260 (2.0)**	**267 (1.5)**	**235 (2.6)**	**248 (2.2)**	**266 (2.4)**	**279 (1.6)**
Arkansas	**244 (1.9)**	**245 (1.4)**	**264 (1.8)**	**263 (1.6)**	**241 (2.7)**	**247 (1.5)**	**265 (2.1)**	**266 (1.7)**
California	**242 (2.5)**	**244 (1.8)**	**259 (2.4)**	**270 (1.7)**	**233 (3.3)**	**243 (2.5)**	**262 (2.9)**	**273 (2.1)**
Colorado	246 (2.2)	254 (1.5)	268 (1.5)	275 (1.4)	244 (3.4)	256 (1.9)	274 (1.6)	280 (1.3)
Connecticut	240 (3.6)	254 (2.1)	264 (1.7)	279 (1.1)	237 (4.4)	256 (2.3)	273 (2.2)	287 (1.3)
Delaware	238 (2.3)	247 (1.8)	258 (2.4)	270 (1.6)	239 (3.2)	246 (1.9)	269 (2.6)	278 (1.9)
District of Columbia	223 (3.0)	224 (1.5)	232 (1.8)	236 (1.7)	210 (2.9)	209 (1.7)	234 (2.5)	233 (2.5)
Florida	232 (3.2)	241 (1.5)	257 (1.6)	262 (1.6)	231 (3.1)	242 (2.1)	266 (2.2)	268 (2.2)
Georgia	**245 (2.4)**	**245 (1.9)**	**263 (1.7)**	**268 (2.1)**	**242 (2.2)**	**247 (1.9)**	**270 (2.2)**	**276 (2.5)**
Hawaii	**237 (3.4)**	**242 (1.3)**	**260 (1.6)**	**263 (1.4)**	**219 (4.1)**	**229 (2.1)**	**256 (2.8)**	**257 (1.6)**
Idaho	**253 (2.3)**	**261 (1.6)**	**271 (1.4)**	**275 (1.1)**	**254 (3.6)**	**263 (1.4)**	**276 (1.5)**	**283 (1.4)**
Illinois	**240 (2.8)**	**247 (1.6)**	**257 (2.0)**	**267 (2.0)**	**239 (4.3)**	**254 (2.0)**	**265 (2.1)**	**275 (2.6)**
Indiana	**250 (2.3)**	**256 (1.3)**	**267 (1.7)**	**274 (1.8)**	**247 (3.0)**	**261 (1.6)**	**274 (1.9)**	**281 (1.6)**
Iowa	259 (2.6)	265 (1.9)	278 (1.9)	282 (1.7)	263 (3.4)	272 (1.6)	286 (2.0)	288 (1.4)
Kentucky	236 (2.2)	249 (1.2)	265 (1.8)	263 (2.0)	236 (2.7)	253 (1.4)	272 (1.8)	272 (2.4)
Louisiana	227 (2.6)	238 (1.8)	249 (1.7)	250 (2.1)	227 (2.5)	238 (2.2)	254 (1.7)	253 (2.6)
Maryland	239 (3.0)	242 (1.4)	259 (1.8)	269 (1.8)	237 (3.3)	246 (1.9)	263 (2.5)	274 (1.7)
Michigan	246 (2.9)	254 (1.6)	264 (1.7)	270 (1.4)	243 (3.2)	255 (2.0)	271 (2.2)	274 (1.6)
Minnesota	**251 (3.9)**	**262 (1.8)**	**278 (1.3)**	**281 (1.2)**	**257 (4.0)**	**267 (1.5)**	**288 (1.3)**	**289 (1.2)**
Montana	**270 (3.0)**	**271 (2.1)**	**282 (2.7)**	**285 (1.2)**	**268 (3.1)**	**272 (1.9)**	**287 (1.9)**	**289 (1.1)**
Nebraska	**250 (5.6)**	**264 (1.7)**	**275 (1.9)**	**263 (1.4)**	**252 (4.5)**	**267 (1.8)**	**280 (2.2)**	**291 (1.4)**
New Hampshire	**259 (2.6)**	**259 (1.4)**	**274 (1.6)**	**281 (1.3)**	**248 (3.6)**	**263 (1.4)**	**280 (2.1)**	**287 (1.4)**
New Jersey	**250 (3.0)**	**254 (1.6)**	**266 (2.1)**	**278 (1.4)**	**248 (3.5)**	**258 (2.1)**	**275 (2.9)**	**283 (1.5)**
New Mexico	243 (2.3)	250 (1.4)	260 (1.3)	270 (1.5)	232 (2.2)	242 (1.8)	263 (1.9)	273 (2.0)
New York	242 (2.8)	252 (2.0)	262 (2.3)	271 (1.8)	239 (4.3)	255 (2.3)	269 (2.1)	278 (1.8)
North Carolina	234 (2.2)	241 (1.4)	256 (1.9)	262 (1.5)	225 (2.6)	236 (1.7)	261 (1.9)	263 (2.1)
North Dakota	253 (3.2)	268 (2.1)	279 (2.4)	285 (1.5)	259 (5.5)	278 (3.0)	288 (2.2)	293 (1.7)
Ohio	245 (2.3)	254 (1.4)	263 (1.6)	270 (1.5)	248 (3.5)	258 (1.5)	272 (1.6)	277 (1.7)
Oklahoma	**248 (2.0)**	**249 (1.4)**	**259 (1.7)**	**270 (1.8)**	**248 (3.4)**	**253 (2.1)**	**269 (2.1)**	**275 (2.1)**
Oregon	**249 (2.3)**	**257 (1.8)**	**274 (1.3)**	**278 (1.1)**	**249 (4.2)**	**259 (2.0)**	**278 (1.6)**	**285 (1.5)**
Pennsylvania	**247 (2.9)**	**254 (1.9)**	**269 (2.1)**	**276 (1.9)**	**244 (3.4)**	**257 (1.8)**	**272 (1.8)**	**284 (2.4)**
Rhode Island	**236 (1.9)**	**246 (1.5)**	**260 (1.8)**	**270 (1.2)**	**234 (3.1)**	**249 (1.5)**	**264 (2.4)**	**276 (1.2)**
Texas	**245 (2.2)**	**249 (2.1)**	**263 (1.9)**	**272 (1.4)**	**239 (2.3)**	**244 (2.3)**	**268 (2.1)**	**275 (2.2)**
Virginia	240 (2.3)	247 (1.5)	264 (1.8)	277 (2.2)	236 (2.6)	248 (1.9)	268 (2.0)	283 (2.4)
West Virginia	238 (2.0)	249 (1.0)	261 (1.8)	267 (1.6)	237 (2.5)	250 (1.2)	265 (2.1)	272 (1.8)
Wisconsin	254 (4.4)	266 (1.7)	275 (1.5)	281 (1.8)	253 (5.2)	271 (1.6)	281 (1.6)	289 (2.0)
Wyoming	256 (2.9)	262 (1.5)	274 (1.2)	277 (1.0)	258 (3.0)	263 (1.8)	280 (1.3)	282 (0.9)
TERRITORIES								
Guam	**225 (3.0)**	**232 (1.8)**	**250 (2.4)**	**245 (1.4)**	**169 (3.0)**	**208 (2.7)**	**233 (4.3)**	**228 (2.7)**
Virgin Islands	**218 (2.8)**	**225 (1.2)**	**227 (2.8)**	**223 (1.9)**	**160 (3.5)**	**200 (2.0)**	**214 (4.3)**	**200 (3.7)**

3:9

TABLE 12.9 | **Average Proficiency in Mathematics Content Areas by Parents' Highest Level of Education (continued)**

GRADE 8 PUBLIC SCHOOLS	Algebra and Functions			
	Did Not Finish High School	Graduated High School	Some Education After High School	Graduated College
NATION	242 (3.0)	253 (2.0)	263 (2.2)	273 (1.7)
Northeast	*** (***)	254 (2.9)	262 (2.9)	280 (3.6)
Southeast	240 (3.5)	247 (4.5)	260 (5.7)	270 (4.1)
Central	*** (***)	259 (3.4)	266 (3.7)	271 (3.1)
West	245 (5.1)	250 (2.4)	264 (3.2)	272 (2.6)
STATES				
Alabama	**239 (2.8)**	**245 (2.1)**	**256 (2.1)**	**261 (2.0)**
Arizona	**236 (3.6)**	**250 (1.9)**	**265 (2.0)**	**271 (1.7)**
Arkansas	**239 (2.1)**	**248 (1.5)**	**263 (1.7)**	**264 (1.5)**
California	**240 (2.7)**	**247 (1.7)**	**264 (2.0)**	**269 (2.1)**
Colorado	239 (2.9)	253 (1.7)	269 (1.5)	276 (1.6)
Connecticut	242 (2.7)	254 (1.9)	266 (2.0)	282 (1.1)
Delaware	243 (3.2)	247 (1.9)	263 (2.4)	274 (1.6)
District of Columbia	231 (2.6)	227 (1.6)	243 (1.8)	242 (1.9)
Florida	236 (2.6)	246 (1.7)	263 (2.0)	266 (1.7)
Georgia	**240 (1.9)**	**248 (1.7)**	**266 (2.1)**	**270 (2.5)**
Hawaii	**233 (3.4)**	**239 (1.8)**	**257 (1.9)**	**259 (1.5)**
Idaho	**249 (3.3)**	**258 (1.8)**	**273 (1.8)**	**277 (1.3)**
Illinois	**243 (3.2)**	**251 (1.8)**	**261 (2.2)**	**273 (1.9)**
Indiana	**253 (2.7)**	**258 (1.5)**	**269 (1.8)**	**276 (1.9)**
Iowa	257 (3.2)	266 (1.6)	279 (1.6)	281 (1.6)
Kentucky	240 (1.6)	251 (1.3)	268 (2.1)	267 (2.0)
Louisiana	235 (2.6)	241 (1.6)	253 (1.5)	254 (2.3)
Maryland	244 (3.1)	248 (1.8)	265 (2.5)	275 (2.0)
Michigan	248 (2.9)	255 (1.3)	268 (1.8)	274 (1.6)
Minnesota	**253 (4.0)**	**262 (1.4)**	**280 (1.3)**	**283 (1.5)**
Montana	**264 (3.0)**	**269 (2.4)**	**280 (1.7)**	**285 (1.1)**
Nebraska	**251 (5.9)**	**265 (1.7)**	**276 (1.5)**	**282 (1.3)**
New Hampshire	**249 (3.3)**	**260 (1.3)**	**274 (2.0)**	**281 (1.4)**
New Jersey	**250 (2.7)**	**259 (1.7)**	**267 (2.1)**	**280 (1.5)**
New Mexico	242 (1.9)	247 (1.7)	263 (1.7)	271 (1.9)
New York	244 (2.6)	253 (1.8)	264 (2.2)	272 (1.3)
North Carolina	233 (1.4)	243 (1.4)	259 (1.7)	265 (1.9)
North Dakota	253 (3.7)	266 (2.6)	276 (2.2)	283 (1.5)
Ohio	248 (2.8)	256 (1.4)	267 (1.7)	272 (1.4)
Oklahoma	**251 (2.9)**	**252 (1.8)**	**264 (1.5)**	**272 (1.5)**
Oregon	**249 (3.2)**	**258 (2.3)**	**276 (1.4)**	**277 (1.3)**
Pennsylvania	**245 (3.2)**	**254 (1.5)**	**269 (1.8)**	**279 (2.1)**
Rhode Island	**239 (3.2)**	**252 (1.4)**	**266 (2.1)**	**275 (1.3)**
Texas	**241 (2.0)**	**247 (1.8)**	**266 (2.1)**	**273 (1.9)**
Virginia	242 (2.8)	251 (1.6)	269 (2.0)	281 (2.2)
West Virginia	238 (2.0)	248 (1.3)	261 (1.9)	269 (1.6)
Wisconsin	250 (3.9)	265 (1.5)	272 (1.7)	281 (1.9)
Wyoming	254 (3.1)	260 (1.3)	273 (1.3)	279 (1.1)
TERRITORIES				
Guam	**219 (2.9)**	**236 (1.8)**	**247 (2.4)**	**241 (1.7)**
Virgin Islands	**207 (3.3)**	**221 (2.0)**	**227 (3.3)**	**223 (2.0)**

TABLE 12.10 | Average Mathematics Proficiency by Gender

GRADE 8 PUBLIC SCHOOLS	Male		Female	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	51 (1.1)	262 (1.8)	49 (1.1)	260 (1.3)
Northeast	50 (2.1)	270 (4.1)	50 (2.1)	268 (3.2)
Southeast	49 (2.8)	252 (3.2)	51 (2.8)	253 (2.5)
Central	50 (1.4)	267 (3.3)	50 (1.4)	264 (2.8)
West	55 (2.1)	262 (3.5)	45 (2.1)	259 (2.6)
STATES				
Alabama	**50 (1.0)**	**254 (1.5)**	**50 (1.0)**	**251 (1.2)**
Arizona	**50 (0.9)**	**263 (1.4)**	**50 (0.9)**	**258 (1.2)**
Arkansas	**50 (1.1)**	**257 (1.2)**	**50 (1.1)**	**255 (1.0)**
California	**51 (0.9)**	**258 (1.8)**	**49 (0.9)**	**255 (1.2)**
Colorado	51 (1.0)	269 (1.0)	49 (1.0)	265 (1.3)
Connecticut	48 (0.8)	271 (1.2)	52 (0.8)	269 (1.4)
Delaware	52 (1.2)	260 (1.3)	48 (1.2)	261 (1.2)
District of Columbia	47 (0.9)	229 (1.1)	53 (0.9)	232 (0.9)
Florida	51 (1.1)	257 (1.6)	49 (1.1)	253 (1.3)
Georgia	**51 (0.8)**	**259 (1.6)**	**49 (0.8)**	**258 (1.4)**
Hawaii	**53 (1.0)**	**248 (1.0)**	**47 (1.0)**	**254 (1.1)**
Idaho	**52 (1.2)**	**273 (0.9)**	**48 (1.2)**	**270 (0.8)**
Illinois	**52 (1.1)**	**260 (2.0)**	**48 (1.1)**	**260 (1.7)**
Indiana	**51 (0.9)**	**269 (1.4)**	**49 (0.9)**	**264 (1.3)**
Iowa	50 (1.2)	281 (1.2)	50 (1.2)	276 (1.2)
Kentucky	51 (1.1)	258 (1.4)	49 (1.1)	255 (1.1)
Louisiana	50 (1.1)	247 (1.3)	50 (1.1)	244 (1.5)
Maryland	51 (0.8)	261 (1.5)	49 (0.8)	260 (1.6)
Michigan	52 (1.0)	265 (1.4)	48 (1.0)	263 (1.2)
Minnesota	**50 (1.0)**	**276 (1.1)**	**50 (1.0)**	**275 (1.0)**
Montana	**51 (1.4)**	**284 (1.1)**	**49 (1.4)**	**277 (1.2)**
Nebraska	**52 (1.2)**	**277 (1.2)**	**48 (1.2)**	**275 (1.1)**
New Hampshire	**53 (1.1)**	**273 (0.9)**	**47 (1.1)**	**274 (1.3)**
New Jersey	**51 (1.0)**	**271 (1.3)**	**49 (1.0)**	**268 (1.2)**
New Mexico	50 (1.2)	259 (1.1)	50 (1.2)	253 (1.0)
New York	49 (1.3)	262 (1.5)	51 (1.3)	259 (1.6)
North Carolina	51 (1.0)	249 (1.2)	49 (1.0)	250 (1.1)
North Dakota	51 (1.6)	284 (1.4)	49 (1.6)	278 (1.5)
Ohio	53 (0.9)	266 (1.2)	47 (0.9)	261 (1.3)
Oklahoma	**50 (0.9)**	**265 (1.4)**	**50 (0.9)**	**260 (1.4)**
Oregon	**52 (0.9)**	**272 (1.3)**	**48 (0.9)**	**271 (1.0)**
Pennsylvania	**51 (1.1)**	**269 (1.7)**	**49 (1.1)**	**264 (1.8)**
Rhode Island	**50 (0.9)**	**261 (0.9)**	**50 (0.9)**	**258 (0.9)**
Texas	**50 (1.0)**	**259 (1.5)**	**50 (1.0)**	**256 (1.4)**
Virginia	49 (0.9)	265 (1.9)	51 (0.9)	262 (1.4)
West Virginia	52 (1.1)	256 (1.3)	48 (1.1)	255 (1.0)
Wisconsin	50 (1.1)	275 (1.3)	50 (1.1)	274 (1.5)
Wyoming	51 (0.8)	274 (0.6)	49 (0.8)	270 (0.8)
TERRITORIES				
Guam	**51 (1.2)**	**231 (1.2)**	**49 (1.2)**	**231 (1.1)**
Virgin Islands	**49 (1.1)**	**220 (0.9)**	**51 (1.1)**	**215 (1.0)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

311

TABLE 12.11 | Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale by Gender

GRADE 8 PUBLIC SCHOOLS	Level 200		Level 250		Level 300		Level 350	
	Male	Female	Male	Female	Male	Female	Male	Female
NATION	97 (0.9)	97 (0.8)	64 (2.0)	64 (1.8)	14 (1.7)	10 (1.3)	0 (0.4)	0 (0.1)
Northeast	99 (0.7)	99 (0.7)	72 (5.6)	72 (4.5)	19 (3.3)	13 (3.8)	0 (1.0)	0 (0.5)
Southeast	93 (3.0)	95 (1.9)	50 (3.6)	54 (3.8)	10 (1.9)	7 (2.0)	0 (0.0)	0 (0.0)
Central	99 (0.6)	98 (1.2)	68 (3.3)	71 (4.0)	14 (4.8)	9 (2.3)	0 (0.5)	0 (0.0)
West	97 (1.2)	96 (1.0)	65 (4.1)	61 (3.2)	13 (3.1)	11 (2.2)	0 (0.7)	0 (0.2)
STATES								
Alabama	**96 (0.7)**	**95 (1.0)**	**54 (2.1)**	**51 (1.9)**	**8 (1.0)**	**6 (0.8)**	**0 (0.1)**	**0 (0.1)**
Arizona	**98 (0.4)**	**97 (0.6)**	**64 (2.2)**	**58 (2.0)**	**12 (1.2)**	**8 (1.0)**	**0 (0.2)**	**0 (0.1)**
Arkansas	**96 (0.7)**	**97 (0.7)**	**58 (2.0)**	**57 (2.1)**	**8 (1.1)**	**5 (0.9)**	**0 (0.0)**	**0 (0.0)**
California	**96 (1.3)**	**94 (1.0)**	**57 (1.9)**	**55 (1.9)**	**12 (1.4)**	**9 (1.0)**	**0 (0.2)**	**0 (0.0)**
Colorado	99 (0.3)	98 (0.5)	73 (1.7)	71 (1.9)	15 (1.0)	13 (1.2)	0 (0.1)	0 (0.0)
Connecticut	98 (0.6)	98 (0.5)	73 (1.7)	72 (1.7)	20 (1.3)	18 (1.4)	0 (0.2)	0 (0.1)
Delaware	96 (0.8)	98 (0.7)	59 (2.1)	62 (1.8)	13 (1.2)	13 (1.4)	1 (0.3)	0 (0.3)
District of Columbia	86 (1.3)	87 (1.1)	22 (1.6)	25 (1.7)	2 (0.7)	2 (0.5)	0 (0.1)	0 (0.2)
Florida	96 (0.9)	96 (0.7)	55 (2.3)	53 (1.8)	12 (1.2)	8 (1.1)	0 (0.1)	0 (0.0)
Georgia	**96 (0.7)**	**97 (0.6)**	**59 (1.8)**	**59 (2.0)**	**13 (1.6)**	**11 (1.2)**	**0 (0.2)**	**0 (0.1)**
Hawaii	**92 (0.9)**	**94 (0.8)**	**45 (1.6)**	**54 (1.9)**	**9 (0.8)**	**11 (0.9)**	**0 (0.2)**	**0 (0.2)**
Idaho	**100 (0.3)**	**99 (0.3)**	**80 (1.4)**	**79 (1.2)**	**17 (1.3)**	**12 (1.0)**	**0 (0.2)**	**0 (0.1)**
Illinois	**96 (1.0)**	**96 (0.7)**	**63 (2.5)**	**64 (2.5)**	**12 (1.5)**	**11 (1.3)**	**0 (0.2)**	**0 (0.1)**
Indiana	**99 (0.4)**	**99 (0.6)**	**73 (1.8)**	**69 (2.3)**	**16 (1.5)**	**11 (1.5)**	**0 (0.2)**	**0 (0.1)**
Iowa	100 (0.1)	100 (0.3)	86 (1.2)	82 (2.0)	24 (1.8)	18 (1.5)	1 (0.3)	0 (0.3)
Kentucky	98 (0.6)	98 (0.6)	58 (2.0)	56 (2.1)	10 (1.1)	6 (1.1)	0 (0.1)	0 (0.0)
Louisiana	95 (0.9)	93 (1.0)	44 (2.0)	42 (2.2)	5 (0.7)	3 (0.7)	0 (0.1)	0 (0.0)
Maryland	96 (0.6)	96 (0.7)	60 (1.6)	61 (2.2)	15 (1.3)	14 (1.4)	0 (0.1)	0 (0.2)
Michigan	98 (0.6)	98 (0.5)	68 (1.9)	66 (1.7)	14 (1.3)	12 (1.2)	0 (0.1)	0 (0.2)
Minnesota	**99 (0.4)**	**99 (0.3)**	**81 (1.3)**	**82 (1.3)**	**22 (1.5)**	**19 (1.2)**	**0 (0.2)**	**0 (0.2)**
Montana	**100 (0.1)**	**100 (0.1)**	**89 (1.4)**	**87 (1.5)**	**28 (1.9)**	**19 (2.4)**	**0 (0.3)**	**0 (0.1)**
Nebraska	**99 (0.5)**	**99 (0.5)**	**82 (1.4)**	**81 (1.4)**	**22 (1.6)**	**20 (1.7)**	**1 (0.4)**	**0 (0.1)**
New Hampshire	**99 (0.4)**	**100 (0.2)**	**79 (1.3)**	**80 (2.3)**	**17 (1.3)**	**16 (1.6)**	**0 (0.2)**	**0 (0.3)**
New Jersey	**99 (0.4)**	**98 (0.5)**	**73 (1.9)**	**70 (1.8)**	**20 (1.7)**	**17 (1.4)**	**0 (0.3)**	**0 (0.3)**
New Mexico	98 (0.6)	97 (0.8)	60 (2.0)	53 (1.5)	10 (1.1)	8 (1.0)	0 (0.2)	0 (0.0)
New York	97 (0.8)	96 (0.9)	64 (2.2)	61 (2.3)	14 (1.4)	12 (1.1)	0 (0.2)	0 (0.1)
North Carolina	94 (0.9)	94 (0.6)	48 (1.7)	50 (1.7)	7 (0.8)	7 (0.9)	0 (0.0)	0 (0.0)
North Dakota	100 (0.3)	99 (0.3)	90 (1.5)	87 (2.2)	27 (2.3)	21 (2.0)	1 (0.6)	0 (0.3)
Ohio	98 (0.4)	98 (0.6)	70 (1.7)	63 (1.9)	14 (1.3)	11 (1.1)	0 (0.1)	0 (0.0)
Oklahoma	**99 (0.4)**	**98 (0.6)**	**70 (2.4)**	**64 (2.1)**	**11 (1.2)**	**9 (1.2)**	**0 (0.1)**	**0 (0.1)**
Oregon	**99 (0.3)**	**99 (0.2)**	**76 (1.8)**	**75 (1.5)**	**21 (1.5)**	**16 (1.0)**	**0 (0.1)**	**0 (0.1)**
Pennsylvania	**98 (0.5)**	**98 (0.7)**	**71 (2.3)**	**67 (2.6)**	**18 (1.7)**	**12 (1.3)**	**0 (0.2)**	**0 (0.2)**
Rhode Island	**96 (0.8)**	**95 (0.7)**	**62 (1.5)**	**60 (1.3)**	**13 (1.2)**	**11 (0.9)**	**0 (0.2)**	**0 (0.1)**
Texas	**97 (0.7)**	**97 (0.8)**	**60 (2.2)**	**57 (2.1)**	**12 (1.2)**	**9 (1.1)**	**0 (0.1)**	**0 (0.1)**
Virginia	98 (0.5)	97 (0.6)	64 (2.2)	63 (1.7)	17 (2.0)	13 (1.5)	1 (0.6)	0 (0.3)
West Virginia	98 (0.5)	98 (0.8)	57 (2.1)	56 (1.8)	9 (1.1)	6 (0.8)	0 (0.0)	0 (0.0)
Wisconsin	99 (0.3)	99 (0.5)	80 (1.7)	80 (1.7)	21 (1.6)	19 (1.8)	0 (0.2)	0 (0.3)
Wyoming	100 (0.2)	100 (0.2)	82 (1.3)	78 (1.5)	18 (1.0)	11 (1.0)	0 (0.2)	0 (0.0)
TERRITORIES								
Guam	**81 (1.3)**	**81 (1.6)**	**28 (1.7)**	**26 (1.7)**	**3 (0.7)**	**3 (0.8)**	**0 (0.1)**	**0 (0.0)**
Virgin Islands	**79 (2.6)**	**73 (2.2)**	**12 (1.0)**	**10 (1.1)**	**1 (0.4)**	**0 (0.2)**	**0 (0.0)**	**0 (0.0)**

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent. Descriptions of mathematics proficiency at the four anchor levels are found in Chapter One.

TABLE 12.12 | **Average Proficiency in Mathematics Content Areas by Gender**

GRADE 8 PUBLIC SCHOOLS	Numbers and Operations		Measurement		Geometry		Data Analysis, Statistics, and Probability		Algebra and Functions	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
NATION	266 (2.0)	266 (1.4)	262 (2.3)	253 (1.6)	260 (1.7)	258 (1.5)	262 (2.1)	261 (1.9)	260 (1.6)	260 (1.4)
Northeast	272 (3.9)	270 (3.1)	271 (5.9)	261 (4.3)	269 (4.0)	266 (4.1)	274 (4.1)	273 (3.6)	266 (4.1)	268 (3.7)
Southeast	257 (3.6)	261 (2.9)	249 (4.4)	243 (4.0)	249 (3.2)	248 (2.4)	249 (3.9)	251 (3.7)	253 (3.2)	255 (2.6)
Central	271 (3.9)	270 (2.7)	267 (4.8)	259 (3.4)	264 (3.7)	260 (3.1)	265 (3.4)	265 (4.0)	263 (2.2)	262 (2.8)
West	264 (3.8)	263 (2.5)	263 (3.5)	252 (2.9)	261 (3.4)	259 (2.9)	264 (4.1)	260 (4.0)	260 (3.3)	259 (2.8)
STATES										
Alabama	259 (1.5)	258 (1.4)	251 (1.8)	244 (1.8)	251 (1.5)	246 (1.4)	253 (2.0)	246 (1.8)	250 (1.8)	252 (1.5)
Arizona	267 (1.5)	262 (1.3)	263 (1.5)	251 (1.7)	260 (1.4)	253 (1.2)	262 (1.8)	254 (1.5)	259 (1.6)	257 (1.4)
Arkansas	262 (1.2)	262 (1.0)	258 (1.8)	249 (1.5)	255 (1.5)	251 (1.1)	255 (1.4)	253 (1.8)	252 (1.8)	253 (1.2)
California	260 (1.6)	259 (1.3)	258 (1.8)	247 (1.6)	258 (1.7)	253 (1.5)	257 (2.2)	252 (1.7)	256 (1.7)	256 (1.5)
Colorado	271 (1.0)	267 (1.3)	269 (1.4)	261 (1.6)	268 (1.3)	263 (1.5)	271 (1.1)	267 (1.5)	266 (1.1)	266 (1.5)
Connecticut	275 (1.2)	272 (1.4)	272 (1.7)	265 (1.9)	268 (1.2)	265 (1.5)	274 (1.6)	269 (1.7)	267 (1.4)	269 (1.5)
Delaware	264 (1.6)	266 (1.4)	259 (2.0)	256 (1.6)	257 (1.3)	256 (1.7)	260 (1.6)	262 (1.6)	257 (1.4)	262 (1.4)
District of Columbia	236 (1.1)	240 (1.1)	222 (1.4)	220 (1.4)	228 (1.3)	231 (1.0)	221 (1.7)	222 (1.4)	232 (1.8)	237 (1.3)
Florida	260 (1.6)	260 (1.2)	256 (2.1)	247 (1.7)	254 (1.7)	248 (1.4)	257 (2.0)	252 (1.7)	255 (1.8)	255 (1.4)
Georgia	262 (1.6)	263 (1.3)	256 (1.9)	248 (1.8)	258 (1.8)	255 (1.5)	260 (1.9)	260 (1.7)	256 (1.9)	258 (1.7)
Hawaii	253 (1.3)	260 (1.3)	248 (1.1)	250 (1.5)	249 (1.2)	256 (1.1)	240 (1.3)	245 (1.6)	245 (1.3)	252 (1.3)
Idaho	275 (1.0)	273 (0.9)	274 (1.3)	267 (1.3)	271 (1.2)	267 (1.0)	275 (1.1)	273 (1.0)	268 (1.0)	270 (1.2)
Illinois	265 (2.0)	265 (1.7)	259 (2.3)	253 (2.3)	256 (2.0)	256 (1.8)	261 (2.3)	262 (2.1)	258 (2.0)	262 (1.7)
Indiana	273 (1.5)	266 (1.4)	269 (1.7)	258 (1.8)	267 (1.4)	262 (1.2)	271 (1.6)	266 (1.7)	267 (1.5)	264 (1
Iowa	285 (1.2)	280 (1.4)	281 (1.8)	272 (1.7)	277 (1.4)	273 (1.4)	283 (1.3)	278 (1.6)	275 (1.5)	273 (1
Kentucky	262 (1.6)	259 (1.1)	257 (1.7)	249 (1.7)	254 (1.5)	251 (1.3)	259 (1.5)	256 (1.7)	255 (1.4)	257 (1.3)
Louisiana	253 (1.4)	252 (1.4)	245 (1.7)	236 (1.7)	244 (1.5)	239 (1.5)	245 (1.7)	240 (2.0)	245 (1.5)	245 (1.6)
Maryland	264 (1.4)	264 (1.6)	260 (1.8)	252 (2.2)	257 (1.5)	256 (1.7)	261 (1.7)	260 (1.8)	260 (1.8)	265 (1.8)
Michigan	268 (1.6)	268 (1.3)	264 (1.7)	255 (1.6)	262 (1.3)	261 (1.1)	265 (1.8)	263 (1.7)	264 (1.5)	265 (1.4)
Minnesota	279 (1.2)	279 (1.2)	276 (1.3)	268 (1.4)	273 (1.4)	272 (1.2)	279 (1.2)	279 (1.2)	272 (1.2)	275 (1.1)
Montana	265 (1.3)	279 (1.5)	265 (1.8)	274 (1.9)	263 (1.2)	276 (1.6)	265 (1.3)	279 (1.2)	279 (1.4)	277 (1.4)
Nebraska	260 (1.3)	279 (1.2)	279 (1.9)	269 (1.5)	275 (1.4)	272 (1.3)	279 (1.4)	278 (1.3)	272 (1.3)	274 (1.4)
New Hampshire	275 (1.1)	274 (1.4)	273 (1.8)	272 (1.8)	271 (1.0)	273 (1.4)	276 (1.3)	275 (1.5)	269 (1.2)	274 (1.5)
New Jersey	275 (1.2)	272 (1.3)	272 (1.7)	262 (1.7)	267 (1.5)	265 (1.2)	272 (1.6)	267 (1.6)	268 (1.4)	269 (1.3)
New Mexico	260 (1.1)	256 (1.1)	260 (1.5)	246 (1.3)	260 (1.1)	254 (1.1)	256 (1.7)	249 (1.5)	257 (1.2)	255 (1.2)
New York	265 (1.6)	262 (1.7)	259 (1.9)	251 (2.0)	261 (1.6)	258 (1.7)	265 (2.1)	262 (2.3)	261 (1.5)	260 (1.5)
North Carolina	254 (1.3)	256 (1.1)	244 (1.4)	239 (1.3)	250 (1.2)	248 (1.2)	247 (1.6)	247 (1.5)	248 (1.3)	254 (1.2)
North Dakota	289 (1.7)	283 (1.8)	286 (2.2)	274 (2.3)	279 (1.6)	276 (1.7)	290 (1.6)	281 (1.8)	276 (1.3)	275 (1.7)
Ohio	271 (1.2)	266 (1.3)	265 (1.8)	253 (1.6)	263 (1.2)	257 (1.4)	269 (1.5)	263 (1.4)	263 (1.2)	261 (1.4)
Oklahoma	269 (1.4)	266 (1.5)	263 (1.8)	253 (1.9)	262 (1.6)	257 (1.5)	267 (2.0)	261 (1.7)	262 (1.5)	262 (1.4)
Oregon	274 (1.3)	273 (1.0)	272 (1.8)	266 (1.5)	271 (1.2)	268 (1.3)	275 (1.7)	274 (1.4)	269 (1.8)	271 (1.2)
Pennsylvania	272 (1.7)	267 (1.8)	271 (2.3)	258 (2.2)	266 (1.8)	261 (1.8)	271 (2.0)	264 (2.1)	265 (1.9)	264 (1.8)
Rhode Island	265 (1.0)	262 (1.0)	262 (1.5)	251 (1.1)	257 (0.9)	255 (0.9)	259 (1.1)	258 (1.1)	260 (1.4)	261 (1.2)
Texas	264 (1.5)	260 (1.4)	258 (1.8)	250 (1.8)	260 (1.5)	256 (1.8)	258 (2.0)	255 (1.9)	257 (1.7)	256 (1.7)
Virginia	269 (1.9)	267 (1.3)	264 (2.1)	255 (1.9)	263 (1.9)	258 (1.5)	265 (2.2)	262 (1.7)	264 (2.1)	266 (1.5)
West Virginia	261 (1.3)	259 (1.1)	255 (1.7)	249 (1.4)	255 (1.4)	253 (1.1)	256 (1.6)	255 (1.3)	253 (1.6)	254 (1.2)
Wisconsin	279 (1.3)	277 (1.4)	276 (1.7)	270 (2.1)	272 (1.5)	272 (1.7)	278 (1.6)	276 (1.7)	270 (1.4)	272 (1.7)
Wyoming	277 (0.8)	272 (0.9)	275 (1.1)	265 (1.3)	273 (0.7)	267 (1.0)	277 (1.0)	270 (0.9)	269 (1.0)	270 (1.0)
TERRITORIES										
Guam	238 (1.1)	240 (1.3)	230 (1.5)	223 (1.3)	237 (1.3)	235 (1.3)	213 (1.8)	213 (1.9)	230 (1.3)	230 (1.4)
Virgin Islands	229 (1.0)	226 (1.2)	220 (1.9)	209 (1.8)	225 (1.2)	220 (0.8)	196 (1.9)	193 (1.6)	221 (1.3)	216 (1.3)

The standard errors of the estimated proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Descriptions of the content area scales are found in Chapter Three.

TABLE 12.13 | **Mathematics Proficiency for Students in the Top One-Third of the NAEP Schools**

GRADE 8 PUBLIC SCHOOLS	Percent of Students	Average Proficiency	Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale			
			Level 200	Level 250	Level 300	Level 350
NATION	41 (5.2)	277 (1.5)	100 (0.2)	81 (1.8)	21 (2.1)	0 (0.4)
Northeast	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Southeast	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Central	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
West	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
STATES						
Alabama	**33 (3.7)**	**267 (1.3)**	**99 (0.4)**	**72 (1.9)**	**13 (1.5)**	**0 (0.1)**
Arizona	**36 (3.3)**	**274 (1.0)**	**100 (0.3)**	**81 (1.7)**	**18 (1.7)**	**0 (0.2)**
Arkansas	**32 (3.5)**	**270 (1.2)**	**100 (0.3)**	**77 (2.2)**	**13 (1.4)**	**0 (0.0)**
California	**33 (3.8)**	**275 (1.5)**	**99 (0.8)**	**78 (1.8)**	**21 (1.8)**	**0 (0.2)**
Colorado	34 (3.8)	281 (1.1)	100 (0.0)	88 (1.5)	23 (1.8)	0 (0.0)
Connecticut	31 (2.8)	290 (1.0)	100 (0.0)	92 (1.3)	36 (1.5)	1 (0.4)
Delaware	31 (0.2)	275 (1.5)	99 (0.5)	76 (2.8)	24 (2.3)	1 (0.7)
District of Columbia	36 (0.2)	247 (1.5)	95 (1.4)	44 (2.4)	6 (1.4)	0 (0.4)
Florida	34 (4.0)	272 (1.2)	99 (0.3)	75 (2.1)	19 (2.0)	0 (0.1)
Georgia	**34 (3.8)**	**277 (1.5)**	**99 (0.4)**	**80 (1.8)**	**24 (2.1)**	**1 (0.4)**
Hawaii	**39 (0.3)**	**264 (1.1)**	**98 (0.8)**	**65 (1.8)**	**16 (1.0)**	**0 (0.3)**
Idaho	**39 (0.9)**	**280 (1.2)**	**100 (0.4)**	**88 (1.2)**	**23 (2.0)**	**0 (0.2)**
Illinois	**31 (3.9)**	**282 (1.3)**	**100 (0.1)**	**88 (1.5)**	**25 (1.9)**	**1 (0.3)**
Indiana	**34 (5.1)**	**280 (1.2)**	**100 (0.1)**	**86 (1.5)**	**24 (2.2)**	**0 (0.3)**
Iowa	30 (4.4)	290 (1.6)	100 (0.0)	94 (1.0)	35 (2.8)	1 (0.5)
Kentucky	31 (4.2)	269 (1.2)	[illegible] (0.3)	74 (1.9)	15 (1.8)	0 (0.1)
Louisiana	34 (3.5)	262 (1.9)	98 (0.6)	65 (2.9)	8 (1.4)	0 (0.1)
Maryland	33 (4.0)	282 (1.5)	100 (0.3)	84 (1.2)	30 (2.1)	1 (0.4)
Michigan	32 (4.2)	280 (1.2)	100 (0.0)	86 (1.6)	25 (1.9)	0 (0.3)
Minnesota	**32 (4.2)**	**286 (0.9)**	**100 (0.0)**	**91 (1.2)**	**30 (1.8)**	**0 (0.4)**
Montana	**35 (2.3)**	**290 (0.9)**	**100 (0.0)**	**95 (1.4)**	**35 (3.3)**	**1 (0.4)**
Nebraska	**35 (3.3)**	**290 (1.0)**	**100 (0.0)**	**94 (1.3)**	**35 (1.9)**	**1 (0.5)**
New Hampshire	**33 (1.0)**	**286 (1.4)**	**100 (0.1)**	**90 (1.8)**	**30 (1.9)**	**1 (0.4)**
New Jersey	**31 (3.9)**	**290 (1.1)**	**100 (0.1)**	**93 (0.9)**	**37 (2.1)**	**1 (0.5)**
New Mexico	36 (0.8)	270 (1.2)	100 (0.2)	75 (2.0)	15 (2.0)	0 (0.0)
New York	30 (3.8)	280 (0.9)	100 (0.0)	86 (1.6)	23 (1.6)	1 (0.3)
North Carolina	33 (4.0)	264 (1.3)	97 (0.7)	66 (1.9)	15 (1.8)	0 (0.0)
North Dakota	46 (2.9)	291 (1.1)	100 (0.0)	95 (1.1)	35 (2.9)	1 (0.7)
Ohio	34 (4.4)	278 (1.1)	100 (0.3)	84 (1.1)	21 (1.4)	0 (0.0)
Oklahoma	**34 (4.3)**	**277 (1.1)**	**100 (0.4)**	**85 (1.8)**	**20 (1.8)**	**0 (0.0)**
Oregon	**32 (4.2)**	**283 (1.2)**	**100 (0.2)**	**48 (1.4)**	**29 (1.8)**	**0 (0.2)**
Pennsylvania	**32 (4.4)**	**284 (1.5)**	**100 (0.0)**	**89 (1.3)**	**28 (2.4)**	**1 (0.4)**
Rhode Island	**30 (0.5)**	**279 (1.2)**	**100 (0.[illegible]**	**83 (1.1)**	**24 (1.9)**	**0 (0.3)**
Texas	**32 (4.3)**	**274 (1.2)**	**100 (0.2)**	**81 (1.8)**	**18 (1.9)**	**0 (0.2)**
Virginia	35 (3.9)	286 (2.3)	100 (0.1)	88 (1.3)	33 (3.6)	2 (1.0)
West Virginia	35 (4.8)	266 (1.0)	99 (0.3)	70 (1.6)	14 (1.7)	0 (0.0)
Wisconsin	36 (4.9)	287 (1.2)	100 (0.1)	92 (1.1)	32 (2.9)	1 (0.5)
Wyoming	29 (0.6)	281 (1.1)	100 (0.0)	89 (1.3)	23 (1.7)	0 (0.2)
TERRITORIES						
Guam	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Virgin Islands	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent.
***The number of schools or students was considered insufficient for this analysis.

TABLE 12.14 | **Percentage of Students Within Selected Demographic Subgroups in the Top One-Third of the Schools**

GRADE 8 PUBLIC SCHOOLS	Percentage of Students by Race/Ethnicity					Percentage of Students by Type of Community			
	White	Black	Hispanic	Asian / Pacific Islander	American Indian	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other
NATION	49 (6.2)	14 (3.8)!	24 (7.2)!	40(12.1)!	21(16.5)!	100 (0.0)	8 (8.8)!	27(16.2)!	39 (6.0)
Northeast	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Southeast	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Central	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
West	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
STATES									
Alabama	42 (4.7)	14 (3.0)!	20 (5.7)!	*** (***)	*** (***)	68(14.2)!	5 (7.7)!	16 (9.7)!	36 (6.4)
Arizona	48 (3.7)	23 (6.3)!	17 (3.3)	*** (***)	7 (3.7)!	80(12.0)	13(10.6)!	9 (7.9)!	34 (4.9)
Arkansas	42 (4.4)	3 (1.5)!	16 (5.3)!	*** (***)	*** (***)	63(22.3)!	14(14.9)!	28 (8.2)!	36 (4.8)
California	48 (5.5)	16 (3.2)	16 (2.8)	33 (5.6)	*** (***)	92 (7.1)!	6 (6.3)!	0 (0.0)	3C (5.1)!
Colorado	41 (4.4)	6 (2.5)!	14 (3.0)	*** (***)	*** (***)	76 (6.6)	0 (0.0)	18(10.5)!	20 (5.0)!
Connecticut	38 (3.3)	7 (1.5)	8 (2.1)!	*** (***)	*** (***)	70 (5.8)	0 (0.0)	0 (0.0)	16 (4.5)!
Delaware	33 (0.7)	25 (2.1)	16 (4.1)!	*** (***)	*** (***)	100 (0.0)	0 (0.0)	7 (0.1)	30 (0.3)
District of Columbia	*** (***)	35 (0.7)	33 (3.5)	*** (***)	*** (***)	100 (0.0)	18 (0.2)	0 (0.0)	50 (0.5)
Florida	41 (4.6)	15 (3.4)!	27 (7.0)!	38 (8.0)!	*** (***)	81(11.4)!	0 (0.0)	0 (0.0)	38 (6.1)
Georgia	47 (4.7)	12 (3.1)!	20 (3.8)	*** (***)	*** (***)	100 (0.0)	0 (0.0)	14 (9.0)!	29 (5.9)!
Hawaii	49 (2.3)	*** (***)	35 (2.5)	37 (0.8)	*** (***)	100 (0.0)	14 (0.7)	0 (0.0)	38 (0.4)
Idaho	40 (1.1)	*** (***)	31 (4.9)!	*** (***)	20 (8.6)!	*** (***)	*** (***)	18 (5.2)!	45 (1.2)
Illinois	39 (4.8)	11 (4.5)!	12 (3.8)!	52(11.4)!	*** (***)	84 (8.2)	0 (0.0)	25 (8.7)!	26 (7.2)!
Indiana	36 (5.4)	4 (2.1)!	25 (7.4)!	*** (***)	*** (***)	62(13.9)!	0 (0.0)	20(11.3)!	40 (7.0)!
Iowa	31 (4.5)	*** (***)	18 (4.3)!	*** (***)	*** (***)	100 (0.0)	0 (0.0)	29 (6.9)!	27 (6.6)!
Kentucky	33 (4.3)	24 (6.7)!	15 (4.3)!	*** (***)	*** (***)	68(16.0)!	10 (9.9)!	12 (5.0)!	43 (7.0)
Louisiana	45 (5.3)	20 (3.1)	25 (5.2)!	*** (***)	*** (***)	100 (0.0)	11 (7.4)!	6 (6.6)!	40 (7.1)
Maryland	42 (5.0)	13 (2.9)!	23 (4.5)	66 (8.5)!	*** (***)	69 (8.8)!	0 (0.0)	0 (0.0)	29 (7.2)!
Michigan	36 (4.9)	9 (2.5)!	20 (5.7)!	*** (***)	*** (***)	73(11.5)!	0 (0.0)	33(14.6)!	24 (6.3)!
Minnesota	33 (4.4)	8 (3.3)!	18 (5.8)!	31 (6.6)!	*** (***)	34 (8.4)!	0 (0.0)	33 (9.9)!	38 (6.8)
Montana	38 (2.5)	*** (***)	15 (3.4)!	*** (***)	7 (2.3)!	*** (***)	0 (0.0)	25 (6.3)!	38 (1.8)
Nebraska	37 (3.6)	5 (2.4)!	22 (6.0)!	*** (***)	*** (***)	64 (1.3)	*** (***)	35 (8.6)!	25 (3.4)
New Hampshire	33 (1.0)	*** (***)	30 (6.6)!	*** (***)	*** (***)	61 (2.8)	0 (0.0)	61(12.0)	32 (1.1)
New Jersey	39 (5.1)	6 (2.5)!	10 (1.6)	58 (7.3)	*** (***)	65(12.7)	0 (0.0)	0 (0.0)	23 (5.3)!
New Mexico	53 (1.8)	*** (***)	26 (1.4)	*** (***)	9 (1.4)	100 (0.0)	35 (1.1)	34 (3.5)	31 (0.7)
New York	43 (5.3)	4 (1.7)!	6 (2.5)!	35(10.4)!	*** (***)	67(14.3)!	0 (0.0)	33(35.1)!	42 (7.3)
North Carolina	39 (4.8)	26 (4.2)	12 (3.9)!	*** (***)	5 (3.4)!	75(20.2)!	52(29.9)!	21 (9.4)!	33 (5.0)
North Dakota	48 (3.0)	*** (***)	43 (7.8)!	*** (***)	5 (2.5)!	59 (1.0)	*** (***)	42 (6.3)!	49 (2.9)
Ohio	38 (4.8)	6 (2.2)!	17 (5.2)!	*** (***)	*** (***)	91 (7.8)!	7 (7.4)!	19(10.6)!	29 (5.6)
Oklahoma	39 (4.6)	20 (6.0)!	25 (6.8)!	*** (***)	17 (4.5)!	100 (0.0)	0 (0.0)	14 (7.4)!	35 (6.3)!
Oregon	33 (4.2)	*** (***)	27 (6.2)!	40 (7.5)	21 (5.5)!	67(13.9)!	0 (0.0)	41(14.4)!	25 (5.3)!
Pennsylvania	36 (4.7)	11 (6.2)!	11 (4.0)!	*** (***)	*** (***)	100 (0.0)	0 (0.0)	31(16.5)!	25 (6.1)!
Rhode Island	33 (0.8)	6 (2.2)!	11 (1.9)	*** (***)	*** (***)	66 (0.2)	0 (0.0)	0 (0.0)	19 (0.1)
Texas	47 (5.3)	15 (4.8)!	16 (3.6)!	*** (***)	*** (***)	93 (7.0)!	10 (6.5)!	22(16.1)!	28 (5.7)!
Virginia	41 (4.7)	11 (2.2)	36 (5.4)	69 (6.0)	*** (***)	72 (8.5)!	0 (0.0)	9 (9.4)!	28 (5.8)!
West Virginia	35 (4.9)	25 (7.3)!	29 (6.5)!	*** (***)	*** (***)	0 (0.0)	38(14.4)!	20 (8.8)!	38 (5.5)
Wisconsin	39 (5.3)	8 (4.2)!	26 (5.5)!	*** (***)	*** (***)	67(21.2)!	0 (0.0)	33(12.1)!	40 (6.1)
Wyoming	31 (0.8)	*** (***)	22 (3.0)	*** (***)	20 (4.5)!	0 (0.0)	0 (0.0)	50 (4.1)	30 (0.7)
TERRITORIES									
Guam	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Virgin Islands	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***The number of schools or students was considered insufficient for this analysis. Underlying subgroup population proportions provided in previous tables should be considered in interpreting these results. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 12.14 | **Percentage of Students Within Selected Demographic Subgroups in the Top One-Third of the Schools (continued)**

GRADE 8 PUBLIC SCHOOLS	Percentage of Students by Parents' Highest Level of Education				Percentage of Students by Gender	
	Did Not Finish High School	Graduated High School	Some Education After High School	Graduated College	Male	Female
NATION	23 (4.6)	33 (5.4)	40 (6.0)	54 (6.0)	41 (5.4)	40 (5.2)
Northeast	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Southeast	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Central	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
West	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
STATES						
Alabama	**23 (4.6)**	**29 (4.3)**	**35 (4.4)**	**41 (4.2)**	**34 (3.9)**	**33 (3.8)**
Arizona	**17 (4.5)!**	**25 (3.0)**	**38 (3.8)**	**48 (4.2)**	**34 (3.3)**	**37 (3.5)**
Arkansas	**29 (4.3)**	**29 (3.9)**	**40 (4.8)**	**37 (4.0)**	**33 (3.9)**	**31 (3.4)**
California	**14 (2.9)!**	**25 (3.9)**	**32 (4.8)**	**48 (5.3)**	**33 (3.9)**	**32 (3.9)**
Colorado	16 (3.6)!	20 (3.6)	30 (4.4)	45 (4.6)	34 (3.9)	33 (3.6)
Connecticut	10 (3.0)!	13 (2.3)	24 (3.4)	48 (3.3)	32 (3.0)	31 (2.9)
Delaware	23 (6.4)!	20 (1.4)	32 (2.6)	43 (1.1)	32 (1.2)	30 (1.2)
District of Columbia	26 (3.7)	26 (1.6)	42 (2.4)	47 (1.7)	34 (0.9)	38 (0.8)
Florida	13 (3.6)!	28 (4.0)	36 (4.3)	45 (4.8)	34 (4.0)	34 (4.1)
Georgia	**22 (4.4)**	**24 (3.8)**	**36 (4.4)**	**48 (5.0)**	**34 (4.0)**	**34 (3.8)**
Hawaii	**31 (4.1)**	**29 (1.8)**	**47 (1.9)**	**47 (1.4)**	**39 (1.0)**	**39 (1.2)**
Idaho	**37 (4.7)**	**30 (2.5)**	**37 (2.1)**	**47 (1.4)**	**41 (1.5)**	**37 (1.8)**
Illinois	**13 (3.1)!**	**19 (3.4)**	**27 (4.4)**	**48 (5.0)**	**32 (4.1)**	**31 (4.0)**
Indiana	**24 (5.7)!**	**33 (5.4)**	**36 (5.9)**	**40 (6.0)**	**36 (5.5)**	**33 (4.9)**
Iowa	17 (4.3)!	26 (4.5)	28 (5.0)	34 (4.9)	30 (4.4)	30 (4.5)
Kentucky	19 (3.7)	26 (4.0)	35 (5.0)	47 (5.6)	32 (4.1)	31 (4.4)
Louisiana	25 (4.1)	29 (3.7)	37 (4.3)	44 (4.1)	34 (3.7)	34 (3.8)
Maryland	18 (4.3)!	17 (3.4)	30 (4.7)	48 (4.5)	33 (4.1)	33 (4.1)
Michigan	18 (4.6)!	23 (4.1)	28 (4.9)	43 (5.1)	33 (4.4)	31 (4.4)
Minnesota	**26 (5.7)!**	**27 (4.5)**	**31 (5.0)**	**38 (4.5)**	**32 (4.3)**	**32 (4.3)**
Montana	**27 (4.1)**	**29 (3.8)**	**36 (3.1)**	**39 (2.7)**	**34 (2.7)**	**36 (2.7)**
Nebraska	**23 (6.1)!**	**28 (4.5)**	**37 (3.2)**	**41 (3.5)**	**34 (3.5)**	**36 (3.4)**
New Hampshire	**12 (2.9)!**	**21 (1.6)**	**29 (2.3)**	**44 (1.4)**	**32 (1.4)**	**34 (1.5)**
New Jersey	**8 (2.6)!**	**16 (3.1)**	**27 (4.8)**	**46 (4.9)**	**32 (4.0)**	**31 (3.9)**
New Mexico	21 (3.2)	29 (1.7)	38 (2.1)	48 (1.6)	37 (1.4)	34 (1.4)
New York	17 (3.9)!	26 (4.0)	31 (5.1)	39 (4.6)	29 (4.0)	31 (3.9)
North Carolina	23 (3.8)	28 (4.0)	30 (4.3)	44 (5.3)	33 (4.1)	33 (4.3)
North Dakota	27 (6.8)!	40 (4.5)	44 (4.0)	51 (2.7)	47 (3.3)	44 (3.4)
Ohio	24 (5.3)!	27 (4.6)	33 (4.7)	45 (5.4)	34 (4.6)	34 (4.4)
Oklahoma	**15 (3.8)!**	**25 (3.9)**	**30 (4.6)**	**47 (5.1)**	**35 (4.4)**	**34 (4.5)**
Oregon	**14 (3.9)!**	**23 (4.1)**	**31 (4.5)**	**40 (4.8)**	**32 (4.4)**	**32 (4.3)**
Pennsylvania	**18 (4.8)!**	**22 (4.0)**	**29 (4.8)**	**48 (5.3)**	**32 (4.4)**	**31 (4.6)**
Rhode Island	**14 (2.4)**	**19 (1.8)**	**32 (2.0)**	**43 (1.3)**	**29 (0.9)**	**30 (0.9)**
Texas	**17 (3.5)**	**24 (4.1)**	**38 (5.2)**	**47 (5.3)**	**34 (4.5)**	**31 (4.3)**
Virginia	15 (3.4)!	21 (3.3)	32 (4.4)	54 (4.6)	35 (3.9)	35 (4.1)
West Virginia	20 (4.6)!	29 (4.4)	40 (5.9)	49 (5.7)	34 (5.0)	36 (4.9)
Wisconsin	17 (4.4)!	32 (4.8)	35 (5.2)	43 (6.0)	36 (5.1)	35 (5.0)
Wyoming	19 (3.0)	28 (2.2)	29 (1.7)	32 (1.2)	30 (1.1)	28 (1.1)
TERRITORIES						
Guam	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Virgin Islands	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)

316

TABLE 12.15 | **Mathematics Proficiency for Students in the Bottom One-Third of the Schools**

GRADE 8 PUBLIC SCHOOLS	Percent of Students	Average Proficiency	Percentage of Students at or Above Four Anchor Levels on the NAEP Mathematics Scale			
			Level 200	Level 250	Level 300	Level 350
NATION	28 (3.8)	239 (2.3)	91 (2.5)	35 (2.9)	2 (0.7)	0 (0.0)
Northeast	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Southeast	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Central	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
West	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
STATES						
Alabama	**32 (4.0)**	**236 (1.7)**	**90 (1.6)**	**31 (2.6)**	**2 (0.5)**	**0 (0.0)**
Arizona	**33 (3.6)**	**242 (1.7)**	**94 (1.0)**	**38 (3.1)**	**2 (0.7)**	**0 (0.0)**
Arkansas	**35 (3.5)**	**241 (1.5)**	**93 (1.4)**	**36 (2.2)**	**2 (0.5)**	**0 (0.0)**
California	**31 (4.0)**	**236 (1.5)**	**89 (2.2)**	**31 (2.3)**	**3 (0.7)**	**0 (0.0)**
Colorado	32 (3.2)	252 (1.6)	97 (0.8)	52 (3.0)	5 (1.0)	0 (0.0)
Connecticut	36 (3.7)	250 (1.7)	95 (1.3)	50 (2.6)	5 (0.7)	0 (0.0)
Delaware	38 (0.3)	248 (1.0)	95 (1.0)	46 (2.3)	5 (0.8)	0 (0.0)
District of Columbia	28 (0.3)	216 (1.1)	76 (1.9)	8 (1.2)	0 (0.0)	0 (0.0)
Florida	33 (3.7)	238 (1.6)	91 (1.5)	33 (2.3)	3 (0.6)	0 (0.0)
Georgia	**34 (4.3)**	**242 (1.2)**	**92 (1.3)**	**38 (2.0)**	**3 (0.5)**	**0 (0.0)**
Hawaii	**31 (0.2)**	**233 (0.9)**	**87 (1.2)**	**29 (1.7)**	**2 (0.4)**	**0 (0.0)**
Idaho	**28 (0.9)**	**260 (1.3)**	**99 (0.5)**	**66 (2.3)**	**7 (1.2)**	**0 (0.0)**
Illinois	**33 (4.4)**	**235 (2.7)**	**89 (2.3)**	**32 (3.6)**	**1 (0.4)**	**0 (0.0)**
Indiana	**33 (4.0)**	**253 (1.6)**	**98 (1.0)**	**53 (3.0)**	**5 (0.7)**	**0 (0.0)**
Iowa	37 (5.2)	268 (1.1)	100 (0.4)	74 (2.0)	11 (1.1)	0 (0.0)
Kentucky	36 (4.9)	245 (1.2)	96 (1.0)	41 (2.0)	4 (1.1)	0 (0.0)
Louisiana	32 (3.6)	227 (1.5)	86 (2.0)	17 (1.6)	0 (0.2)	0 (0.0)
Maryland	33 (3.2)	238 (1.5)	90 (1.2)	33 (2.3)	3 (0.8)	0 (0.0)
Michigan	33 (4.3)	243 (1.9)	94 (1.1)	40 (3.4)	2 (0.5)	0 (0.0)
Minnesota	**38 (4.5)**	**265 (1.3)**	**98 (0.7)**	**72 (2.1)**	**11 (1.8)**	**0 (0.0)**
Montana	**27 (2.4)**	**271 (1.8)**	**99 (0.3)**	**78 (2.7)**	**14 (1.2)**	**0 (0.0)**
Nebraska	**36 (3.1)**	**261 (1.1)**	**98 (0.9)**	**66 (2.5)**	**9 (0.9)**	**0 (0.0)**
New Hampshire	**37 (0.8)**	**262 (1.5)**	**99 (0.6)**	**66 (2.4)**	**8 (1.7)**	**0 (0.0)**
New Jersey	**31 (3.4)**	**247 (2.7)**	**96 (1.2)**	**40 (4.0)**	**3 (0.9)**	**0 (0.0)**
New Mexico	25 (0.9)	239 (1.1)	94 (1.4)	34 (1.9)	1 (0.7)	0 (0.0)
New York	37 (3.7)	239 (1.8)	91 (1.5)	32 (2.8)	4 (1.6)	0 (0.0)
North Carolina	34 (3.8)	236 (1.1)	89 (1.4)	31 (1.4)	2 (0.4)	0 (0.0)
North Dakota	29 (2.6)	267 (2.0)	98 (0.7)	75 (3.3)	11 (1.9)	0 (0.0)
Ohio	34 (4.1)	248 (1.2)	95 (1.0)	46 (2.0)	4 (1.0)	0 (0.0)
Oklahoma	**32 (4.4)**	**248 (1.4)**	**96 (1.2)**	**47 (2.8)**	**2 (0.6)**	**0 (0.0)**
Oregon	**34 (4.6)**	**260 (1.0)**	**98 (0.4)**	**62 (2.3)**	**10 (1.0)**	**0 (0.0)**
Pennsylvania	**35 (4.7)**	**249 (2.3)**	**95 (1.2)**	**48 (3.6)**	**6 (1.3)**	**0 (0.1)**
Rhode Island	**37 (0.7)**	**242 (0.7)**	**90 (1.1)**	**39 (1.8)**	**5 (1.1)**	**0 (0.0)**
Texas	**31 (4.3)**	**240 (1.9)**	**93 (1.7)**	**34 (2.4)**	**3 (0.7)**	**0 (0.0)**
Virginia	33 (3.3)	243 (1.1)	94 (1.1)	40 (2.3)	2 (0.8)	0 (0.0)
West Virginia	32 (4.0)	245 (1.0)	96 (1.3)	41 (2.2)	2 (0.8)	0 (0.0)
Wisconsin	33 (4.0)	258 (2.1)	97 (1.1)	62 (3.1)	8 (1.4)	0 (0.1)
Wyoming	33 (0.6)	262 (0.9)	99 (0.4)	69 (1.8)	7 (1.2)	0 (0.0)
TERRITORIES						
Guam	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Virgin Islands	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. When the proportion of students is either 0 percent or 100 percent, the standard error is inestimable. However, percentages 99.5 percent and greater were rounded to 100 percent and percentages less than 0.5 percent were rounded to 0 percent.
***The number of schools or students was considered insufficient for this analysis.

317

TABLE 12.16 | **Percentage of Students Within Selected Demographic Subgroups in the Bottom One-Third of the Schools**

GRADE 8 PUBLIC SCHOOLS	Percentage of Students by Race/Ethnicity					Percentage of Students by Type of Community			
	White	Black	Hispanic	Asian / Pacific Islander	American Indian	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other
NATION	19 (4.0)!	69 (6.3)	30 (9.2)!	11 (6.7)!	61(35.4)!	0 (0.0)	53(13.3)!	43(21.0)!	26 (4.3)
Northeast	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Southeast	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Central	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
West	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
STATES									
Alabama	**19 (3.8)**	**60 (5.5)**	**50 (7.2)!**	***** (***)**	***** (***)**	**13(10.5)!**	**42(13.8)!**	**62(13.3)!**	**30 (5.9)!**
Arizona	**15 (3.2)!**	**45(10.2)!**	**56 (5.1)**	***** (***)**	**85 (5.5)!**	**0 (0.0)**	**76(13.2)!**	**71(14.9)!**	**33 (5.9)**
Arkansas	**22 (3.3)**	**77 (3.5)**	**52 (9.2)**	***** (***)**	***** (***)**	**0 (0.0)**	**66(14.9)!**	**32 (9.0)!**	**35 (4.9)**
California	**13 (2.9)!**	**51 (8.4)!**	**61 (5.7)**	**34 (6.3)!**	***** (***)**	**0 (0.0)**	**60(15.0)!**	**0 (0.0)**	**34 (7.4)!**
Colorado	23 (3.2)	71 (9.4)!	59 (5.3)	*** (***)	*** (***)	5 (3.9)!	100 (0.0)	24(12.4)!	34 (5.8)
Connecticut	24 (3.8)	78 (3.5)	92 (3.6)	*** (***)	*** (***)	4 (3.4)!	100 (0.0)	0 (0.0)	31 (6.4)!
Delaware	34 (0.7)	45 (1.8)	54 (4.5)	*** (***)	*** (***)	0 (0.0)	0 (0.0)	32 (0.3)	44 (0.4)
District of Columbia	*** (***)	30 (0.5)	25 (3.0)	*** (***)	*** (***)	0 (0.0)	43 (0.3)	0 (0.0)	0 (0.0)
Florida	22 (3.5)	56 (6.0)	44 (6.7)	13 (5.6)!	*** (***)	0 (0.0)	75 (9.6)!	40(23.0)!	27 (6.0)!
Georgia	**22 (4.1)**	**54 (6.1)**	**48 (6.8)**	***** (***)**	***** (***)**	**0 (0.0)**	**51(17.2)!**	**44(12.5)!**	**36 (6.4)**
Hawaii	**18 (1.9)**	***** (***)**	**36 (2.7)**	**33 (0.8)**	***** (***)**	**0 (0.0)**	**75 (0.7)**	**0 (0.0)**	**24 (0.3)**
Idaho	**27 (0.9)**	***** (***)**	**33 (3.7)**	***** (***)**	**47 (8.8)!**	***** (***)**	***** (***)**	**31 (3.9)**	**30 (0.8)**
Illinois	**18 (4.4)!**	**68 (8.5)**	**66 (5.7)**	**33(12.1)!**	***** (***)**	**6 (5.8)!**	**72 (9.4)**	**17(13.2)!**	**30 (8.2)!**
Indiana	**28 (3.9)**	**77 (7.1)**	**55 (8.5)!**	***** (***)**	***** (***)**	**10 (9.8)!**	**100 (0.0)**	**31(13.0)!**	**28 (5.8)!**
Iowa	36 (5.2)	*** (***)	51 (7.4)	*** (***)	*** (***)	0 (0.0)	100 (0.0)	36 (8.4)!	39 (8.1)!
Kentucky	34 (5.1)	47 (7.2)	60 (7.9)!	*** (***)	*** (***)	8 (7.2)!	83 (9.9)!	40(10.0)!	28 (5.2)!
Louisiana	13 (2.7)	59 (4.6)	44 (6.9)	*** (***)	*** (***)	0 (0.0)	59(10.8)!	64(13.0)!	17 (5.7)!
Maryland	18 (3.2)	64 (4.5)	43 (5.8)	13 (4.2)!	*** (***)	12 (6.9)!	88 (8.5)!	26(26.1)!	26 (5.8)!
Michigan	22 (4.3)	85 (3.7)	47 (7.4)!	*** (***)	*** (***)	0 (0.0)	92 (6.7)!	27(16.5)!	22 (6.7)!
Minnesota	**34 (4.8)**	**74(12.2)!**	**41 (8.0)!**	**50 (8.0)!**	***** (***)**	**39 (9.7)!**	**0 (0.0)**	**36(10.8)!**	**25 (7.2)!**
Montana	**24 (2.3)**	***** (***)**	**43 (7.9)!**	***** (***)**	**56 (7.5)!**	***** (***)**	**0 (0.0)**	**37 (6.4)**	**24 (2.1)**
Nebraska	**33 (3.4)**	**89 (2.8)**	**54 (5.8)**	***** (***)**	***** (***)**	**19 (0.7)**	***** (***)**	**31 (8.3)!**	**43 (3.1)**
New Hampshire	**37 (0.8)**	***** (***)**	**28 (8.1)!**	***** (***)**	***** (***)**	**6 (5.9)!**	**0 (0.0)**	**24(15.1)!**	**35 (0.8)**
New Jersey	**14 (3.1)!**	**62 (4.4)**	**66 (4.8)**	**11 (3.7)!**	***** (***)**	**1 (0.8)!**	**100 (0.0)**	**0 (0.0)**	**29 (7.2)!**
New Mexico	12 (0.9)	*** (***)	31 (1.7)	*** (***)	49 (3.5)	0 (0.0)	13 (0.5)	29 (4.3)	27 (0.7)
New York	14 (2.9)	78 (6.6)	77 (5.4)	38(10.8)	*** (***)	0 (0.0)	96 (3.8)	0 (0.0)	12 (5.2)!
North Carolina	23 (3.9)	49 (4.5)	58 (6.4)	*** (***)	76(11.0)!	0 (0.0)	48(29.9)!	62 (9.8)!	27 (4.5)
North Dakota	26 (2.3)	*** (***)	38 (7.5)!	*** (***)	88 (4.4)!	11 (0.7)	*** (***)	32 (5.4)	26 (3.2)
Ohio	27 (4.3)	84 (3.9)	55 (6.9)	*** (***)	*** (***)	9 (7.8)!	86 (9.2)	24(17.2)!	31 (5.5)
Oklahoma	**26 (4.2)**	**62 (7.9)**	**40 (8.6)!**	***** (***)**	**40 (8.8)!**	**0 (0.0)**	**87 (9.1)!**	**56(11.1)!**	**17 (5.1)!**
Oregon	**32 (4.6)**	***** (***)**	**42 (6.4)**	**30 (7.2)!**	**42 (8.5)!**	**0 (0.0)**	**90(10.6)!**	**[illegible](15.4)!**	**34 (6.0)**
Pennsylvania	**26 (4.5)**	**84 (6.8)!**	**68 (6.9)!**	***** (***)**	***** (***)**	**0 (0.0)**	**66(15.2)!**	**28(19.0)!**	**33 (5.4)**
Rhode Island	**29 (0.8)**	**84 (3.3)**	**74 (2.8)**	***** (***)**	***** (***)**	**4 (0.1)**	**68 (7.9)**	**0 (0.0)**	**39 (0.2)**
Texas	**15 (3.9)!**	**53 (7.5)**	**47 (5.9)**	***** (***)**	***** (***)**	**0 (0.0)**	**78 (9.8)!**	**19(13.3)!**	**25 (5.4)!**
Virginia	22 (2.8)	66 (4.5)	39 (5.6)	8 (2.5)!	*** (***)	0 (0.0)	84(12.3)!	67 (9.8)!	36 (5.4)
West Virginia	31 (4.0)	48 (9.5)!	35 (6.8)!	*** (***)	*** (***)	0 (0.0)	26(10.9)!	28 (9.9)!	34 (4.9)
Wisconsin	27 (4.1)	87 (5.3)	50 (5.5)	*** (***)	*** (***)	0 (0.0)	100 (0.0)	12 (6.7)!	33 (6.3)!
Wyoming	31 (0.8)	*** (***)	41 (3.0)	*** (***)	56 (5.4)	0 (0.0)	0 (0.0)	28 (1.4)	31 (0.6)
TERRITORIES									
Guam	***** (***)**	***** (***)**	***** (***)**	***** (***)**	***** (***)**	***** (***)**	***** (***)**	***** (***)**	***** (***)**
Virgin Islands	***** (***)**	***** (***)**	***** (***)**	***** (***)**	***** (***)**	***** (***)**	***** (***)**	***** (***)**	***** (***)**

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***The number of schools or students was considered insufficient for this analysis. Underlying subgroup population proportions provided in previous tables should be considered in interpreting these results. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 12.16 | **Percentage of Students Within Selected Demographic Subgroups in the Bottom One-Third of the Schools (continued)**

GRADE 8 PUBLIC SCHOOLS	Percentage of Students by Parents' Highest Level of Education				Percentage of Students by Gender	
	Did Not Finish High School	Graduated High School	Some Education After High School	Graduated College	Male	Female
NATION	45 (6.9)!	34 (5.3)	26 (3.7)	19 (2.7)	27 (3.9)	29 (4.0)
Northeast	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Southeast	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Central	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
West	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
STATES						
Alabama	38 (5.6)	34 (4.7)	30 (4.1)	27 (4.2)	32 (4.1)	32 (4.1)
Arizona	67 (5.8)	42 (4.8)	27 (3.7)	20 (3.7)	34 (4.0)	32 (3.8)
Arkansas	34 (4.9)	38 (4.4)	25 (3.7)	34 (2.9)	35 (3.7)	36 (3.7)
California	52 (8.3)	38 (5.0)	24 (4.1)	17 (3.1)	32 (4.0)	31 (4.0)
Colorado	57 (5.9)	48 (4.6)	30 (4.0)	21 (2.9)	33 (3.3)	32 (3.4)
Connecticut	62 (6.5)	47 (4.8)	41 (5.3)	21 (2.8)	35 (3.9)	36 (3.7)
Delaware	43 (5.0)	42 (1.6)	33 (2.1)	31 (1.3)	37 (1.1)	38 (1.3)
District of Columbia	31 (4.2)	36 (1.5)	24 (1.8)	21 (1.3)	29 (1.0)	27 (0.9)
Florida	49 (6.3)	38 (4.3)	31 (3.9)	23 (3.2)	32 (3.9)	33 (3.8)
Georgia	47 (8.7)	42 (4.8)	30 (4.7)	24 (3.9)	35 (4.3)	34 (4.4)
Hawaii	42 (5.2)	41 (1.7)	27 (1.8)	23 (1.0)	33 (0.8)	30 (1.0)
Idaho	30 (3.7)	34 (2.4)	28 (2.1)	24 (1.4)	27 (1.4)	29 (1.4)
Illinois	50 (8.8)	40 (5.4)	32 (5.1)	20 (3.9)	34 (4.7)	32 (4.4)
Indiana	45 (8.7)	34 (4.7)	28 (3.8)	31 (4.5)	32 (4.1)	35 (4.0)
Iowa	41 (7.7)!	40 (5.5)	37 (5.4)	32 (5.3)	37 (5.1)	36 (5.4)
Kentucky	46 (6.4)!	38 (5.3)	33 (5.8)!	26 (3.8)	35 (4.5)	37 (5.4)
Louisiana	38 (4.8)	37 (4.2)	25 (3.6)	28 (3.6)	32 (3.8)	33 (3.7)
Maryland	42 (6.1)	43 (4.2)	35 (3.4)	24 (2.8)	34 (3.3)	32 (3.4)
Michigan	49 (7.1)	41 (5.5)	32 (4.5)	23 (3.5)	32 (4.4)	33 (4.4)
Minnesota	42 (8.4)	40 (5.3)	37 (5.0)	30 (4.5)	36 (4.4)	35 (4.8)
Montana	42 (7.0)!	34 (3.4)	23 (2.7)	23 (2.3)	28 (2.7	27 (2.8)
Nebraska	49 (8.8)	45 (4.5)	33 (3.3)	30 (2.7)	37 (3.2)	35 (3.2)
New Hampshire	59 (8.2)	44 (1.8)	30 (2.8)	28 (1.1)	37 (1.2)	37 (1.4)
New Jersey	62 (8.2)	41 (4.7)	29 (3.6)	18 (2.8)	30 (3.8)	32 (3.4)
New Mexico	36 (3.2)	29 (1.7)	24 (1.7)	15 (1.1)	24 (1.2)	26 (1.3)
New York	59 (5.4)	36 (4.5)	33 (4.5)	27 (3.3)	37 (3.9)	38 (3.9)
North Carolina	40 (5.6)	38 (4.3)	31 (3.8)	27 (4.1)	33 (3.7)	34 (4.2)
North Dakota	54 (8.0)!	32 (3.9)	32 (3.4)	23 (2.6)	27 (2.8)	31 (2.9)
Ohio	49 (5.9)	37 (4.7)	33 (4.6)	26 (3.9)	33 (4.2)	35 (4.1)
Oklahoma	48 (8.0)	39 (4.8)	27 (4.9)	23 (3.7)	32 (4.3)	31 (4.8)
Oregon	48 (7.1)!	44 (5.7)	35 (5.2)	25 (3.9)	33 (4.8)	34 (4.5)
Pennsylvania	55 (8.2)	39 (5.1)	35 (5.3)	25 (4.3)	34 (4.8)	38 (4.9)
Rhode Island	60 (4.0)	42 (2.9)	34 (2.8)	23 (1.3)	38 (1.4)	37 (0.8)
Texas	44 (6.7)	34 (5.4)	27 (4.5)	21 (3.5)	31 (4.5)	31 (4.3)
Virginia	49 (5.6)	41 (4.3)	33 (3.9)	21 (3.0)	33 (3.4)	32 (3.3)
West Virginia	48 (6.0)	36 (4.4)	25 (4.2)	21 (3.7)	33 (4.3)	30 (4.0)
Wisconsin	45 (6.0)	36 (4.4)	31 (4.2)	27 (4.2)	33 (4.2)	33 (4.0)
Wyoming	48 (3.9)	36 (2.4)	30 (2.0)	29 (1.1)	34 (0.9)	32 (1.0)
TERRITORIES						
Guam	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)
Virgin Islands	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)	*** (***)

Chapter 13

Mathematics Instructional Materials, Group Work, Projects and Resources at Grade 8 in the States

INTRODUCTION

The context in which mathematics learning and instruction takes place is an important factor in developing students' proficiency. To provide a glimpse into the eighth-grade classrooms across the participating states and territories, the 1990 NAEP Trial State Assessment collected information from students and their teachers about a number of instructional variables. Similar to the state-level data in previous chapters, the results portray a great deal of variability in the methods and resources that public-school teachers employ in providing mathematics instruction to eighth graders. In general, however, the results suggest some distance between actual instructional practice and the classrooms as envisioned by the National Council of Teachers of Mathematics (NCTM).[95]

TEACHERS' REPORTS ON STUDENT ABILITY GROUPING

Teachers of eighth graders participating in the assessment were asked whether their students were assigned to mathematics classes by ability. The teachers also were asked to describe the overall ability level of students' classes as high-ability, average-ability, low-ability, or widely-mixed ability. TABLES 13.1 and 13.2 contain information on grouping practices across states. The results in TABLE 13.2 essentially replicate the alphabetically ordered results in TABLE 13.1, except the data are organized by the extent to which states use ability grouping.

---

[95] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

Professional Standards for Teaching Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1991).

In almost all the participating states and territories, with the exception of North Dakota, the Virgin Islands, Montana, and Nebraska, at least half of the eighth graders attending public schools were assigned to mathematics classes by some form of ability grouping. States with more than 85 percent of their public-school eighth graders ability-grouped were Connecticut, Guam, Rhode Island, Oregon, Hawaii, and Maryland. Across the states, there was little relationship, if any, between degree of ability grouping and average performance. Within states, however, students grouped by ability had higher average proficiency, compared to those not grouped.

Teachers' views of the ability levels of their classes and the corresponding proficiency levels are provided in TABLE 13.3. The large differences in performance across the ability groups are reminiscent of the Second International Mathematics Study (SIMS) finding that eighth graders in the United States were perhaps the most ability-tracked group of 13-year-olds in the world.[96] The use of ability grouping can result in vast differences in students' exposure or opportunity to learn mathematics. Students who enter Algebra I tend to do so with substantially different content area exposure and pre-algebra skills. For those students who are less well prepared, the greater demands required by Algebra I, compared to their earlier course work, can create a context for failure.[97]

USE OF TEXTBOOKS AND WORKSHEETS IN MATHEMATICS CLASSES

Two questions about instructional materials were asked of both the public-school eighth graders and their teachers. The first was about the frequency with which they did mathematics problems from a textbook, and the second was about the frequency with which they did mathematics problems on worksheets. The results are presented in TABLES 13.4 through 13.7.

More students reported frequent use of the textbook for problem sources than did teachers, although both reported high reliance on textbooks. States

[96]Curtis McKnight, et. al., *The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective, A National Report on the Second International Mathematics Study* (Champaign, IL: International Association for the Evaluation of Educational Achievement, Stipes Publishing Company, 1987).

[97]Flanders, J. "How Much of the Content in Mathematics Textbooks is New?" *The Arithmetic Teacher, 35*, (1), September 1987: 18-23.

with high agreement between students' and teachers' reports about extensive daily usage of textbooks were West Virginia (84 percent and 85 percent), Alabama (83 percent and 85 percent), and Indiana (82 percent and 81 percent). States with similar reports from students and teachers indicating lower daily usage of textbooks were Maryland (62 percent and 57 percent), Connecticut (67 percent and 56 percent), and the District of Columbia (53 percent and 39 percent). In general, eighth graders working problems from the textbook daily performed considerably better than did those who used a textbook less frequently.

Although worksheets were used less frequently than textbooks, they were still used several times a week for about one-third of the eighth graders. Teachers and students appeared to be in relatively close agreement on this issue. Among the states having the greatest amount of student and teacher agreement on the frequent use of worksheets (at least several times a week), Delaware (51 percent and 53 percent) and North Carolina (45 percent and 49 percent) reported the most eighth-grade public-school students using them. Oklahoma (25 percent and 28 percent), West Virginia (26 percent and 29 percent), and Idaho (27 percent and 29 percent) reported the fewest. Across the states, eighth graders in classrooms with more frequent use of worksheets performed less well than did students in classrooms with less frequent use.

USE OF SMALL GROUPS IN MATHEMATICS CLASSES

As discussed in Chapter Six, the *NCTM Standards* and a number of other sources have recommended the use of small groups and cooperative-learning strategies for mathematics teaching in the middle grades.[98] The NAEP Trial State Assessment data provide an opportunity to explore the prevalence of such practices. However, the results presented in TABLES 13.8 through 13.11 show considerable disagreement between students and teachers about the frequency of work in small groups. The results in TABLES 13.8 and 13.10 are in

[98]David W. Johnson and Roger T. Johnson, "Using Cooperative Learning in Math" in *Cooperative Learning in Mathematics*, Neil Davidson, editor (Menlo Park, CA: Addison-Wesley Publishing Company, 1990).

Curriculum and Evaluation Standards for School Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1989).

Professional Standards for Teaching Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1991).

alphabetical order, while those in TABLES 13.9 and 13.11 are organized by the percentages of public-school eighth graders engaged in group work at least weekly, as reported by students and their teachers, respectively. Overall, eighth graders reported small-group work much less frequently than did their teachers.

States with the greatest disagreement between student and teacher reports on weekly small-group work in mathematics class were the District of Columbia (47 percent and 82 percent), Wyoming (44 percent and 70 percent), and Oregon (39 percent and 70 percent). The states with the lowest percentages of both students and teachers reporting weekly group work were Rhode Island (14 percent and 27 percent), Pennsylvania (17 percent and 33 percent), and Arkansas (18 percent and 33 percent).

Teachers' reports about the frequency of small-group work showed no consistent relationship with student achievement from state to state. In several states, higher proficiency was associated with more frequent group work, and in several states, lower proficiency was associated with more frequent group work. In most states, however, there was no difference in achievement according to teachers' reports about the frequency of group work. From the eighth graders' perspective, students reporting moderate use of small-group work tended to have higher average proficiency than did students reporting small-group activity either weekly or never. This pattern prevailed in most states, except Montana, North Dakota, and West Virginia, where there was no clear pattern.

USE OF MANIPULATIVE TEACHING AIDS IN MATHEMATICS

Studies have suggested that regular use of concrete materials and tools has a significant effect on both student achievement and attitudes toward mathematics.[99] Students' and teachers' reports about the frequency with which manipulative teaching materials like rulers, counting blocks, and geometric shapes were used to supplement instruction are shown in TABLES 13.12 and 13.13. An analysis of the state-by-state data suggests that teachers were less likely than students to report the "never" category.

[99] E. J. Sowell, "Effects of Manipulative Materials in Mathematics Instruction," *Journal for Research in Mathematics Education, 20 (5),* (November, 1989): 498-505.

In the District of Columbia (37 percent and 43 percent), Montana (36 percent and 37 percent), and California (32 percent and 35 percent), about one-third of the eighth graders attending public schools used manipulatives on a weekly basis, according to both students' and teachers' reports. States with high agreement in their reports, but where fewer eighth-grade students engaged in the weekly use of manipulatives, were Pennsylvania (17 percent and 11 percent), Arkansas (21 percent and 13 percent), and Rhode Island (20 percent and 14 percent).

For most states, eighth graders who reported using these mathematics materials less than once a week had higher performance than did students either reporting more frequent use of these materials or never using them. Even though teachers' reports in Florida, Idaho, Montana, Nebraska, New York, Oklahoma, Rhode Island, and Guam showed no systematic relationship between use of these materials and students' achievement levels, teachers in most states tended to report more use for eighth graders having lower performance. This pattern may reflect a tendency toward more use of manipulatives and teaching tools in general eighth-grade mathematics classes than in algebra classes.

PREVALENCE OF REPORT WRITING AND PROJECT WORK

Another recommendation commonly made in the *NCTM Standards* as well as in other sources, for curriculum and instruction, is that teachers should work to build connections in their students' minds among various aspects of mathematics, and between mathematics and other disciplines, through report writing and project work. To monitor the prevalence of these activities, students and teachers were asked to report the frequency with which eighth-grade students attending public schools were involved in writing reports or doing mathematics projects. The results of the students' and teachers' responses are shown in TABLES 13.14 and 13.15.

Across the states, the most prevalent response from both students and teachers was that these activities never took place in mathematics class, although teachers reported more students engaged in these activities than did eighth graders. The low percentages of eighth graders who reported an opportunity to work on projects or do written reports make the study of the relationship of such activities to student proficiency difficult. Teachers' reports for states where 55 percent or more of the students received some report or project work during the year indicated a slight positive relationship between the presence of this work and average proficiency levels.

TESTING IN THE MATHEMATICS CLASSROOM

Eighth-grade students in public schools were asked about the amount of testing in their mathematics classes. To further examine the nature of that testing, their teachers were asked more specifically about how frequently they administered teacher-generated tests, mandated tests (school, district, or state), and other published tests. The results are shown in TABLES 13.16 through 13.19.

Across the states, eighth graders attending public schools generally reported a considerable amount of testing. In the District of Columbia, Guam, and the Virgin Islands -- where eighth-grade students attending public schools tended to have lower overall average mathematics proficiency levels -- more than one-fourth of the students (from 27 to 30 percent) reported being tested several times a week. At the other end of the continuum, close to half the students (from 45 to 52 percent) in Iowa, Montana, Oregon and Wisconsin reported being tested less than weekly, and these were among the higher-performing states. Additionally, the results within each state suggested that lower-performing students may be tested more frequently. This phenomenon may result from a tendency to focus on narrow objectives, so that the pattern becomes one of teaching a small block of work then testing, teaching then testing, and so on. However, more complex problem-solving requires students to integrate information across larger bodies of content and build the connections necessary for higher-order thinking. Many educators believe it is preferable to incorporate ongoing evaluation into instructional activities and use tests as summative measures of performance across more substantial blocks of study.[100]

Teachers reported testing large percentages of students on a weekly basis, using tests of their own making rather than mandated tests. In Alabama,

[100] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1991).

Senta A. Raizen, et al., *Assessment in Science Education: The Middle Years* (Washington, DC: The National Center for Improving Science Education, The NETWORK, Inc. and The Biological Sciences Curriculum Study, 1990).

Louisiana, New Hampshire, New York, and Rhode Island, teachers reported administering teacher-generated tests to more than two-thirds of their eighth-grade students about once a week. Average proficiency levels varied substantially across these states, although the pattern across the results for individual states suggests a tendency to test lower-performing students more frequently, which agrees with students' reports. The results for North Dakota and Guam, however, represented notable exceptions -- the 10 percent of the students tested the most frequently had higher proficiency levels than did those tested less frequently.

According to teachers, school-, district-, and state-mandated tests were administered much less frequently than teacher-generated tests. However, in a preponderance of states, teachers in public schools reported administering published tests (in addition to those mandated) to at least 10 percent of their students on a weekly basis. About one-fourth of the eighth graders, and sometimes fewer, were never given these tests, except in New York and New Hampshire, where more than one-third of the students at grade 8 were never given additional published tests.

THE AVAILABILITY OF RESOURCES

Teachers' reports on the availability of resources in public schools are presented in TABLES 13.20 and 13.21, in alphabetical order and organized by the percentage of students in poorly supplied classrooms, respectively. Teachers in four states and territories -- the District of Columbia, Louisiana, Guam, and the Virgin Islands -- reported that the majority of eighth-grade students were in classrooms where only some or even none of the necessary resources were available. However, in all states but two (Iowa and Wyoming), at least one-fifth of the public-school eighth graders were in poorly supplied classrooms. In no state were more than one-third of the students in fully equipped classrooms where teachers reported receiving all the necessary resources. The results within a majority of the participating states indicate a relatively consistent relationship between resources and proficiency, with eighth-grade students in public-school classrooms with more resources performing better.

SUMMARY

The prevalence of ability grouping for eighth-grade mathematics instruction in our country's public schools was confirmed on a state-by-state basis. In all states but Montana, Nebraska, North Dakota and the Virgin Islands, the majority of the eighth graders were in classes grouped by ability. In 10 of the participating states, at least four-fifths of the eighth graders were grouped by ability.

Most of the references cited in this report about research and reforms in mathematics teaching and learning recommend instructional activities that engage students in learning and foster higher-order thinking. Yet the picture across the states as reported by both students and their teachers in public schools reinforces that found for the nation -- most eighth-grade students were working problems from their textbooks on a daily basis, few spent much time in small-group work or using mathematical manipulatives and tools, and large percentages never had the opportunity to do mathematics projects or write reports.

Teachers reported more activity associated with innovative instructional strategies than did students, which may signal that some teachers are familiar with the approaches suggested by research in learning mathematics. In two states -- the District of Columbia and Oregon -- at least 30 percent of the eighth graders reported small-group work and working with manipulatives or tools on at least a weekly basis. Only in the District of Columbia was this work associated with substantially less reliance on working problems from textbooks.

Finally, eighth-grade mathematics classrooms in public schools across the states appeared to be characterized by considerable testing and limited resource materials. Most tests were teacher-generated. For example, in Alabama, Louisiana, New Hampshire and Rhode Island, teachers reported administering teacher-generated tests to more than two-thirds of their eighth-grade students about once a week. In general, the data suggest a tendency to test lower-performing students more often. Lower-performing students also tended to be in the most poorly supplied classrooms. However, in no state were more than one-third of the public-school eighth graders in classrooms where teachers reported receiving all the necessary resources.

TABLE 13.1 | **Teachers' Reports on the Prevalence of Ability Grouping**

GRADE 8 PUBLIC SCHOOLS	Yes, Students Grouped by Ability		No, Students Not Grouped by Ability	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	63 (4.0)	269 (2.1)	38 (4.0)	253 (2.5)
Northeast	71 (10.1)	272 (2.8)	29 (10.1)	260 (9.4)!
Southeast	58 (8.0)	265 (5.1)	42 (8.0)	245 (3.8)!
Central	60 (5.7)	270 (2.9)	40 (5.7)	253 (4.2)
West	64 (8.3)	269 (4.2)	36 (8.3)	258 (5.9)!
STATES				
Alabama	60 (4.1)	256 (1.6)	40 (4.1)	247 (2.0)
Arizona	71 (2.5)	263 (1.4)	29 (2.5)	249 (2.5)
Arkansas	50 (3.3)	262 (1.6)	50 [illegible]	252 (1.4)
California	72 (3.4)	262 (1.6)	[illegible]	241 (2.2)
Colorado	66 (2.9)	272 (1.2)	[illegible]	256 (1.9)
Connecticut	86 (2.6)	273 (1.2)	14 (2.6)	257 (3.3)
Delaware	82 (1.0)	265 (0.9)	18 (1.0)	240 (1.3)
District of Columbia	51 (1.1)	236 (1.3)	49 (1.1)	225 (0.8)
Florida	77 (3.0)	259 (1.6)	23 (3.0)	247 (1.8)
Georgia	79 (2.5)	260 (1.4)	21 (2.5)	250 (3.0)
Hawaii	93 (0.4)	253 (0.7)	7 (0.4)	232 (1.8)
Idaho	70 (2.0)	273 (0.9)	30 (2.0)	268 (1.5)
Illinois	64 (3.2)	266 (2.6)	36 (3.2)	254 (2.9)
Indiana	69 (4.1)	272 (1.6)	31 (4.1)	259 (2.2)
Iowa	52 (3.8)	278 (1.6)	48 (3.8)	277 (1.6)
Kentucky	61 (3.8)	259 (1.7)	39 (3.8)	252 (1.6)
Louisiana	52 (4.2)	253 (2.0)	48 (4.2)	238 (1.8)
Maryland	93 (1.1)	263 (1.7)	7 (1.1)	239 (3.6)
Michigan	64 (3.9)	270 (1.7)	36 (3.9)	254 (2.2)
Minnesota	63 (4.0)	278 (1.2)	37 (4.0)	272 (1.5)
Montana	46 (2.9)	283 (1.6)	54 (2.9)	279 (1.0)
Nebraska	49 (2.4)	275 (1.2)	51 (2.4)	277 (1.5)
New Hampshire	78 (1.0)	274 (1.1)	22 (1.0)	268 (1.2)
New Jersey	78 (3.2)	276 (1.2)	22 (3.2)	248 (3.1)
New Mexico	65 (1.1)	262 (1.2)	35 (1.1)	247 (1.2)
New York	73 (3.6)	265 (2.0)	27 (3.6)	247 (3.0)
North Carolina	80 (3.0)	253 (1.4)	20 (3.0)	241 (1.8)
North Dakota	30 (2.0)	287 (2.1)	70 (2.0)	280 (1.6)
Ohio	68 (3.6)	269 (1.6)	32 (3.6)	256 (2.3)
Oklahoma	56 (3.7)	267 (1.4)	44 (3.7)	258 (2.2)
Oregon	90 (2.4)	273 (1.3)	10 (2.4)	263 (3.9)!
Pennsylvania	81 (3.1)	271 (1.5)	19 (3.1)	250 (3.6)
Rhode Island	89 (0.7)	263 (0.7)	11 (0.7)	236 (2.1)
Texas	63 (3.7)	256 (1.6)	37 (3.7)	255 (2.5)
Virginia	80 (2.4)	266 (1.8)	20 (2.4)	252 (3.0)
West Virginia	60 (4.0)	261 (1.7)	40 (4.0)	250 (1.5)
Wisconsin	52 (4.3)	282 (1.4)	48 (4.3)	268 (1.9)
Wyoming	66 (1.7)	273 (0.9)	34 (1.7)	271 (1.0)
TERRITORIES				
Guam	87 (0.4)	232 (0.7)	13 (0.4)	228 (2.1)
Virgin Islands	45 (0.8)	228 (0.8)	55 (0.8)	212 (0.7)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 13.2 | **Teachers' Reports on the Prevalence of Ability Grouping Organized by Percentage of Students Grouped by Ability**

GRADE 8 PUBLIC SCHOOLS	Yes, Students Grouped by Ability		No, Students Not Grouped by Ability	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
STATES/TERRITORIES				
Hawaii	93 (0.4)	253 (0.7)	7 (0.4)	232 (1.8)
Maryland	93 (1.1)	263 (1.7)	7 (1.1)	239 (3.6)
Oregon	90 (2.4)	273 (1.3)	10 (2.4)	263 (3.9)!
Rhode Island	89 (0.7)	263 (0.7)	11 (0.7)	238 (2.1)
Guam	**87 (0.4)**	**232 (0.7)**	**13 (0.4)**	**228 (2.1)**
Connecticut	**86 (2.6)**	**273 (1.2)**	**14 (2.6)**	**257 (3.3)**
Delaware	**82 (1.0)**	**265 (0.9)**	**18 (1.0)**	**240 (1.3)**
Pennsylvania	**81 (3.1)**	**271 (1.5)**	**19 (3.1)**	**250 (3.6)**
Virginia	**80 (2.4)**	**266 (1.8)**	**20 (2.4)**	**252 (3.0)**
North Carolina	80 (3.0)	253 (1.4)	20 (3.0)	241 (1.8)
Georgia	79 (2.5)	260 (1.4)	21 (2.5)	250 (3.0)
New Jersey	78 (3.2)	276 (1.2)	22 (3.2)	248 (3.1)
New Hampshire	78 (1.0)	274 (1.1)	22 (1.0)	268 (1.2)
Florida	77 (3.0)	259 (1.6)	23 (3.0)	247 (1.8)
New York	**73 (3.6)**	**265 (2.0)**	**27 (3.6)**	**247 (3.0)**
California	**72 (3.4)**	**262 (1.6)**	**28 (3.4)**	**241 (2.2)**
Arizona	**71 (2.5)**	**263 (1.4)**	**29 (2.5)**	**249 (2.5)**
Idaho	**70 (2.0)**	**273 (0.9)**	**30 (2.0)**	**268 (1.5)**
Indiana	**69 (4.1)**	**272 (1.6)**	**31 (4.1)**	**259 (2.2)**
Ohio	68 (3.6)	269 (1.6)	32 (3.6)	256 (2.3)
Colorado	66 (2.9)	272 (1.2)	34 (2.9)	256 (1.9)
Wyoming	66 (1.7)	273 (0.9)	34 (1.7)	271 (1.0)
New Mexico	65 (1.1)	262 (1.2)	35 (1.1)	247 (1.2)
Michigan	64 (3.9)	270 (1.7)	36 (3.9)	254 (2.2)
Illinois	**64 (3.2)**	**265 (2.8)**	**36 (3.2)**	**254 (2.9)**
Minnesota	**63 (4.0)**	**278 (1.2)**	**37 (4.0)**	**272 (1.5)**
Texas	**63 (3.7)**	**258 (1.6)**	**37 (3.7)**	**255 (2.5)**
Kentucky	**61 (3.8)**	**259 (1.7)**	**39 (3.8)**	**252 (1.6)**
West Virginia	**60 (4.0)**	**261 (1.7)**	**40 (4.0)**	**250 (1.5)**
Alabama	60 (4.1)	256 (1.6)	40 (4.1)	247 (2.0)
Oklahoma	56 (3.7)	267 (1.4)	44 (3.7)	258 (2.2)
Iowa	52 (3.8)	278 (1.6)	48 (3.8)	277 (1.6)
Wisconsin	52 (4.3)	282 (1.4)	48 (4.3)	268 (1.9)
Louisiana	52 (4.2)	253 (2.0)	48 (4.2)	238 (1.8)
District of Columbia	**51 (1.1)**	**236 (1.3)**	**49 (1.1)**	**225 (0.8)**
Arkansas	**50 (3.3)**	**262 (1.6)**	**50 (3.3)**	**252 (1.4)**
Nebraska	**49 (2.4)**	**275 (1.2)**	**51 (2.4)**	**277 (1.5)**
Montana	**46 (2.9)**	**283 (1.6)**	**54 (2.9)**	**279 (1.0)**
Virgin Islands	45 (0.6)	228 (0.8)	55 (0.6)	212 (0.7)
North Dakota	30 (2.0)	287 (2.1)	70 (2.0)	280 (1.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 13.3 | **Teachers' Reports on the Ability of the Students in Their Classes**

GRADE 8 PUBLIC SCHOOLS	Primarily High Ability		Primarily Average Ability		Primarily Low Ability		Ability Widely Mixed	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	25 (1.8)	289 (2.4)	34 (2.9)	259 (1.9)	16 ([illegible])	241 (3.2)	25 (4.3)	256 (3.4)
Northeast	24 (4.7)	285 (8.5)!	38 (7.9)	270 (3.6)!	21 (5.1)	248 (4.4)!	17(10.3)	*** (***)
Southeast	30 (4.4)	288 (4.2)	25 (4.1)	250 (3.5)!	16 (5.1)	231 (4.4)!	30 (8.1)	246 (3.6)!
Central	21 (2.6)	286 (4.4)	40 (4.1)	259 (4.6)	17 (4.2)	253 (7.5)!	22 (5.3)	256 (7.0)!
West	24 (3.0)	295 (4.0)	36 (6.8)	259 (3.4)	13 (3.1)	232 (4.6)!	27 (8.9)	258 (7.2)!
STATES								
Alabama	22 (2.3)	281 (2.5)	37 (3.1)	253 (1.7)	19 (2.1)	229 (2.6)	22 (3.2)	248 (2.6)
Arizona	24 (1.8)	288 (1.8)	40 (2.6)	257 (1.6)	17 (1.4)	236 (1.6)	19 (2.3)	249 (3.0)
Arkansas	23 (1.9)	282 (1.9)	37 (2.9)	255 (1.3)	15 (1.3)	230 (1.8)	24 (2.8)	253 (1.3)
California	31 (2.0)	288 (1.5)	29 (2.3)	251 (1.5)	20 (1.8)	229 (2.1)	20 (2.7)	242 (2.4)
Colorado	25 (1.7)	291 (2.3)	34 (2.5)	267 (1.5)	14 (1.6)	239 (1.8)	27 (2.6)	258 (1.4)
Connecticut	36 (2.2)	296 (1.8)	36 (1.9)	265 (1.3)	19 (1.4)	241 (1.7)	10 (2.1)	254 (4.4)!
Delaware	30 (1.0)	294 (1.2)	33 (1.0)	259 (1.4)	23 (0.9)	234 (1.5)	14 (0.8)	242 (1.4)
District of Columbia	15 (1.0)	262 (2.8)	36 (0.8)	231 (1.2)	20 (1.0)	214 (1.2)	29 (1.2)	227 (0.9)
Florida	27 (1.4)	289 (1.7)	39 (2.4)	254 (1.3)	22 (1.8)	226 (2.0)	12 (2.1)	244 (1.8)
Georgia	25 (1.8)	287 (2.1)	35 (2.0)	260 (1.5)	27 (1.7)	229 (1.7)	13 (1.7)	252 (2.9)
Hawaii	25 (0.8)	282 (1.0)	37 (0.9)	253 (0.9)	29 (0.9)	219 (0.9)	7 (0.4)	[illegible] (2.2)
Idaho	23 (2.0)	295 (1.8)	44 (1.4)	271 (1.0)	15 (1.0)	241 (1.4)	17 (1.9)	267 (2.1)
Illinois	22 (1.9)	291 (3.0)	42 (2.9)	262 (1.8)	17 (2.4)	233 (3.1)	19 (2.5)	[illegible]
Indiana	25 (1.8)	296 (1.6)	40 (3.0)	266 (1.4)	19 (2.1)	240 (2.7)	16 (2.4)	[illegible] (2.7)
Iowa	18 (1.9)	304 (1.9)	34 (3.5)	275 (1.5)	12 (1.9)	251 (2.2)	36 (4.1)	276 (2.1)
Kentucky	26 (1.6)	285 (1.2)	36 (2.8)	254 (1.3)	20 (2.0)	230 (2.0)	19 (2.9)	249 (1.7)
Louisiana	16 (1.6)	278 (2.3)	35 (3.1)	247 (2.1)	27 (2.5)	229 (1.9)	23 (2.6)	241 (2.0)
Maryland	33 (1.7)	293 (1.9)	38 (1.7)	257 (1.5)	21 (1.6)	226 (1.8)	8 (1.4)	243 (3.8)
Michigan	24 (1.6)	293 (1.9)	41 (3.1)	260 (2.2)	14 (1.8)	230 (2.4)	20 (2.9)	257 (3.0)
Minnesota	21 (1.7)	303 (2.0)	47 (2.9)	274 (1.2)	15 (2.0)	251 (2.4)	18 (2.8)	270 (2.8)
Montana	19 (2.4)	301 (2.7)	41 (2.8)	280 (1.1)	12 (2.7)	264 (3.9)!	28 (2.7)	278 (1.8)
Nebraska	17 (1.2)	302 (1.7)	42 (2.8)	274 (1.4)	8 (1.1)	239 (4.2)	32 (2.9)	275 (1.7)
New Hampshire	28 (1.6)	296 (1.8)	37 (1.3)	270 (1.3)	16 (1.4)	247 (1.1)	19 (1.1)	265 (1.8)
New Jersey	27 (1.8)	300 (3.3)	37 (2.1)	269 (1.7)	22 (1.7)	249 (2.2)	14 (2.1)	265 (3.5)
New Mexico	23 (1.1)	284 (1.3)	39 (1.4)	255 (1.1)	19 (0.9)	236 (1.3)	19 (1.0)	246 (1.6)
New York	21 (1.9)	291 (3.7)	41 (2.7)	263 (1.7)	23 (1.5)	233 (1.9)	15 (2.6)	254 (3.4)
North Carolina	26 (1.5)	285 (1.3)	34 (1.[illegible])	249 (1.4)	29 (2.0)	224 (1.4)	12 (2.6)	242 (2.2)!
North Dakota	15 (1.7)	306 (2.7)	45 (3.2)	282 (1.9)	8 (1.5)	249 (3.5)	31 (2.7)	279 (1.1)
Ohio	25 (2.0)	294 (2.0)	42 (3.4)	262 (1.8)	16 (2.0)	234 (2.4)	18 (3.1)	259 (2.8)
Oklahoma	23 (2.2)	286 (2.0)	40 (3.8)	264 (1.8)	18 (1.7)	236 (1.7)	19 (3.3)	256 (2.7)
Oregon	37 (2.1)	297 (1.3)	30 (2.4)	263 (1.5)	17 (1.6)	243 (1.7)	8 (2.0)	261 (2.8)
Pennsylvania	31 (1.9)	296 (1.2)	39 (2.3)	265 (1.5)	22 (1.8)	239 (1.9)	8 (1.5)	267 (4.0)
Rhode Island	30 (1.1)	290 (1.1)	40 (1.2)	260 (0.7)	23 (0.8)	230 (1.2)	6 (0.5)	257 (1.9)
Texas	17 (1.9)	286 (2.5)	41 (2.8)	257 (1.9)	19 (1.7)	227 (1.8)	23 (2.5)	254 (2.1)
Virginia	29 (1.8)	293 (2.4)	38 (1.9)	260 (1.6)	19 (1.4)	232 (2.0)	14 (2.0)	254 (3.6)
West Virginia	27 (1.9)	282 (1.4)	35 (2.7)	253 (1.6)	18 (2.2)	231 (1.7)	19 (3.1)	251 (2.0)
Wisconsin	24 (2.3)	302 (1.8)	38 (2.8)	274 (1.7)	14 (1.4)	245 (2.6)	24 (3.1)	268 (1.8)
Wyoming	26 (0.9)	292 (1.1)	38 (1.8)	269 (1.0)	13 (0.7)	249 (1.6)	23 (1.5)	270 (1.4)
TERRITORIES								
Guam	19 (0.8)	260 (1.5)	33 (0.9)	238 (0.9)	36 (0.7)	205 (0.8)	13 (0.4)	233 (1.7)
Virgin Islands	14 (0.5)	239 (1.7)	38 (0.7)	223 (0.8)	23 (0.8)	204 (1.2)	26 (1.1)	215 (1.2)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. **Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

330

TABLE 13.4 | **Students' Reports on the Frequency with Which They Do Mathematics Problems from Textbooks in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	Almost Every Day		Several Times a Week		About Once a Week or Less	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	74 (1.9)	267 (1.2)	14 (0.8)	252 (1.7)	12 (1.8)	242 (4.5)
Northeast	72 (5.3)	275 (3.7)	14 (1.6)	261 (4.5)	14 (4.3)	249 (7.4)!
Southeast	78 (2.4)	257 (2.6)	14 (1.9)	246 (4.4)	8 (2.7)	222 (5.3)!
Central	74 (4.7)	271 (2.2)	15 (1.6)	250 (4.2)	11 (4.3)	250 (4.7)!
West	71 (3.5)	267 (2.4)	15 (1.5)	251 (2.4)	14 (3.1)	242(11.2)!
STATES						
Alabama	83 (1.2)	255 (1.2)	12 (0.9)	246 (2.0)	6 (0.6)	233 (3.3)
Arizona	79 (1.4)	264 (1.1)	13 (0.7)	247 (1.9)	8 (1.1)	241 (2.8)
Arkansas	81 (1.6)	259 (1.0)	13 (0.9)	244 (2.0)	6 (0.9)	236 (3.3)
California	69 (2.0)	262 (1.3)	17 (1.1)	247 (2.5)	14 (1.5)	240 (2.8)
Colorado	73 (2.1)	272 (1.0)	15 (1.0)	256 (1.9)	12 (1.6)	250 (2.2)
Connecticut	67 (2.2)	274 (1.2)	19 (1.1)	265 (1.9)	14 (1.9)	257 (2.1)
Delaware	68 (1.1)	266 (0.9)	17 (1.1)	253 (2.3)	15 (0.8)	248 (2.1)
District of Columbia	53 (1.1)	233 (1.3)	27 (1.0)	232 (1.2)	20 (0.8)	222 (1.1)
Florida	76 (1.4)	261 (1.3)	14 (0.9)	243 (1.6)	9 (1.0)	230 (2.8)
Georgia	76 (1.7)	263 (1.4)	17 (1.2)	249 (2.1)	7 (0.7)	239 (2.9)
Hawaii	70 (0.9)	259 (0.8)	18 (0.8)	233 (1.7)	11 (0.7)	232 (1.9)
Idaho	83 (0.9)	274 (0.7)	11 (0.6)	263 (1.8)	6 (0.6)	247 (3.8)
Illinois	71 (2.6)	265 (1.7)	16 (1.3)	248 (3.0)	13 (1.6)	249 (3.7)
Indiana	82 (1.5)	270 (1.1)	12 (0.9)	259 (2.1)	5 (1.0)	250 (3.3)
Iowa	79 (2.2)	279 (1.1)	12 (1.1)	274 (2.4)	9 (1.6)	272 (3.9)
Kentucky	82 (1.6)	258 (1.5)	12 (1.1)	250 (2.1)	6 (0.9)	245 (4.3)
Louisiana	79 (1.4)	248 (1.4)	14 (0.8)	242 (1.8)	7 (0.8)	229 (2.7)
Maryland	62 (2.2)	266 (1.8)	22 (1.1)	256 (1.7)	16 (1.7)	247 (2.2)
Michigan	77 (2.0)	267 (1.4)	12 (1.0)	258 (2.7)	10 (1.7)	251 (3.8)
Minnesota	81 (1.5)	279 (0.9)	12 (1.2)	265 (1.8)	7 (1.2)	257 (4.4)
Montana	79 (1.5)	282 (0.8)	13 (1.0)	279 (1.8)	6 (1.0)	266 (3.2)
Nebraska	83 (1.3)	278 (0.9)	12 (1.0)	262 (1.9)	5 (0.6)	265 (4.8)
New Hampshire	72 (1.4)	278 (1.0)	15 (0.7)	266 (1.7)	13 (1.3)	267 (1.5)
New Jersey	73 (1.8)	272 (1.2)	18 (1.0)	259 (2.2)	7 (1.0)	260 (3.4)
New Mexico	78 (0.9)	259 (0.9)	13 (0.9)	249 (2.4)	9 (0.6)	245 (1.4)
New York	63 (2.4)	266 (1.8)	21 (1.2)	255 (1.9)	17 (1.7)	248 (2.6)
North Carolina	77 (1.4)	254 (1.1)	15 (1.0)	238 (1.8)	8 (0.7)	230 (3.0)
North Dakota	80 (1.2)	284 (1.1)	11 (0.9)	268 (3.7)	9 (0.8)	275 (2.5)
Ohio	75 (2.2)	266 (1.1)	17 (1.3)	257 (1.6)	7 (1.2)	253 (3.3)
Oklahoma	[illegible] (1.5)	265 (1.3)	9 (0.8)	252 (2.5)	4 (0.8)	241 (2.1)
Oregon	74 (1.6)	276 (1.1)	16 (1.3)	262 (2.2)	10 (1.2)	262 (3.0)
Pennsylvania	75 (1.7)	270 (1.5)	17 (1.0)	256 (2.3)	9 (0.8)	256 (4.6)
Rhode Island	75 (0.8)	266 (0.7)	13 (0.6)	259 (1.8)	12 (0.5)	[illegible] (1.6)
Texas	72 (1.7)	262 (1.3)	16 (1.2)	249 (2.8)	12 (1.2)	247 (3.2)
Virginia	77 (1.8)	267 (1.5)	15 (1.1)	255 (2.4)	8 (1.0)	248 (4.1)
West Virginia	84 (1.2)	258 (1.0)	12 (1.0)	247 (1.9)	4 (0.5)	232 (2.6)
Wisconsin	78 (2.6)	276 (1.3)	13 (1.1)	267 (2.3)	9 (2.0)	270 (3.5)!
Wyoming	79 (0.8)	'74 (0.6)	10 (0.6)	267 (1.8)	10 (0.5)	265 (1.1)
TERRITORIES						
Guam	[illegible]	236 (0.8)	20 (0.9)	220 (1.4)	12 (0.5)	212 (2.4)
Virgin Islands	73 (1.4)	220 (0.7)	17 (0.8)	218 (1.5)	10 (1.1)	207 (1.3)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

331

TABLE 13.5 | **Teachers' Reports on the Frequency with Which Students Do Mathematics Problems from Textbooks in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	Almost Every Day		Several Times a Week		About Once a Week or Less	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	62 (3.4)	267 (1.8)	31 (3.1)	254 (2.9)	7 (1.8)	260 (5.1)!
Northeast	57 (9.3)	276 (4.4)	31 (8.3)	261 (8.2)!	13 (2.8)	*** (***)
Southeast	75 (7.8)	259 (3.7)	22 (7.8)	248 (5.2)!	3 (2.8)	*** (***)
Central	62 (5.6)	269 (3.8)	32 (4.2)	252 (5.3)	6 (2.7)	*** (***)
West	55 (6.0)	270 (3.3)	36 (5.1)	256 (5.2)	9 (4.9)	*** (***)
STATES						
Alabama	85 (2.5)	255 (1.2)	14 (2.5)	243 (4.1)	1 (0.5)	*** (***)
Arizona	72 (2.5)	262 (1.5)	23 (2.3)	257 (2.4)	5 (1.3)	238 (4.8)!
Arkansas	80 (2.7)	256 (1.2)	18 (2.7)	251 (2.7)	2 (0.6)	*** (***)
California	64 (3.2)	259 (1.8)	27 (2.8)	254 (2.5)	9 (2.1)	250 (5.4)!
Colorado	59 (3.6)	271 (1.2)	31 (2.7)	263 (2.1)	10 (2.4)	253 (3.2)!
Connecticut	56 (3.5)	273 (1.5)	29 (3.2)	269 (1.5)	15 (2.7)	264 (3.3)
Delaware	68 (1.0)	266 (1.0)	27 (0.8)	249 (1.4)	5 (0.5)	251 (4.1)
District of Columbia	39 (1.2)	239 (1.5)	42 (1.0)	230 (0.9)	19 (0.9)	223 (1.4)
Florida	76 (2.6)	261 (1.3)	21 (2.7)	244 (2.7)	3 (0.8)	*** (***)
Georgia	74 (2.6)	261 (1.4)	24 (2.7)	249 (2.8)	2 (0.7)	*** (***)
Hawaii	68 (1.3)	257 (0.9)	25 (1.2)	242 (1.4)	7 (0.5)	232 (2.3)
Idaho	75 (1.9)	274 (0.8)	22 (1.6)	266 (1.9)	3 (0.5)	*** (***)
Illinois	71 (4.6)	267 (1.8)	26 (4.4)	251 (3.9)	3 (0.9)	*** (***)
Indiana	81 (3.1)	270 (1.3)	16 (2.9)	262 (2.9)	3 (1.1)	*** (***)
Iowa	77 (2.9)	279 (1.3)	19 (2.5)	275 (2.8)	4 (1.3)	274 (5.1)!
Kentucky	80 (2.6)	258 (1.3)	17 (2.6)	252 (3.0)	3 (0.9)	233 (3.6)!
Louisiana	83 (2.7)	246 (1.3)	16 (2.6)	243 (3.6)	1 (0.7)	*** (***)
Maryland	57 (3.2)	267 (2.0)	33 (3.0)	255 (2.9)	10 (1.7)	247 (4.1)
Michigan	71 (3.6)	266 (1.8)	24 (3.4)	260 (3.5)	5 (1.5)	259 (6.2)!
Minnesota	73 (3.9)	279 (1.2)	23 (3.9)	271 (1.6)	4 (1.3)	259 (6.1)!
Montana	62 (3.1)	284 (1.0)	32 (2.5)	276 (1.4)	6 (1.6)	279 (3.0)!
Nebraska	78 (2.1)	278 (1.3)	19 (2.0)	266 (2.3)	2 (0.4)	*** (***)
New Hampshire	55 (1.2)	273 (1.4)	34 (1.4)	272 (1.2)	11 (1.2)	276 (2.0)
New Jersey	74 (2.9)	272 (1.5)	23 (2.6)	262 (3.5)	3 (1.2)	262 (9.6)!
New Mexico	69 (1.2)	258 (0.9)	25 (1.2)	253 (1.4)	6 (0.3)	247 (3.0)
New York	60 (3.5)	267 (1.9)	31 (2.9)	254 (3.5)	9 (1.7)	242 (4.7)
North Carolina	70 (3.2)	254 (1.3)	26 (3.1)	244 (2.4)	4 (0.9)	229 (5.8)!
North Dakota	79 (3.3)	282 (1.1)	16 (3.4)	280 (5.6)!	5 (0.3)	*** (***)
Ohio	69 (3.8)	267 (1.6)	27 (3.6)	262 (3.2)	5 (1.6)	251 (9.4)!
Oklahoma	79 (3.4)	265 (1.3)	20 (3.3)	256 (2.8)	1 (0.7)	*** (***)
Oregon	62 (3.7)	277 (1.7)	32 (3.4)	266 (2.0)	7 (1.6)	251 (4.0)!
Pennsylvania	74 (2.9)	272 (1.6)	21 (2.6)	258 (3.0)	5 (1.3)	247(11.8)!
Rhode Island	71 (1.0)	265 (0.8)	21 (0.9)	255 (1.2)	8 (0.5)	228 (2.4)
Texas	62 (3.2)	258 (1.7)	29 (3.1)	251 (2.3)	8 (1.2)	254 (5.8)
Virginia	70 (2.5)	267 (1.9)	26 (2.5)	254 (2.4)	4 (1.1)	252(11.9)!
West Virginia	85 (2.6)	257 (1.0)	15 (2.6)	257 (2.5)	0 (0.2)	*** (***)
Wisconsin	69 (3.6)	277 (1.5)	24 (3.3)	270 (2.4)	7 (1.8)	280 (4.1)!
Wyoming	71 (0.6)	274 (0.8)	20 (0.7)	270 (1.3)	10 (0.4)	268 (1.3)
TERRITORIES						
Guam	57 (0.7)	234 (0.9)	29 (0.8)	233 (1.1)	14 (0.6)	223 (2.3)
Virgin Islands	84 (0.9)	221 (0.8)	9 (0.6)	208 (1.3)	6 (0.2)	215 (3.7)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

332

TABLE 13.6 | **Students' Reports on the Frequency with Which They Do Mathematics Problems on Worksheets in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	At Least Several Times a Week		About Once a Week		Less than Weekly	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	38 (2.4)	253 (2.2)	25 (1.2)	261 (1.4)	37 (2.5)	272 (1.9)
Northeast	44 (5.9)	261 (3.6)	22 (1.6)	268 (3.6)	34 (6.5)	282 (4.3)
Southeast	38 (4.3)	245 (4.3)	32 (1.5)	254 (2.8)	29 (3.9)	263 (3.3)
Central	36 (6.0)	257 (4.9)	23 (2.3)	264 (2.8)	40 (5.6)	273 (4.0)
West	35 (4.0)	250 (4.2)	23 (2.6)	262 (2.1)	41 (4.1)	270 (3.4)
STATES						
Alabama	34 (2.0)	245 (1.9)	31 (1.6)	251 (1.6)	35 (2.6)	261 (1.6)
Arizona	31 (1.9)	250 (1.3)	29 (1.2)	259 (1.5)	40 (1.5)	267 (1.6)
Arkansas	35 (2.5)	249 (1.2)	27 (1.5)	254 (1.6)	37 (2.5)	263 (1.4)
California	44 (2.4)	249 (1.9)	24 (1.2)	257 (1.8)	33 (2.3)	266 (2.0)
Colorado	36 (2.3)	259 (1.5)	28 (1.4)	270 (1.3)	37 (2.2)	274 (1.3)
Connecticut	43 (2.4)	265 (1.3)	23 (1.2)	270 (1.9)	34 (2.3)	277 (1.7)
Delaware	51 (1.2)	253 (1.0)	23 (0.9)	262 (1.6)	26 (1.1)	275 (1.5)
District of Columbia	58 (1.1)	225 (0.8)	24 (1.1)	236 (1.5)	18 (0.7)	241 (1.9)
Florida	35 (1.9)	243 (1.3)	29 (1.2)	257 (1.7)	36 (1.8)	266 (1.7)
Georgia	43 (2.0)	252 (1.6)	29 (1.1)	261 (1.6)	28 (1.6)	267 (2.1)
Hawaii	48 (1.0)	238 (0.9)	20 (0.9)	255 (1.5)	32 (1.1)	268 (1.4)
Idaho	27 (1.7)	265 (1.4)	26 (1.0)	270 (1.3)	47 (1.5)	278 (1.1)
Illinois	40 (3.0)	258 (2.1)	22 (1.3)	257 (2.0)	37 (3.0)	268 (2.7)
Indiana	32 (2.5)	259 (1.6)	29 (1.4)	270 (1.8)	40 (2.4)	272 (1.8)
Iowa	40 (3.2)	275 (1.8)	23 (1.7)	279 (1.4)	38 (2.7)	281 (1.4)
Kentucky	35 (2.4)	249 (1.7)	28 (1.6)	257 (1.3)	36 (2.4)	263 (1.5)
Louisiana	36 (2.2)	242 (2.1)	32 (1.4)	246 (1.5)	32 (2.2)	250 (1.8)
Maryland	47 (2.0)	256 (1.4)	26 (1.2)	263 (2.2)	27 (2.1)	267 (2.7)
Michigan	38 (2.4)	259 (1.7)	24 (1.4)	263 (1.7)	38 (2.3)	270 (1.8)
Minnesota	33 (2.2)	269 (1.5)	29 (1.6)	275 (1.3)	37 (2.4)	282 (1.5)
Montana	32 (2.1)	276 (1.3)	29 (1.2)	280 (1.4)	39 (2.1)	284 (0.9)
Nebraska	37 (2.2)	273 (1.3)	29 (1.4)	275 (1.6)	34 (2.1)	280 (1.4)
New Hampshire	43 (1.2)	271 (0.9)	27 (0.9)	272 (1.8)	30 (1.0)	279 (1.9)
New Jersey	43 (1.9)	264 (1.3)	27 (1.2)	271 (1.8)	30 (1.6)	277 (2.0)
New Mexico	34 (1.2)	250 (1.4)	25 (0.9)	254 (1.3)	41 (1.1)	263 (1.2)
New York	41 (2.4)	256 (2.0)	22 (1.4)	262 (1.9)	36 (2.3)	265 (2.2)
North Carolina	45 (2.1)	244 (1.7)	29 (1.3)	252 (1.5)	27 (1.8)	258 (1.8)
North Dakota	36 (1.9)	278 (2.0)	24 (1.8)	280 (1.8)	40 (2.4)	284 (1.5)
Ohio	38 (2.6)	257 (1.5)	27 (1.4)	263 (1.9)	35 (2.3)	272 (1.5)
Oklahoma	25 (2.2)	253 (1.9)	29 (1.6)	263 (1.9)	46 (2.3)	268 (1.7)
Oregon	35 (1.9)	262 (1.5)	25 (1.1)	270 (1.7)	40 (2.1)	280 (1.4)
Pennsylvania	42 (2.4)	261 (1.8)	22 (1.4)	268 (2.4)	35 (2.4)	271 (2.4)
Rhode Island	38 (0.9)	260 (1.1)	24 (0.8)	260 (1.4)	38 (1.0)	270 (1.1)
Texas	45 (2.2)	252 (1.7)	25 (1.2)	256 (1.7)	30 (2.3)	266 (2.0)
Virginia	43 (1.8)	258 (2.0)	29 (1.2)	263 (1.8)	28 (1.7)	274 (2.6)
West Virginia	26 (2.4)	249 (1.5)	30 (1.5)	255 (1.4)	43 (2.4)	260 (1.3)
Wisconsin	41 (2.6)	269 (1.6)	25 (1.5)	276 (2.1)	34 (2.3)	280 (1.9)
Wyoming	29 (0.9)	267 (1.1)	27 (0.9)	270 (1.0)	44 (1.1)	277 (0.9)
TERRITORIES						
Guam	44 (0.8)	223 (1.0)	22 (1.0)	235 (2.1)	34 (1.0)	239 (1.3)
Virgin Islands	38 (1.6)	212 (1.0)	30 (1.5)	222 (1.1)	32 (1.3)	222 (1.1)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

333

TABLE 13.7 | **Teachers' Reports on the Frequency with Which Students Do Mathematics Problems on Worksheets in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	At Least Several Times a Week		About Once a Week		Less than Weekly	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	34 (3.8)	256 (2.3)	33 (3.4)	260 (2.3)	32 (3.6)	274 (2.7)
Northeast	53(11.3)	262 (4.5)!	32 (8.2)	270 (3.4)!	15 (4.6)	*** (***)
Southeast	30 (6.6)	251 (3.4)!	44 (9.1)	256 (3.7)!	27 (8.6)	263 (6.0)!
Central	38 (8.3)	252 (5.5)!	23 (4.8)	261 (6.1)	39 (7.0)	276 (4.1)
West	25 (5.2)	258 (4.3)!	34 (4.6)	258 (4.1)	41 (5.6)	274 (4.2)
STATES						
Alabama	38 (3.3)	249 (2.2)	41 (3.4)	252 (1.7)	22 (3.1)	262 (3.1)
Arizona	32 (3.2)	253 (1.9)	32 (2.5)	256 (2.3)	36 (2.8)	266 (2.2)
Arkansas	38 (3.2)	252 (1.3)	29 (2.9)	260 (2.3)	33 (3.3)	260 (2.3)
California	35 (3.1)	253 (2.6)	31 (2.9)	256 (3.0)	34 (2.9)	260 (2.9)
Colorado	40 (3.6)	259 (1.8)	29 (2.7)	270 (2.2)	31 (3.3)	274 (2.3)
Connecticut	43 (3.0)	272 (1.6)	31 (2.5)	269 (2.0)	26 (2.8)	270 (2.6)
Delaware	54 (1.0)	252 (1.2)	31 (1.3)	268 (1.6)	15 (1.2)	279 (2.5)
District of Columbia	51 (1.3)	228 (0.8)	29 (1.1)	240 (2.1)	20 (0.9)	233 (1.5)
Florida	35 (2.8)	248 (2.4)	33 (2.9)	259 (1.9)	32 (2.7)	264 (2.7)
Georgia	41 (3.0)	252 (1.9)	33 (3.2)	260 (2.2)	26 (2.9)	264 (2.9)
Hawaii	41 (0.9)	240 (0.9)	25 (0.9)	248 (1.7)	34 (0.8)	268 (1.4)
Idaho	29 (2.0)	265 (1.6)	34 (1.2)	270 (1.1)	38 (2.0)	278 (1.2)
Illinois	47 (4.1)	253 (3.0)	23 (2.6)	262 (4.3)	29 (4.2)	275 (2.6)
Indiana	33 (3.8)	258 (2.3)	34 (3.3)	266 (2.0)	33 (3.8)	277 (2.4)
Iowa	47 (4.5)	275 (1.6)	21 (3.1)	283 (2.2)	32 (3.8)	278 (2.1)
Kentucky	44 (3.9)	250 (1.7)	31 (2.8)	258 (1.7)	26 (3.5)	266 (2.5)
Louisiana	37 (3.9)	242 (2.3)	33 (3.8)	247 (2.3)	29 (4.4)	248 (2.0)
Maryland	47 (2.5)	257 (2.5)	29 (3.1)	268 (3.2)	23 (2.6)	262 (3.4)
Michigan	36 (3.8)	260 (2.3)	33 (3.7)	263 (3.1)	31 (3.7)	271 (3.2)
Minnesota	39 (3.5)	271 (1.5)	32 (3.5)	275 (1.9)	29 (3.6)	284 (2.2)
Montana	47 (3.3)	280 (1.1)	22 (2.1)	282 (2.7)	30 (2.2)	281 (0.8)
Nebraska	46 (3.3)	274 (1.2)	33 (2.9)	277 (2.0)	22 (2.6)	280 (2.0)
New Hampshire	49 (1.3)	270 (1.1)	26 (1.1)	272 (1.2)	25 (1.2)	280 (2.4)
New Jersey	53 (3.5)	267 (1.7)	25 (3.1)	264 (2.2)	22 (2.8)	281 (4.2)
New Mexico	33 (1.0)	248 (1.1)	29 (1.2)	259 (1.4)	38 (1.4)	261 (1.3)
New York	43 (3.9)	260 (2.4)	31 (2.9)	258 (2.9)	27 (3.4)	263 (3.1)
North Carolina	49 (3.3)	245 (1.9)	30 (2.5)	254 (2.6)	21 (2.8)	257 (3.1)
North Dakota	37 (2.5)	279 (2.1)	34 (3.3)	281 (1.6)	29 (2.7)	286 (2.3)
Ohio	38 (3.8)	261 (2.3)	32 (3.9)	259 (2.8)	30 (3.6)	277 (2.2)
Oklahoma	28 (3.2)	257 (2.1)	32 (3.3)	264 (2.2)	40 (3.0)	267 (2.0)
Oregon	36 (3.0)	262 (2.1)	30 (2.6)	275 (2.1)	34 (2.9)	279 (1.9)
Pennsylvania	51 (4.0)	262 (2.2)	24 (2.6)	272 (3.0)	25 (3.3)	272 (3.5)
Rhode Island	43 (0.9)	259 (0.9)	27 (0.9)	259 (1.4)	30 (0.9)	262 (1.3)
Texas	41 (3.2)	255 (2.1)	32 (3.5)	253 (2.5)	27 (3.3)	260 (3.4)
Virginia	44 (3.4)	259 (2.1)	28 (2.3)	264 (2.8)	27 (3.2)	270 (3.4)
West Virginia	29 (3.2)	253 (2.0)	39 (3.4)	255 (1.6)	32 (3.4)	262 (2.1)
Wisconsin	42 (4.0)	269 (1.9)	30 (3.2)	280 (2.5)	28 (3.3)	280 (2.2)
Wyoming	27 (1.0)	270 (1.2)	42 (1.6)	274 (0.7)	31 (1.7)	272 (1.3)
TERRITORIES						
Guam	42 (1.1)	224 (1.0)	28 (0.5)	231 (1.4)	30 (1.1)	243 (1.1)
Virgin Islands	49 (0.7)	210 (0.9)	29 (0.6)	227 (1.0)	22 (0.6)	233 (1.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 13.8 | **Students' Reports on the Frequency with Which They Work in Small Groups in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	28 (2.5)	258 (2.7)	28 (1.4)	267 (2.0)	44 (2.9)	261 (1.6)
Northeast	27 (6.7)	260 (4.8)!	22 (2.8)	271 (5.0)	51 (7.9)	273 (4.6)
Southeast	26 (3.9)	251 (4.8)	26 (2.2)	259 (3.9)	49 (4.8)	252 (2.4)
Central	23 (4.6)	266 (6.5)	32 (3.3)	266 (3.0)	45 (6.3)	264 (3.4)
West	35 (4.8)	258 (4.2)	29 (2.8)	271 (3.1)	36 (4.8)	258 (2.0)
STATES						
Alabama	15 (1.3)	248 (2.4)	23 (1.5)	258 (1.8)	63 (2.0)	253 (1.4)
Arizona	33 (1.9)	258 (2.1)	26 (1.1)	264 (1.6)	42 (1.8)	261 (1.8)
Arkansas	18 (1.2)	249 (1.9)	27 (1.5)	265 (1.6)	55 (2.0)	255 (1.1)
California	35 (2.0)	256 (2.0)	25 (1.2)	260 (1.8)	40 (2.0)	254 (1.7)
Colorado	38 (2.3)	266 (1.5)	30 (1.4)	270 (1.6)	32 (2.1)	265 (1.6)
Connecticut	30 (1.9)	271 (1.6)	27 (1.7)	277 (1.6)	43 (2.6)	265 (1.6)
Delaware	26 (1.1)	261 (2.0)	26 (0.9)	269 (1.7)	48 (1.4)	257 (0.9)
District of Columbia	47 (1.1)	226 (1.0)	18 (0.7)	243 (1.5)	34 (1.2)	230 (0.9)
Florida	26 (1.9)	251 (2.2)	23 (1.2)	261 (1.9)	51 (1.9)	255 (1.6)
Georgia	27 (1.7)	252 (1.8)	32 (1.3)	265 (1.5)	41 (2.2)	258 (1.7)
Hawaii	28 (0.9)	240 (1.5)	20 (0.8)	257 (1.5)	52 (1.0)	255 (1.1)
Idaho	29 (1.0)	271 (1.2)	29 (1.0)	274 (1.2)	41 (1.1)	271 (1.1)
Illinois	27 (2.4)	258 (3.5)	30 (2.1)	271 (1.9)	43 (2.8)	258 (1.9)
Indiana	20 (2.0)	265 (2.4)	30 (1.7)	270 (1.4)	50 (2.6)	266 (1.4)
Iowa	28 (2.4)	278 (2.1)	38 (2.6)	281 (1.3)	37 (3.1)	276 (1.6)
Kentucky	19 (1.4)	252 (2.5)	25 (1.7)	264 (1.8)	56 (2.2)	255 (1.2)
Louisiana	19 (1.7)	244 (2.8)	21 (1.5)	253 (2.2)	60 (2.6)	244 (1.3)
Maryland	30 (2.1)	258 (2.2)	28 (1.4)	269 (2.3)	42 (2.3)	258 (1.8)
Michigan	23 (1.8)	265 (2.3)	25 (1.8)	270 (1.7)	52 (2.5)	261 (1.3)
Minnesota	28 (2.0)	277 (1.7)	28 (1.7)	279 (1.2)	45 (2.3)	273 (1.3)
Montana	31 (1.7)	280 (1.4)	30 (1.3)	282 (1.3)	39 (1.6)	280 (1.5)
Nebraska	27 (1.6)	277 (1.7)	38 (1.6)	279 (1.2)	36 (1.6)	272 (1.2)
New Hampshire	32 (1.1)	274 (1.2)	35 (1.1)	278 (1.4)	33 (1.0)	271 (1.3)
New Jersey	24 (1.7)	263 (2.4)	25 (1.4)	281 (1.7)	51 (2.5)	267 (1.5)
New Mexico	24 (0.9)	256 (1.6)	24 (0.9)	263 (1.6)	52 (1.0)	253 (1.0)
New York	21 (1.5)	254 (2.6)	20 (1.4)	271 (2.1)	58 (2.1)	261 (1.5)
North Carolina	23 (1.4)	245 (1.9)	28 (1.3)	257 (1.6)	49 (2.1)	249 (1.3)
North Dakota	19 (1.6)	282 (1.7)	31 (1.2)	283 (1.8)	50 (2.0)	280 (1.5)
Ohio	20 (1.7)	262 (2.7)	28 (1.6)	268 (1.8)	52 (2.4)	262 (1.5)
Oklahoma	20 (2.0)	261 (2.8)	23 (2.0)	267 (1.8)	56 (2.6)	262 (1.5)
Oregon	39 (2.0)	270 (1.5)	32 (1.6)	275 (1.4)	29 (1.6)	270 (1.7)
Pennsylvania	17 (1.4)	263 (2.8)	25 (1.5)	272 (1.3)	58 (2.2)	266 (1.9)
Rhode Island	14 (0.5)	256 (2.3)	19 (0.5)	267 (1.4)	67 (0.7)	259 (0.7)
Texas	23 (2.0)	259 (2.3)	28 (1.5)	264 (1.8)	48 (2.4)	254 (1.5)
Virginia	29 (2.1)	264 (2.8)	29 (1.7)	271 (2.2)	42 (2.4)	259 (1.9)
West Virginia	19 (1.9)	254 (1.8)	25 (1.4)	257 (1.2)	56 (2.3)	256 (1.1)
Wisconsin	26 (2.2)	273 (2.1)	34 (1.9)	279 (1.4)	40 (2.5)	272 (1.9)
Wyoming	44 (1.3)	274 (0.9)	32 (0.8)	274 (0.8)	24 (1.0)	266 (1.4)
TERRITORIES						
Guam	24 (1.1)	234 (1.4)	16 (0.9)	247 (1.3)	60 (1.3)	230 (0.8)
Virgin Islands	34 (1.4)	214 (1.0)	16 (0.7)	224 (1.5)	51 (1.2)	219 (0.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 13.9 | **Students' Reports on the Frequency with Which They Work in Small Groups in Mathematics Class Organized by Percentage of Students Reporting at Least Once a Week**

GRADE 8 PUBLIC SCHOOLS	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
STATES/TERRITORIES						
District of Columbia	47 (1.1)	226 (1.0)	16 (0.7)	243 (1.5)	34 (1.2)	230 (0.9)
Wyoming	44 (1.3)	274 (0.9)	32 (0.8)	274 (0.8)	24 (1.0)	268 (1.4)
Oregon	39 (2.0)	270 (1.5)	32 (1.6)	275 (1.4)	29 (1.8)	270 (1.7)
Colorado	38 (2.3)	268 (1.5)	30 (1.4)	270 (1.6)	32 (2.1)	265 (1.6)
California	**35 (2.0)**	**258 (2.0)**	**25 (1.2)**	**260 (1.8)**	**40 (2.0)**	**254 (1.7)**
Virgin Islands	**34 (1.4)**	**214 (1.0)**	**16 (0.7)**	**224 (1.5)**	**51 (1.2)**	**219 (0.8)**
Arizona	**33 (1.9)**	**256 (2.1)**	**26 (1.1)**	**264 (1.8)**	**42 (1.8)**	**261 (1.8)**
New Hampshire	**32 (1.1)**	**274 (1.2)**	**35 (1.1)**	**278 (1.4)**	**33 (1.0)**	**271 (1.3)**
Montana	**31 (1.7)**	**280 (1.4)**	**30 (1.3)**	**282 (1.3)**	**39 (1.6)**	**280 (1.5)**
Maryland	30 (2.1)	258 (2.2)	28 (1.4)	269 (2.3)	42 (2.3)	258 (1.8)
Connecticut	30 (1.9)	271 (1.6)	27 (1.7)	277 (1.6)	43 (2.6)	265 (1.6)
Idaho	29 (1.0)	271 (1.2)	29 (1.0)	274 (1.2)	41 (1.1)	271 (1.1)
Virginia	29 (2.1)	264 (2.8)	29 (1.7)	271 (2.2)	42 (2.4)	259 (1.9)
Hawaii	28 (0.9)	240 (1.5)	20 (0.8)	257 (1.5)	52 (1.0)	255 (1.1)
Iowa	**28 (2.4)**	**278 (2.1)**	**36 (2.6)**	**281 (1.3)**	**37 (3.1)**	**276 (1.8)**
Illinois	**27 (2.4)**	**266 (3.5)**	**30 (2.1)**	**271 (1.9)**	**43 (2.8)**	**258 (1.9)**
Georgia	**27 (1.7)**	**252 (1.8)**	**32 (1.3)**	**265 (1.5)**	**41 (2.2)**	**258 (1.7)**
Nebraska	**27 (1.8)**	**277 (1.7)**	**36 (1.5)**	**279 (1.2)**	**36 (1.9)**	**272 (1.2)**
Wisconsin	**26 (2.2)**	**273 (2.1)**	**34 (1.9)**	**279 (1.4)**	**40 (2.5)**	**272 (1.9)**
Minnesota	26 (2.0)	277 (1.7)	28 (1.7)	279 (1.2)	45 (2.3)	273 (1.3)
Florida	26 (1.9)	251 (2.2)	23 (1.2)	261 (1.9)	51 (1.9)	255 (1.6)
Delaware	26 (1.1)	261 (2.0)	26 (0.9)	269 (1.7)	48 (1.4)	257 (0.9)
New Jersey	24 (1.7)	263 (2.4)	25 (1.4)	281 (1.7)	51 (2.5)	267 (1.5)
Guam	24 (1.1)	224 (1.4)	16 (0.9)	247 (1.9)	60 (1.3)	230 (0.9)
New Mexico	**24 (0.9)**	**256 (1.6)**	**24 (0.9)**	**263 (1.9)**	**52 (1.0)**	**253 (1.0)**
Texas	**23 (2.0)**	**259 (2.3)**	**28 (1.5)**	**264 (1.8)**	**48 (2.4)**	**254 (1.5)**
Michigan	**23 (1.8)**	**265 (2.3)**	**25 (1.8)**	**270 (1.7)**	**52 (2.5)**	**261 (1.3)**
North Carolina	**23 (1.4)**	**245 (1.9)**	**28 (1.3)**	**257 (1.8)**	**49 (2.1)**	**249 (1.3)**
New York	**21 (1.5)**	**254 (2.8)**	**20 (1.4)**	**271 (2.1)**	**59 (2.1)**	**261 (1.5)**
Oklahoma	20 (2.0)	261 (2.6)	23 (2.0)	267 (1.8)	56 (2.6)	262 (1.5)
Indiana	20 (2.0)	268 (2.4)	30 (1.7)	270 (1.4)	50 (2.6)	266 (1.4)
Ohio	20 (1.7)	262 (2.7)	28 (1.6)	268 (1.8)	52 (2.4)	262 (1.5)
West Virginia	19 (1.9)	254 (1.8)	25 (1.4)	257 (1.2)	56 (2.3)	256 (1.1)
North Dakota	19 (1.6)	282 (1.7)	31 (1.2)	283 (1.8)	50 (2.0)	280 (1.5)
Louisiana	**19 (1.7)**	**244 (2.8)**	**21 (1.5)**	**253 (2.2)**	**60 (2.6)**	**244 (1.3)**
Kentucky	**19 (1.4)**	**252 (2.5)**	**25 (1.7)**	**264 (1.8)**	**56 (2.2)**	**255 (1.2)**
Arkansas	**18 (1.2)**	**249 (1.8)**	**27 (1.5)**	**259 (1.6)**	**55 (2.0)**	**255 (1.1)**
Pennsylvania	**17 (1.4)**	**263 (2.6)**	**25 (1.5)**	**272 (1.9)**	**58 (2.2)**	**260 (1.9)**
Alabama	15 (1.3)	246 (2.4)	23 (1.5)	256 (1.6)	63 (2.0)	253 (1.4)
Rhode Island	14 (0.5)	258 (2.3)	19 (0.5)	267 (1.4)	67 (0.7)	259 (0.7)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 13.10 | **Teachers' Reports on the Frequency with Which Students Work in Small Groups in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	50 (4.4)	260 (2.2)	43 (4.1)	264 (2.3)	8 (2.0)	277 (5.4)!
Northeast	44 (6.4)	264 (6.0)	39 (8.6)	267 (5.0)!	17 (6.5)	*** (***)
Southeast	44 (8.2)	255 (4.7)!	48 (8.3)	258 (3.9)!	7 (4.1)	*** (***)
Central	50 (7.8)	258 (4.1)	43 (8.6)	266 (4.0)!	7 (4.3)	*** (***)
West	57 (8.9)	262 (4.2)!	39 (7.6)	268 (4.5)	3 (2.2)	*** (***)
STATES						
Alabama	**34 (4.2)**	**247 (2.2)**	**48 (4.1)**	**257 (2.0)**	**18 (3.5)**	**252 (2.4)**
Arizona	**61 (2.6)**	**267 (1.6)**	**31 (2.6)**	**264 (1.9)**	**8 (1.2)**	**264 (3.3)**
Arkansas	**33 (3.3)**	**252 (1.7)**	**48 (4.0)**	**258 (1.6)**	**18 (3.1)**	**261 (2.1)**
California	**59 (3.1)**	**259 (2.0)**	**32 (2.9)**	**254 (2.8)**	**9 (1.4)**	**250 (6.3)!**
Colorado	69 (3.0)	266 (1.4)	25 (2.9)	265 (2.5)	6 (1.6)	275 (4.5)!
Connecticut	51 (3.7)	273 (1.5)	37 (3.1)	269 (2.1)	12 (2.7)	265 (3.4)!
Delaware	43 (1.2)	259 (1.4)	36 (1.5)	266 (1.2)	21 (0.8)	255 (1.5)
District of Columbia	82 (0.8)	229 (0.7)	17 (0.8)	247 (3.1)	2 (0.4)	*** (***)
Florida	48 (3.2)	254 (2.0)	34 (2.8)	260 (1.9)	18 (2.4)	256 (3.2)
Georgia	**56 (3.4)**	**258 (1.7)**	**40 (3.2)**	**260 (2.1)**	**4 (1.2)**	**257 (5.5)!**
Hawaii	**34 (1.0)**	**242 (1.4)**	**38 (1.0)**	**254 (1.3)**	**28 (0.9)**	**259 (1.2)**
Idaho	**55 (2.2)**	**272 (1.0)**	**33 (2.3)**	**271 (1.2)**	**12 (0.8)**	**272 (2.9)**
Illinois	**45 (4.3)**	**260 (3.5)**	**40 (4.0)**	**263 (2.8)**	**15 (2.9)**	**263 (3.4)**
Indiana	**39 (4.1)**	**271 (2.3)**	**46 (3.6)**	**266 (1.5)**	**15 (2.7)**	**262 (3.8)**
Iowa	48 (4.5)	277 (1.7)	44 (3.8)	279 (1.5)	7 (1.9)	270 (7.4)!
Kentucky	42 (4.0)	256 (1.9)	44 (3.8)	256 (1.6)	13 (2.8)	258 (2.5)!
Louisiana	45 (3.7)	245 (2.1)	42 (3.7)	247 (2.2)	13 (2.3)	245 (3.4)
Maryland	56 (3.3)	260 (2.7)	36 (3.2)	262 (2.3)	8 (2.2)	264 (3.2)!
Michigan	44 (3.3)	267 (2.1)	39 (3.5)	263 (2.6)	16 (3.0)	260 (3.4)
Minnesota	**43 (3.0)**	**279 (1.8)**	**50 (3.1)**	**273 (1.4)**	**7 (1.9)**	**279 (3.8)!**
Montana	**60 (3.0)**	**262 (1.2)**	**32 (2.9)**	**260 (1.9)**	**8 (1.8)**	**260 (2.3)!**
Nebraska	**46 (3.0)**	**279 (1.6)**	**48 (3.2)**	**275 (1.3)**	**6 (1.1)**	**268 (4.4)**
New Hampshire	**57 (1.5)**	**273 (1.0)**	**33 (1.4)**	**274 (1.9)**	**10 (0.7)**	**270 (1.7)**
New Jersey	**44 (3.6)**	**270 (2.4)**	**42 (3.6)**	**270 (2.5)**	**14 (2.5)**	**267 (3.9)**
New Mexico	51 (1.4)	257 (1.1)	38 (1.4)	256 (1.2)	11 (0.7)	258 (2.0)
New York	31 (3.2)	252 (2.8)	40 (3.4)	263 (2.3)	30 (3.0)	260 (2.7)
North Carolina	45 (3.6)	247 (1.9)	44 (3.4)	255 (1.9)	11 (1.8)	247 (3.4)
North Dakota	38 (3.3)	281 (2.5)	43 (3.7)	284 (1.5)	18 (2.1)	279 (2.5)
Ohio	37 (3.4)	266 (2.0)	49 (3.6)	265 (1.9)	14 (2.8)	266 (3.9)
Oklahoma	**44 (3.9)**	**263 (2.2)**	**38 (3.7)**	**266 (1.7)**	**18 (2.9)**	**259 (2.8)**
Oregon	**70 (2.9)**	**271 (1.4)**	**23 (2.7)**	**276 (2.1)**	**6 (1.5)**	**270 (4.0)!**
Pennsylvania	**39 (3.3)**	**265 (1.8)**	**40 (3.2)**	**266 (2.2)**	**21 (3.2)**	**269 (4.2)**
Rhode Island	**27 (0.6)**	**260 (1.2)**	**41 (0.9)**	**259 (1.2)**	**32 (0.8)**	**261 (1.2)**
Texas	**38 (3.6)**	**255 (2.5)**	**50 (3.6)**	**257 (1.8)**	**10 (1.7)**	**250 (4.0)**
Virginia	48 (2.8)	265 (2.4)	41 (2.4)	263 (2.1)	11 (1.9)	258 (3.6)
West Virginia	39 (3.5)	258 (2.0)	41 (3.5)	257 (1.3)	20 (2.5)	253 (2.7)
Wisconsin	43 (3.8)	274 (2.2)	49 (3.9)	277 (1.5)	7 (2.1)	271 (4.9)!
Wyoming	70 (1.4)	274 (0.7)	23 (1.3)	270 (1.6)	7 (0.5)	264 (2.5)
TERRITORIES						
Guam	**33 (1.1)**	**231 (1.4)**	**43 (0.6)**	**234 (0.9)**	**24 (1.0)**	**228 (1.1)**
Virgin Islands	**55 (0.6)**	**211 (0.8)**	**33 (0.7)**	**233 (1.1)**	**12 (0.6)**	**215 (1.4)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 13.11 | **Teachers' Reports on the Frequency with Which Students Work in Small Groups in Mathematics Class Organized by Percentage of Students Asked to Do Group Work at Least Once a Week**

GRADE 8 PUBLIC SCHOOLS	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
STATES/TERRITORIES						
District of Columbia	82 (0.8)	229 (0.7)	17 (0.8)	247 (3.1)	2 (0.4)	*** (***)
Oregon	70 (2.9)	271 (1.4)	23 (2.7)	278 (2.1)	6 (1.5)	270 (4.0)!
Wyoming	70 (1.4)	274 (0.7)	23 (1.3)	270 (1.6)	7 (0.5)	264 (2.5)
Colorado	69 (3.0)	266 (1.4)	25 (2.9)	265 (2.5)	6 (1.6)	275 (4.5)!
Arizona	61 (2.6)	257 (1.8)	31 (2.6)	264 (1.9)	8 (1.2)	264 (3.3)
Montana	60 (3.0)	282 (1.2)	32 (2.9)	280 (1.9)	8 (1.6)	280 (2.3)!
California	58 (3.1)	259 (2.0)	32 (2.9)	254 (2.8)	9 (1.8)	250 (6.3)!
New Hampshire	57 (1.5)	273 (1.0)	33 (1.4)	274 (1.9)	10 (0.7)	270 (1.7)
Georgia	56 (3.4)	258 (1.7)	40 (3.2)	260 (2.1)	4 (1.2)	257 (5.5)!
Maryland	56 (3.3)	260 (2.7)	36 (3.2)	262 (2.3)	8 (2.2)	264 (3.2)!
Idaho	55 (2.2)	272 (1.0)	33 (2.3)	271 (1.2)	12 (0.8)	272 (2.9)
Virgin Islands	53 (0.8)	211 (0.8)	36 (0.7)	233 (1.1)	12 (0.6)	215 (1.4)
Connecticut	51 (3.7)	273 (1.5)	37 (3.1)	269 (2.1)	12 (2.7)	265 (3.4)!
New Mexico	51 (1.4)	257 (1.1)	38 (1.4)	256 (1.2)	11 (0.7)	258 (2.0)
Iowa	48 (4.5)	277 (1.7)	44 (3.6)	279 (1.5)	7 (1.9)	270 (7.4)!
Virginia	48 (2.6)	265 (2.4)	41 (2.4)	263 (2.1)	11 (1.9)	258 (3.6)
Florida	48 (3.2)	254 (2.0)	34 (2.6)	260 (1.9)	18 (2.4)	256 (3.2)
Nebraska	46 (3.0)	279 (1.6)	48 (3.2)	275 (1.3)	6 (1.1)	268 (4.4)
Louisiana	45 (3.7)	245 (2.1)	42 (3.7)	247 (2.2)	13 (2.3)	245 (3.4)
North Carolina	45 (3.6)	247 (1.9)	44 (3.4)	255 (1.9)	11 (1.6)	247 (3.4)
Illinois	45 (4.3)	260 (3.5)	40 (4.0)	263 (2.6)	15 (2.9)	263 (3.4)
Michigan	44 (3.3)	267 (2.1)	39 (3.5)	263 (2.6)	16 (3.0)	260 (3.4)
New Jersey	44 (3.8)	270 (2.4)	42 (3.6)	270 (2.5)	14 (2.5)	267 (3.9)
Oklahoma	44 (3.9)	263 (2.2)	38 (3.7)	266 (1.7)	18 (2.9)	259 (2.8)
Delaware	43 (1.2)	259 (1.4)	36 (1.5)	266 (1.2)	21 (0.9)	255 (1.5)
Wisconsin	43 (3.6)	274 (2.2)	49 (3.9)	277 (1.5)	7 (2.1)	271 (4.9)!
Minnesota	43 (3.0)	279 (1.8)	50 (3.1)	273 (1.4)	7 (1.9)	279 (3.8)!
Kentucky	42 (4.0)	256 (1.9)	44 (3.6)	258 (1.6)	13 (2.6)	258 (2.5)!
Texas	39 (2.8)	265 (2.5)	50 (3.6)	257 (1.6)	10 (1.7)	250 (4.0)
Indiana	39 (4.1)	271 (2.3)	46 (3.6)	266 (1.5)	15 (2.7)	262 (3.8)
West Virginia	39 (3.5)	258 (2.0)	41 (3.5)	257 (1.3)	20 (2.5)	253 (2.7)
North Dakota	38 (3.3)	281 (2.5)	43 (3.7)	284 (1.5)	18 (2.1)	279 (2.5)
Ohio	37 (3.4)	266 (2.0)	49 (3.6)	265 (1.9)	14 (2.8)	266 (3.9)
Alabama	34 (4.2)	247 (2.2)	48 (4.1)	257 (2.0)	18 (3.5)	252 (2.4)
Hawaii	34 (1.0)	242 (1.4)	38 (1.0)	254 (1.3)	28 (0.9)	259 (1.2)
Arkansas	33 (3.3)	252 (1.7)	48 (4.0)	256 (1.6)	18 (3.4)	261 (2.1)
Guam	33 (1.1)	231 (1.4)	43 (0.9)	234 (0.9)	24 (1.0)	228 (1.1)
Pennsylvania	33 (3.3)	265 (2.9)	46 (3.2)	268 (2.2)	21 (3.2)	269 (4.2)
New York	31 (3.2)	259 (2.8)	40 (3.4)	263 (2.3)	30 (3.0)	260 (2.7)
Rhode Island	27 (0.8)	260 (1.2)	41 (0.9)	259 (1.2)	32 (0.8)	261 (1.2)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

338

TABLE 13.12 | **Students' Reports on the Frequency with Which They Work with Objects Like Rulers, Counting Blocks, or Geometric Shapes in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	28 (1.8)	258 (2.6)	31 (1.2)	269 (1.5)	41 (2.2)	259 (1.6)
Northeast	30 (4.3)	265 (6.9)	30 (3.2)	277 (3.9)	40 (4.8)	266 (3.9)
Southeast	23 (3.4)	242 (3.6)	29 (2.5)	261 (3.5)	48 (4.5)	254 (3.0)
Central	23 (2.9)	260 (3.5)	36 (2.5)	272 (2.9)	41 (4.6)	262 (2.8)
West	36 (3.5)	260 (4.0)	28 (1.8)	269 (2.7)	36 (3.3)	256 (2.8)
STATES						
Alabama	26 (1.6)	245 (2.4)	32 (1.6)	260 (1.2)	42 (2.3)	252 (1.3)
Arizona	21 (1.4)	254 (1.8)	25 (1.2)	264 (1.9)	53 (1.7)	260 (1.3)
Arkansas	21 (1.5)	247 (1.7)	35 (1.1)	262 (1.3)	44 (2.0)	255 (1.1)
California	32 (2.0)	253 (1.9)	28 (1.3)	263 (1.9)	40 (1.9)	254 (1.4)
Colorado	26 (1.9)	264 (1.7)	32 (1.2)	271 (1.3)	43 (1.9)	266 (1.4)
Connecticut	27 (1.5)	262 (1.7)	33 (1.2)	276 (1.5)	40 (1.7)	270 (1.4)
Delaware	24 (1.1)	252 (1.7)	30 (1.1)	267 (1.4)	46 (1.3)	262 (1.2)
District of Columbia	37 (0.9)	227 (1.1)	21 (1.1)	238 (2.2)	42 (0.9)	230 (1.0)
Florida	24 (1.7)	250 (2.2)	25 (1.3)	264 (1.8)	51 (2.2)	254 (1.5)
Georgia	28 (1.7)	250 (1.7)	32 (1.0)	263 (1.4)	40 (1.9)	261 (1.9)
Hawaii	32 (1.0)	246 (1.3)	26 (0.9)	263 (1.3)	42 (1.2)	247 (1.1)
Idaho	21 (1.3)	269 (1.8)	34 (1.1)	274 (1.1)	45 (0.9)	271 (1.1)
Illinois	31 (2.2)	255 (2.5)	31 (1.5)	270 (1.7)	39 (2.1)	257 (2.0)
Indiana	23 (1.7)	261 (2.3)	37 (1.6)	271 (1.2)	40 (2.0)	267 (1.3)
Iowa	28 (1.9)	275 (1.8)	43 (1.4)	281 (1.2)	29 (1.6)	277 (1.7)
Kentucky	21 (1.9)	253 (1.8)	33 (1.7)	263 (1.3)	46 (2.3)	254 (1.6)
Louisiana	22 (1.9)	240 (1.9)	26 (1.6)	255 (1.8)	52 (2.6)	244 (1.6)
Maryland	23 (1.4)	252 (2.0)	31 (1.1)	267 (1.6)	46 (1.7)	260 (2.0)
Michigan	26 (1.7)	262 (1.7)	30 (1.2)	270 (1.5)	44 (2.2)	262 (1.6)
Minnesota	23 (2.1)	270 (1.5)	38 (1.5)	280 (1.1)	39 (2.2)	275 (1.3)
Montana	36 (1.1)	262 (1.2)	36 (1.2)	282 (1.3)	27 (1.2)	276 (1.5)
Nebraska	30 (1.3)	275 (1.3)	41 (1.2)	281 (1.1)	28 (1.4)	270 (1.9)
New Hampshire	30 (0.9)	272 (1.5)	33 (0.9)	276 (1.4)	37 (1.0)	273 (1.4)
New Jersey	26 (1.6)	262 (1.9)	31 (1.2)	276 (1.4)	43 (1.9)	270 (1.6)
New Mexico	22 (1.1)	251 (1.4)	31 (1.2)	261 (1.4)	47 (1.2)	256 (1.0)
New York	27 (1.3)	254 (1.8)	32 (1.2)	271 (1.5)	41 (2.0)	258 (1.8)
North Carolina	26 (1.7)	241 (1.5)	31 (1.3)	256 (1.6)	43 (2.1)	251 (1.4)
North Dakota	24 (1.4)	278 (1.7)	45 (1.5)	284 (1.6)	30 (1.4)	280 (1.9)
Ohio	21 (1.5)	262 (2.1)	32 (1.3)	268 (1.6)	47 (2.0)	262 (1.4)
Oklahoma	19 (1.6)	258 (2.2)	30 (1.6)	267 (1.8)	51 (2.6)	262 (1.5)
Oregon	30 (1.5)	266 (1.4)	36 (1.2)	276 (1.1)	34 (1.6)	270 (1.5)
Pennsylvania	17 (1.5)	264 (2.4)	29 (1.2)	268 (1.6)	54 (1.9)	266 (2.1)
Rhode Island	20 (0.6)	259 (1.8)	22 (0.9)	270 (1.4)	59 (1.0)	257 (0.9)
Texas	28 (2.0)	253 (1.9)	33 (1.2)	264 (1.8)	39 (2.2)	256 (1.7)
Virginia	24 (1.6)	261 (2.9)	29 (1.3)	269 (1.7)	47 (2.2)	262 (1.7)
West Virginia	24 (1.8)	249 (1.8)	31 (1.4)	260 (1.1)	45 (2.3)	257 (1.2)
Wisconsin	32 (2.0)	274 (1.7)	38 (1.3)	280 (1.4)	30 (1.8)	269 (1.9)
Wyoming	27 (1.2)	270 (1.2)	35 (1.0)	274 (0.9)	37 (1.0)	272 (1.0)
TERRITORIES						
Guam	31 (1.0)	229 (1.1)	19 (0.9)	244 (1.7)	50 (1.2)	228 (1.1)
Virgin Islands	25 (0.9)	219 (1.4)	18 (1.0)	226 (1.3)	58 (1.1)	215 (0.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

339

TABLE 13.13 | **Teachers' Reports on the Frequency with Which Students Do Work with Objects Like Rulers, Counting Blocks, or Geometric Shapes in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	22 (3.7)	254 (3.2)	69 (3.9)	263 (1.9)	9 (2.6)	282 (5.9)!
Northeast	14 (5.5)	*** (***)	78 (6.8)	269 (1.6)	9 (3.5)	*** (***)
Southeast	19 (8.2)	243 (4.3)!	65(10.3)	257 (3.8)	16 (8.1)	*** (***)
Central	15 (5.1)	255 (4.9)!	81 (6.0)	264 (3.3)	4 (2.3)	*** (***)
West	34 (8.2)	256 (4.9)!	57 (6.4)	265 (4.0)	8 (3.0)	*** (***)
STATES						
Alabama	17 (2.7)	248 (3.4)	77 (2.6)	[illegible]	6 (1.3)	270 (5.7)
Arizona	21 (2.6)	258 (2.4)	63 (3.1)	[illegible]	17 (2.3)	[illegible]
Arkansas	13 (3.3)	248 (4.3)!	78 (3.3)	257 (1.2)	8 (1.5)	[illegible]
California	35 (3.6)	252 (2.5)	58 (3.7)	257 (1.3)	7 (1.2)	248 (7.2)
Colorado	34 (2.9)	264 (2.0)	57 (2.7)	267 (1.3)	9 (1.6)	276 (3.5)
Connecticut	26 (3.3)	266 (2.5)	59 (2.9)	271 (1.4)	15 (3.2)	276 (3.9)!
Delaware	21 (1.0)	252 (1.5)	65 (1.3)	260 (1.1)	14 (0.9)	275 (2.3)
District of Columbia	43 (0.8)	231 (0.8)	52 (1.0)	230 (1.0)	5 (0.6)	275 (7.7)
Florida	21 (2.7)	254 (2.8)	63 (2.8)	257 (1.6)	16 (2.5)	256 (3.6)
Georgia	26 (2.7)	250 (2.6)	[illegible]	[illegible]	6 (1.0)	271 (6.4)
Hawaii	16 (0.8)	248 (2.8)	70 (1.1)	252 (0.9)	14 (0.7)	257 (2.1)
Idaho	20 (1.2)	274 (1.3)	64 (1.1)	270 (0.8)	16 (0.9)	276 (2.2)
Illinois	26 (3.7)	254 (3.5)	66 (3.5)	[illegible]	7 (1.4)	[illegible]
Indiana	11 (2.5)	259 (4.4)!	77 (3.3)	[illegible]	11 (2.3)	[illegible]
Iowa	20 (3.3)	273 (2.2)	74 (3.4)	278 (1.3)	5 (1.1)	299 (3.4)
Kentucky	19 (3.0)	252 (3.4)	71 (3.1)	257 (1.2)	10 (2.1)	261 (4.3)!
Louisiana	15 (2.6)	234 (3.4)	69 (3.2)	247 (1.7)	16 (2.6)	250 (3.1)
Maryland	22 (2.4)	254 (3.0)	67 (2.4)	261 (1.6)	11 (2.0)	282 (5.0)
Michigan	28 (3.3)	259 (2.9)	61 (3.0)	266 (1.7)	11 (2.0)	270 (4.6)
Minnesota	19 (3.3)	271 (2.1)	72 (3.4)	276 (0.9)	9 (1.2)	280 (4.8)
Montana	27 (2.6)	282 (1.7)	61 (2.6)	281 (1.0)	1 (0.4)	*** (***)
Nebraska	29 (3.4)	277 (1.4)	65 (3.6)	276 (1.3)	6 (0.6)	276 (5.7)
New Hampshire	31 (1.2)	270 (1.3)	59 (1.6)	272 (1.0)	11 (1.1)	282 (4.8)
New Jersey	22 (3.1)	258 (3.7)	62 (3.4)	[illegible]	16 (2.2)	[illegible]
New Mexico	19 (1.0)	252 (1.5)	73 (1.1)	256 (0.9)	8 (0.6)	260 (2.4)
New York	13 (2.3)	257 (4.3)	73 (2.8)	262 (1.5)	14 (2.1)	254 (5.6)
North Carolina	29 (3.2)	245 (2.3)	63 (3.5)	250 (1.5)	9 (1.8)	267 (5.4)!
North Dakota	21 (2.7)	279 (1.3)	74 (2.9)	281 (1.5)	5 (0.9)	*** (***)
Ohio	14 (2.1)	259 (3.2)	80 (2.6)	265 (1.5)	6 (1.5)	279 (9.0)!
Oklahoma	18 (2.7)	261 (2.5)	72 (3.4)	263 (1.4)	11 (2.3)	265 (5.4)!
Oregon	36 (3.4)	266 (2.0)	57 (3.0)	273 (1.3)	7 (1.3)	[illegible]
Pennsylvania	11 (1.7)	266 (4.0)	67 (3.1)	[illegible]	22 (3.1)	276 (5.7)
Rhode Island	14 (0.5)	260 (1.6)	62 (1.1)	270 (0.6)	24 (1.2)	[illegible]
Texas	24 (3.0)	248 (2.5)	70 (3.0)	257 (1.5)	6 (1.4)	[illegible]
Virginia	21 (2.6)	256 (2.9)	66 (2.7)	264 (1.9)	12 (1.7)	271 (4.5)
West Virginia	19 (3.6)	254 (2.3)	68 (4.1)	254 (1.0)	12 (2.3)	270 (4.5)
Wisconsin	25 (3.7)	274 (1.7)	69 (4.0)	274 (1.8)	6 (1.9)	293 (5.0)!
Wyoming	32 (2.1)	268 (1.2)	60 (1.7)	274 (0.9)	8 (0.9)	280 (2.3)
TERRITORIES						
Guam	18 (0.7)	231 (1.3)	54 (0.9)	233 (0.7)	27 (0.8)	[illegible]
Virgin Islands	20 (1.0)	214 (1.4)	65 (1.2)	220 (0.8)	15 (0.8)	232 (1.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. *** Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 13.14 | **Students' Reports on the Frequency with Which They Write Reports or Do Projects in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	10 (0.9)	240 (3.0)	19 (1.3)	268 (2.5)	71 (1.6)	263 (1.3)
Northeast	7 (0.9)	*** (***)	13 (1.3)	275 (5.7)	81 (1.9)	270 (3.5)
Southeast	11 (2.2)	225 (6.4)	20 (2.6)	262 (5.2)	69 (4.1)	255 (2.9)
Central	8 (1.1)	244 (4.4)	18 (1.8)	270 (5.2)	74 (1.8)	266 (2.2)
West	13 (1.8)	245 (4.6)	24 (3.1)	268 (4.2)	63 (3.4)	262 (2.4)
STATES						
Alabama	8 (0.8)	229 (2.8)	21 (2.1)	254 (2.4)	71 (2.5)	255 (1.0)
Arizona	9 (0.8)	241 (2.8)	17 (1.1)	263 (2.1)	74 (1.3)	261 (1.2)
Arkansas	6 (0.6)	231 (2.9)	18 (1.1)	261 (1.9)	76 (1.3)	257 (0.9)
California	11 (0.9)	236 (3.4)	22 (1.3)	263 (1.9)	66 (1.7)	258 (1.2)
Colorado	10 (0.9)	255 (2.6)	22 (1.2)	269 (1.8)	68 (1.5)	268 (1.0)
Connecticut	6 (0.6)	250 (4.4)	22 (1.4)	274 (2.0)	72 (1.5)	271 (1.1)
Delaware	6 (0.6)	244 (3.3)	18 (0.8)	262 (2.2)	77 (0.9)	262 (0.7)
District of Columbia	17 (0.7)	217 (1.5)	24 (0.9)	239 (1.1)	59 (1.0)	232 (1.0)
Florida	8 (0.6)	228 (2.6)	19 (1.3)	261 (2.0)	73 (1.5)	257 (1.3)
Georgia	9 (0.7)	234 (2.3)	21 (1.1)	263 (1.9)	69 (1.2)	261 (1.3)
Hawaii	15 (0.7)	231 (1.7)	20 (0.8)	256 (1.8)	65 (0.9)	254 (0.7)
Idaho	8 (0.6)	253 (2.8)	19 (1.1)	274 (1.3)	73 (1.1)	273 (0.8)
Illinois	11 (0.8)	236 (3.8)	20 (1.2)	264 (2.1)	70 (1.4)	263 (1.8)
Indiana	7 (0.6)	260 (3.7)	16 (1.2)	269 (2.4)	77 (1.4)	268 (1.1)
Iowa	7 (0.7)	263 (2.3)	19 (1.2)	284 (1.8)	73 (1.4)	278 (1.0)
Kentucky	8 (0.6)	244 (2.1)	20 (1.5)	261 (1.9)	72 (1.5)	257 (1.2)
Louisiana	8 (0.6)	227 (2.6)	16 (1.1)	252 (2.2)	76 (1.3)	247 (1.2)
Maryland	7 (0.6)	238 (2.5)	22 (1.6)	262 (2.4)	71 (1.8)	262 (1.7)
Michigan	7 (0.6)	242 (2.6)	16 (1.1)	266 (2.1)	77 (1.2)	266 (1.1)
Minnesota	8 (0.6)	258 (3.1)	19 (1.2)	281 (1.3)	73 (1.4)	276 (0.9)
Montana	7 (0.5)	272 (2.2)	24 (1.0)	281 (1.2)	69 (1.1)	281 (1.1)
Nebraska	9 (0.7)	262 (3.2)	21 (1.2)	278 (1.5)	70 (1.4)	277 (0.9)
New Hampshire	6 (0.5)	259 (2.4)	29 (1.0)	277 (1.3)	65 (1.0)	274 (1.1)
New Jersey	7 (0.6)	241 (3.1)	21 (1.5)	273 (2.0)	72 (1.5)	271 (1.1)
New Mexico	8 (0.7)	245 (2.7)	18 (0.9)	259 (1.6)	74 (1.0)	257 (0.9)
New York	7 (0.7)	229 (3.9)	21 (1.8)	266 (2.8)	72 (2.1)	263 (1.1)
North Carolina	9 (0.5)	232 (2.3)	24 (1.7)	259 (2.2)	68 (1.9)	249 (1.1)
North Dakota	7 (0.7)	273 (3.6)	20 (1.5)	279 (2.1)	74 (1.5)	283 (1.1)
Ohio	6 (0.5)	251 (3.5)	18 (1.2)	264 (2.0)	76 (1.4)	265 (1.0)
Oklahoma	5 (0.5)	247 (3.2)	15 (1.1)	266 (2.1)	80 (1.3)	263 (1.3)
Oregon	9 (0.6)	256 (2.2)	21 (1.2)	273 (1.4)	70 (1.5)	273 (1.1)
Pennsylvania	6 (0.6)	243 (2.7)	16 (1.0)	271 (2.8)	78 (1.3)	267 (1.6)
Rhode Island	5 (0.4)	239 (3.1)	14 (0.6)	264 (1.8)	81 (0.7)	261 (0.6)
Texas	9 (0.9)	237 (2.8)	22 (1.5)	264 (2.0)	69 (1.9)	259 (1.3)
Virginia	7 (0.5)	245 (3.5)	22 (2.1)	270 (3.9)	71 (2.2)	264 (1.3)
West Virginia	7 (0.7)	241 (3.1)	13 (0.9)	256 (1.4)	80 (1.2)	257 (0.9)
Wisconsin	8 (0.8)	254 (3.2)	24 (1.8)	278 (1.5)	68 (2.3)	276 (1.3)
Wyoming	7 (0.5)	260 (2.1)	19 (0.8)	275 (1.4)	74 (0.9)	273 (0.6)
TERRITORIES						
Guam	12 (0.6)	218 (2.4)	12 (0.9)	247 (2.7)	76 (1.1)	231 (0.7)
Virgin Islands	15 (0.9)	208 (1.8)	11 (0.9)	225 (1.8)	74 (1.3)	219 (0.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students.

TABLE 13.15 | **Teachers' Reports on the Frequency with Which Students Write Reports or Do Projects in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	3 (1.2)	*** (***)	55 (4.5)	262 (2.4)	43 (4.7)	264 (2.3)
Northeast	0 (0.0)	0 (0.0)	50 (8.9)	268 (5.7)!	50 (8.9)	271 (4.3)
Southeast	4 (3.5)	*** (***)	63 (8.0)	255 (4.5)	33 (7.7)	260 (5.1)!
Central	1 (0.9)	*** (***)	58 (9.3)	266 (3.8)	41 (8.9)	260 (6.5)!
West	4 (2.2)	*** (***)	48 (8.5)	264 (5.3)!	48(10.0)	265 (3.2)!
STATES						
Alabama	2 (1.1)	*** (***)	58 (4.3)	252 (1.8)	40 (4.3)	254 (1.9)
Arizona	4 (1.2)	255 (4.1)!	40 (3.4)	256 (2.3)	56 (3.6)	262 (1.8)
Arkansas	0 (0.1)	*** (***)	47 (3.6)	255 (1.3)	53 (3.6)	258 (1.2)
California	4 (1.2)	265 (9.1)!	51 (3.3)	257 (1.9)	45 (3.4)	255 (2.4)
Colorado	4 (1.5)	263 (9.2)!	53 (3.1)	268 (1.5)	43 (3.2)	266 (1.5)
Connecticut	3 (1.2)	263(10.4)!	56 (3.3)	274 (1.3)	41 (3.5)	266 (2.0)
Delaware	1 (0.3)	*** (***)	39 (0.9)	262 (1.4)	60 (0.9)	260 (1.0)
District of Columbia	6 (0.6)	220 (2.3)	76 (0.9)	234 (0.9)	18 (0.6)	225 (1.5)
Florida	3 (0.9)	*** (***)	49 (3.0)	258 (1.6)	48 (3.2)	255 (2.2)
Georgia	3 (1.0)	257 (7.2)!	59 (3.7)	258 (1.7)	39 (3.8)	257 (2.7)
Hawaii	3 (0.2)	247 (3.6)	44 (0.9)	252 (1.1)	53 (0.9)	251 (1.1)
Idaho	3 (0.5)	*** (***)	44 (2.1)	273 (1.2)	54 (2.1)	271 (1.0)
Illinois	4 (1.5)	240(10.6)!	51 (4.3)	261 (2.9)	46 (4.1)	265 (2.7)
Indiana	1 (0.5)	*** (***)	45 (4.3)	267 (2.0)	54 (4.4)	269 (1.8)
Iowa	2 (1.4)	*** (***)	45 (4.2)	277 (1.7)	53 (4.3)	278 (1.6)
Kentucky	3 (1.4)	*** (***)	58 (3.3)	257 (1.3)	39 (3.5)	256 (1.7)
Louisiana	1 (0.6)	*** (***)	41 (3.9)	246 (2.3)	56 (3.9)	248 (1.6)
Maryland	2 (0.8)	*** (***)	55 (3.4)	258 (2.1)	43 (3.4)	265 (2.1)
Michigan	2 (1.0)	*** (***)	40 (3.2)	262 (2.5)	59 (3.3)	266 (1.4)
Minnesota	1 (0.6)	*** (***)	41 (4.1)	279 (1.5)	58 (4.1)	274 (1.3)
Montana	1 (0.2)	*** (***)	54 (2.5)	281 (1.2)	45 (2.5)	281 (1.2)
Nebraska	3 (1.4)	*** (***)	56 (3.1)	275 (1.5)	41 (3.0)	279 (1.3)
New Hampshire	6 (0.4)	264 (3.7)	68 (1.2)	273 (1.0)	27 (1.1)	274 (2.0)
New Jersey	1 (0.4)	*** (***)	60 (3.5)	271 (1.6)	39 (3.6)	267 (2.3)
New Mexico	3 (0.3)	262 (4.1)	44 (1.4)	257 (1.2)	53 (1.4)	255 (1.1)
New York	1 (0.4)	*** (***)	49 (3.8)	261 (2.3)	50 (3.7)	260 (2.0)
North Carolina	2 (0.8)	*** (***)	64 (3.1)	251 (1.5)	35 (3.2)	250 (2.1)
North Dakota	1 (0.4)	*** (***)	45 (3.0)	283 (2.1)	53 (3.0)	280 (1.2)
Ohio	2 (0.9)	*** (***)	53 (3.9)	265 (1.8)	46 (3.9)	265 (1.9)
Oklahoma	3 (1.2)	265 (3.7)!	44 (4.0)	265 (1.8)	53 (4.1)	262 (1.8)
Oregon	2 (1.0)	*** (***)	43 (3.3)	272 (2.1)	54 (3.3)	272 (1.7)
Pennsylvania	1 (0.9)	*** (***)	38 (3.6)	262 (2.5)	61 (3.6)	271 (2.0)
Rhode Island	1 (0.5)	*** (***)	36 (1.0)	258 (1.2)	63 (1.0)	261 (0.7)
Texas	3 (1.2)	*** (***)	59 (3.7)	256 (1.9)	38 (3.8)	255 (2.1)
Virginia	3 (1.0)	*** (***)	59 (3.3)	266 (2.1)	39 (3.3)	259 (2.1)
West Virginia	2 (1.1)	*** (***)	43 (3.9)	259 (1.4)	55 (4.0)	255 (1.5)
Wisconsin	2 (1.1)	*** (***)	51 (4.1)	275 (2.1)	47 (4.0)	275 (1.7)
Wyoming	2 (0.3)	*** (***)	37 (1.5)	275 (1.0)	61 (1.6)	271 (0.9)
TERRITORIES						
Guam	0 (0.0)	0 (0.0)	33 (0.8)	237 (1.1)	67 (0.8)	229 (0.9)
Virgin Islands	0 (0.0)	0 (0.0)	45 (0.8)	215 (0.7)	55 (0.8)	223 (0.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 13.16 | **Students' Reports on How Often They Take Mathematics Tests**

GRADE 8 PUBLIC SCHOOLS	At Least Several Times a Week		About Once a Week		Less than Weekly	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	12 (1.0)	244 (2.7)	58 (2.4)	263 (1.9)	30 (2.?)	268 (1.6)
Northeast	14 (2.8)	257 (6.2)!	55 (8.9)	268 (5.5)	30 (9.4)	278 (3.5)!
Southeast	16 (2.2)	233 (4.0)	65 (3.0)	259 (3.1)	19 (2.5)	252 (3.7)
Central	8 (1.5)	*** (***)	57 (4.3)	265 (3.2)	35 (3.5)	272 (2.2)
West	11 (1.9)	247 (6.1)	54 (3.8)	262 (3.4)	34 (2.7)	266 (2.7)
STATES						
Alabama	17 (1.7)	239 (2.7)	69 (1.9)	258 (1.3)	14 (1.1)	251 (2.2)
Arizona	11 (0.9)	246 (2.7)	62 (1.6)	261 (1.2)	27 (1.6)	264 (1.5)
Arkansas	14 (1.7)	241 (2.2)	64 (1.7)	257 (1.0)	22 (1.6)	263 (1.5)
California	12 (0.8)	240 (2.8)	55 (1.7)	258 (1.4)	34 (1.7)	262 (1.7)
Colorado	9 (0.9)	257 (2.4)	54 (1.7)	267 (1.2)	37 (1.8)	269 (1.3)
Connecticut	10 (0.7)	255 (2.3)	56 (1.5)	270 (1.2)	34 (1.7)	276 (1.6)
Delaware	11 (0.8)	248 (3.4)	60 (1.2)	261 (0.8)	28 (0.9)	267 (1.7)
District of Columbia	29 (0.9)	222 (1.2)	53 (1.0)	235 (1.2)	18 (0.7)	232 (1.7)
Florida	18 (1.1)	243 (1.9)	62 (1.6)	257 (1.3)	21 (1.2)	263 (1.8)
Georgia	18 (1.3)	245 (2.4)	61 (1.4)	261 (1.3)	22 (1.5)	265 (2.1)
Hawaii	23 (0.8)	235 (1.5)	47 (0.9)	255 (1.0)	30 (0.6)	258 (1.3)
Idaho	5 (0.5)	266 (2.8)	58 (1.4)	272 (1.0)	37 (1.3)	274 (1.0)
Illinois	11 (1.3)	239 (3.0)	49 (2.1)	260 (1.8)	40 (2.5)	267 (1.9)
Indiana	8 (0.8)	248 (3.5)	57 (1.9)	267 (1.3)	34 (1.9)	271 (1.2)
Iowa	6 (0.8)	268 (2.4)	47 (1.9)	279 (1.6)	47 (2.2)	279 (1.0)
Kentucky	10 (1.0)	245 (2.1)	57 (1.7)	256 (1.2)	33 (1.8)	261 (1.6)
Louisiana	22 (1.7)	237 (2.5)	70 (1.7)	248 (1.2)	8 (0.8)	252 (2.6)
Maryland	12 (0.8)	244 (2.8)	61 (1.5)	261 (1.6)	27 (1.3)	268 (2.0)
Michigan	9 (1.0)	248 (2.7)	55 (1.9)	262 (1.4)	37 (2.0)	271 (1.4)
Minnesota	6 (0.7)	259 (3.3)	50 (1.9)	277 (1.1)	44 (2.3)	277 (1.1)
Montana	7 (1.1)	270 (3.8)	47 (1.6)	280 (1.1)	46 (1.6)	283 (0.9)
Nebraska	6 (0.6)	266 (3.0)	50 (1.6)	275 (1.1)	43 (1.6)	279 (1.3)
New Hampshire	4 (0.8)	264 (2.8)	58 (0.9)	274 (1.2)	34 (1.1)	275 (1.1)
New Jersey	13 (1.3)	252 (2.9)	59 (1.4)	271 (1.2)	27 (1.4)	275 (1.4)
New Mexico	10 (0.7)	234 (1.9)	61 (1.2)	257 (0.9)	29 (1.1)	263 (1.5)
New York	12 (1.0)	240 (2.5)	63 (1.4)	262 (1.3)	25 (1.2)	268 (2.0)
North Carolina	20 (1.2)	238 (2.2)	56 (1.2)	252 (1.1)	24 (1.1)	255 (1.7)
North Dakota	10 (1.0)	275 (2.9)	52 (1.8)	282 (1.3)	38 (1.9)	282 (1.7)
Ohio	11 (1.0)	251 (2.3)	63 (1.8)	264 (1.2)	27 (1.9)	268 (1.6)
Oklahoma	7 (0.8)	242 (3.4)	58 (1.6)	263 (1.3)	35 (2.0)	267 (1.5)
Oregon	6 (0.7)	249 (2.8)	43 (2.0)	271 (1.4)	52 (2.2)	274 (1.2)
Pennsylvania	10 (0.9)	253 (3.4)	56 (1.6)	265 (1.8)	34 (2.1)	273 (2.0)
Rhode Island	14 (0.7)	251 (1.8)	64 (1.1)	259 (0.7)	21 (1.1)	260 (1.3)
Texas	13 (0.9)	240 (2.8)	64 (1.9)	259 (1.3)	23 (1.6)	267 (1.9)
Virginia	17 (1.2)	250 (2.3)	59 (1.3)	266 (1.6)	24 (1.3)	270 (2.4)
West Virginia	11 (1.1)	249 (2.5)	54 (1.3)	256 (1.1)	35 (1.4)	258 (1.1)
Wisconsin	8 (0.9)	262 (2.4)	47 (2.2)	275 (1.5)	45 (2.6)	276 (1.4)
Wyoming	6 (0.5)	258 (2.1)	53 (1.2)	274 (0.6)	41 (1.2)	272 (1.1)
TERRITORIES						
Guam	27 (1.8)	218 (1.7)	51 (1.4)	236 (1.0)	22 (1.3)	239 (1.9)
Virgin Islands	30 (1.6)	206 (1.3)	59 (1.5)	223 (0.8)	10 (0.9)	226 (2.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 13.17 | **Teachers' Reports on How Often Students Take Teacher-Generated Mathematics Tests**

GRADE 8 PUBLIC SCHOOLS	At Least Several Times a Week		About Once a Week		Less than Weekly	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	3 (1.4)	*** (***)	58 (4.1)	260 (2.3)	39 (3.9)	265 (2.2)
Northeast	1 (1.0)	*** (***)	68 (8.4)	268 (4.1)	30 (8.5)	273 (2.4)!
Southeast	3 (2.8)	*** (***)	62(11.1)	254 (4.2)!	35(10.5)	261 (5.0)!
Central	2 (2.4)	*** (***)	56 (6.2)	258 (4.5)	41 (7.2)	268 (4.4)
West	6 (3.4)	*** (***)	50 (7.2)	263 (4.9)	44 (5.6)	262 (3.5)
STATES						
Alabama	9 (2.8)	251 (4.3)!	70 (3.1)	253 (1.4)	20 (3.0)	253 (3.2)
Arizona	7 (2.2)	263 (3.7)!	47 (2.7)	260 (1.8)	46 (2.9)	259 (2.2)
Arkansas	6 (2.3)	254 (4.9)!	61 (3.1)	255 (1.5)	33 (3.1)	260 (1.7)
California	5 (1.2)	254 (5.5)!	52 (3.8)	256 (1.8)	43 (3.7)	257 (2.4)
Colorado	6 (1.5)	258 (4.9)!	50 (3.8)	268 (1.7)	44 (3.8)	266 (1.6)
Connecticut	5 (1.7)	269 (4.6)!	66 (2.9)	269 (1.5)	29 (3.2)	274 (2.2)
Delaware	2 (0.3)	*** (***)	65 (1.1)	263 (1.1)	33 (1.1)	259 (1.6)
District of Columbia	27 (1.0)	246 (1.8)	55 (1.1)	226 (0.8)	18 (1.1)	230 (1.7)
Florida	11 (1.8)	255 (3.7)	61 (3.1)	256 (1.6)	28 (3.0)	258 (2.3)
Georgia	7 (1.7)	257 (5.6)!	66 (3.4)	258 (1.5)	27 (3.2)	261 (3.1)
Hawaii	4 (0.4)	248 (8.2)	51 (0.9)	250 (1.1)	45 (0.9)	253 (0.9)
Idaho	2 (0.4)	269 (4.7)	51 (2.2)	271 (1.0)	46 (2.2)	273 (1.1)
Illinois	4 (1.7)	263 (6.4)!	46 (4.2)	256 (2.8)	50 (4.6)	266 (2.5)
Indiana	5 (1.5)	260 (3.0)!	49 (4.0)	265 (1.5)	46 (3.9)	271 (1.9)
Iowa	6 (2.9)	276(10.3)!	44 (4.8)	278 (1.8)	50 (4.3)	278 (1.6)
Kentucky	6 (1.6)	252 (3.4)!	52 (4.4)	254 (1.6)	42 (4.0)	260 (1.8)
Louisiana	11 (2.4)	241 (3.8)!	77 (3.6)	245 (1.6)	12 (2.5)	255 (3.4)!
Maryland	4 (1.4)	251 (8.4)!	65 (3.4)	261 (2.1)	30 (3.3)	263 (3.6)
Michigan	5 (1.6)	261 (4.7)!	44 (3.7)	260 (2.3)	51 (3.9)	268 (1.8)
Minnesota	3 (1.1)	270 (5.7)!	41 (3.5)	277 (1.7)	56 (3.6)	276 (1.4)
Montana	3 (0.6)	272 (8.7)!	50 (2.9)	282 (1.1)	46 (3.0)	281 (1.3)
Nebraska	5 (1.2)	272 (3.2)!	49 (3.5)	278 (1.4)	46 (3.7)	275 (1.3)
New Hampshire	5 (0.8)	270 (5.2)	69 (1.3)	272 (1.0)	26 (1.5)	275 (1.7)
New Jersey	11 (2.5)	262 (5.6)!	64 (3.7)	268 (1.8)	26 (3.4)	276 (3.1)
New Mexico	4 (0.6)	242 (3.9)	64 (1.5)	256 (1.0)	33 (1.4)	259 (1.5)
New York	6 (2.1)	254 (6.8)!	68 (3.3)	260 (1.9)	26 (3.2)	264 (3.4)
North Carolina	10 (1.6)	244 (4.2)	60 (3.2)	249 (1.3)	30 (2.8)	255 (2.1)
North Dakota	10 (0.8)	289 (1.6)	46 (3.0)	281 (1.9)	44 (3.2)	281 (1.8)
Ohio	4 (1.3)	265 (9.0)!	63 (3.8)	264 (1.7)	33 (3.7)	267 (3.1)
Oklahoma	2 (0.8)	*** (***)	45 (3.8)	264 (2.0)	53 (3.8)	263 (1.6)
Oregon	3 (1.1)	*** (***)	37 (3.3)	269 (2.3)	60 (3.3)	274 (1.4)
Pennsylvania	5 (1.4)	275 (4.3)!	66 (3.3)	265 (2.1)	29 (3.5)	269 (2.7)
Rhode Island	12 (1.0)	264 (1.8)	72 (1.6)	259 (0.7)	16 (1.0)	265 (2.0)
Texas	3 (1.1)	251 (8.1)!	65 (3.5)	254 (1.8)	32 (3.5)	259 (2.4)
Virginia	12 (2.2)	262 (4.4)	57 (3.4)	266 (2.1)	31 (3.1)	259 (2.3)
West Virginia	8 (2.1)	257 (3.2)!	49 (4.6)	258 (1.5)	43 (4.3)	255 (1.7)
Wisconsin	5 (1.8)	275 (5.0)!	52 (3.7)	275 (1.7)	43 (3.8)	275 (1.9)
Wyoming	4 (0.7)	275 (2.6)	46 (1.2)	274 (0.8)	49 (1.1)	271 (1.0)
TERRITORIES						
Guam	10 (0.8)	245 (2.4)	41 (0.7)	229 (1.1)	49 (0.9)	231 (0.8)
Virgin Islands	5 (0.4)	*** (***)	56 (0.7)	221 (0.8)	37 (0.9)	[illegible]

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

344

TABLE 13.18 | **Teachers' Reports on How Often Students Take Mathematics Tests Required by the School, District, or State**

GRADE 8 PUBLIC SCHOOLS	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	11 (3.4)	256 (5.4)!	79 (4.3)	265 (1.7)	10 (3.0)	258 (4.6)!
Northeast	16(10.2)	263(22.7)!	84(10.2)	271 (1.6)	0 (0.0)	0 (0.0)
Southeast	19(10.3)	*** (***)	72(10.4)	252 (3.9)	8 (4.0)	*** (***)
Central	3 (2.4)	*** (***)	83 (9.5)	264 (2.4)	14 (9.6)	*** (***)
West	8 (3.6)	*** (***)	78 (4.9)	267 (3.7)	14 (4.1)	256 (6.9)!
STATES						
Alabama	9 (2.2)	252 (3.6)!	86 (2.8)	254 (1.3)	6 (1.8)	243 (3.1)!
Arizona	16 (2.9)	255 (2.9)	80 (3.0)	260 (1.6)	4 (1.3)	253 (8.2)!
Arkansas	8 (2.2)	254 (5.3)!	89 (2.8)	257 (1.0)	3 (1.5)	256 (3.8)!
California	6 (1.1)	252 (4.6)	90 (1.4)	257 (1.5)	3 (1.0)	256 (4.4)!
Colorado	3 (1.2)	262 (4.2)!	91 (2.0)	267 (1.1)	6 (1.5)	269 (4.2)!
Connecticut	5 (1.3)	266 (4.2)!	92 (1.8)	270 (1.1)	4 (1.2)	281 (5.4)!
Delaware	5 (0.3)	245 (2.4)	89 (0.7)	261 (0.9)	5 (0.6)	281 (2.5)
District of Columbia	9 (0.4)	245 (2.0)	87 (0.6)	231 (0.9)	4 (0.5)	234 (3.7)
Florida	10 (1.9)	253 (4.0)	86 (2.3)	257 (1.5)	4 (1.4)	249 (4.8)!
Georgia	6 (1.4)	249 (4.6)!	92 (1.7)	259 (1.3)	2 (0.9)	*** (***)
Hawaii	2 (0.3)	*** (***)	89 (0.6)	253 (0.6)	9 (0.5)	243 (1.7)
Idaho	3 (0.7)	267 (5.1)!	86 (0.8)	272 (0.7)	12 (0.4)	270 (3.3)
Illinois	11 (3.1)	245 (4.9)!	84 (3.6)	264 (2.0)	5 (2.1)	261 (7.4)!
Indiana	1 (0.7)	*** (***)	95 (1.1)	266 (1.2)	4 (0.9)	257 (4.1)!
Iowa	4 (1.7)	274 (7.9)!	83 (3.1)	278 (1.2)	13 (2.7)	280 (2.3)
Kentucky	4 (1.4)	256 (5.6)!	89 (2.2)	256 (1.4)	7 (1.7)	259 (4.1)!
Louisiana	16 (2.6)	241 (3.9)	76 (3.1)	247 (1.5)	8 (1.7)	246 (3.9)!
Maryland	3 (1.2)	257 (6.1)!	90 (2.3)	262 (1.9)	7 (1.9)	262 (5.5)!
Michigan	2 (0.8)	*** (***)	84 (2.8)	264 (1.4)	13 (2.7)	268 (3.0)!
Minnesota	3 (1.1)	279 (3.2)!	82 (3.2)	276 (1.0)	14 (3.1)	276 (3.2)!
Montana	2 (0.7)	290 (4.8)!	79 (2.2)	281 (0.9)	19 (2.0)	281 (2.4)
Nebraska	4 (1.5)	282 (1.5)!	85 (2.2)	276 (1.1)	10 (2.0)	279 (3.3)
New Hampshire	2 (0.4)	283 (4.0)	86 (0.8)	273 (1.0)	12 (0.6)	267 (2.5)
New Jersey	9 (2.0)	257 (8.3)!	87 (2.3)	270 (1.1)	4 (1.4)	287 (5.7)!
New Mexico	9 (0.7)	265 (2.1)	86 (0.8)	256 (0.8)	4 (0.5)	251 (3.4)
New York	6 (1.4)	252 (5.8)!	87 (2.6)	262 (1.6)	7 (2.2)	258 (6.3)!
North Carolina	3 (1.0)	241(10.1)!	90 (1.7)	251 (1.0)	7 (1.8)	247 (3.2)!
North Dakota	4 (2.6)	284 (3.5)!	64 (3.4)	282 (1.8)	32 (2.7)	281 (1.6)
Ohio	3 (1.3)	271 (6.8)!	91 (2.3)	266 (1.4)	6 (1.7)	267 (5.1)!
Oklahoma	7 (2.0)	263 (4.0)!	89 (2.3)	263 (1.4)	5 (1.1)	264 (5.9)!
Oregon	4 (1.0)	276 (7.6)!	85 (2.7)	272 (1.2)	11 (2.7)	271 (4.4)!
Pennsylvania	3 (1.4)	264(14.0)!	92 (1.7)	267 (1.5)	6 (1.4)	276 (7.8)!
Rhode Island	8 (0.4)	256 (2.3)	81 (0.7)	261 (0.7)	10 (0.6)	255 (2.5)
Texas	12 (2.4)	242 (4.6)!	85 (2.6)	258 (1.5)	3 (1.0)	248 (6.1)!
Virginia	2 (0.9)	*** (***)	91 (1.4)	264 (1.6)	7 (1.2)	256 (3.5)
West Virginia	3 (1.2)	258 (5.5)!	79 (3.0)	256 (1.0)	17 (3.0)	257 (2.6)
Wisconsin	2 (0.3)	*** (***)	91 (2.1)	276 (1.4)	7 (2.1)	273 (3.5)!
Wyoming	2 (0.3)	259 (3.2)	79 (1.2)	274 (0.7)	19 (1.1)	269 (2.1)
TERRITORIES						
Guam	1 (0.1)	*** (***)	95 (0.5)	234 (0.7)	5 (0.5)	217 (3.4)
Virgin Islands	1 (0.0)	*** (***)	89 (0.5)	220 (0.6)	9 (0.5)	219 (1.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

345

TABLE 13.19 | Teachers' Reports on How Often Students Take Other Published Mathematics Tests

GRADE 8 PUBLIC SCHOOLS	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	11 (2.7)	259 (6.6)!	70 (3.6)	261 (1.6)	18 (2.4)	270 ([illegible])
Northeast	14 (5.9)	*** (***)	64 (7.4)	271 (2.1)	22 (6.6)	273 (4.8)!
Southeast	16 (7.7)	250 (9.3)!	77 (8.3)	257 (2.5)	7 (3.2)	*** (***)
Central	12 (3.9)	265(16.7)!	62 (7.9)	261 (4.1)	25 (5.9)	269 (6.3)!
West	5 (3.1)	*** (***)	75 (5.0)	262 (3.0)	20 (4.2)	272 (8.1)!
STATES						
Alabama	10 (2.5)	262 (3.4)!	71 (3.5)	251 (1.7)	19 (3.6)	253 (2.8)
Arizona	23 (2.6)	263 (3.0)	55 (3.4)	259 (1.5)	22 (3.1)	258 (3.0)
Arkansas	9 (2.4)	253 (3.7)!	74 (3.8)	256 (1.1)	17 (3.1)	251 (2.4)
California	9 (1.6)	260 (5.2)	70 (2.9)	256 (1.7)	21 (2.6)	257 (3.3)
Colorado	16 (2.6)	274 (2.0)	59 (3.5)	266 (1.4)	26 (3.3)	264 (2.5)
Connecticut	12 (1.9)	274 (3.9)	63 (3.2)	269 (1.6)	25 (2.8)	273 (2.7)
Delaware	13 (0.8)	268 (2.4)	67 (1.0)	258 (1.1)	21 (0.7)	266 (1.7)
District of Columbia	15 (0.8)	237 (1.7)	71 (1.0)	234 (1.0)	14 (0.7)	221 (1.5)
Florida	13 (2.3)	257 (3.9)	68 (3.3)	258 (1.6)	19 (2.7)	253 (3.3)
Georgia	14 (2.2)	259 (3.4)	70 (2.8)	258 (1.5)	15 (2.2)	254 (2.9)
Hawaii	16 (0.7)	254 (1.9)	70 (0.9)	253 (0.8)	15 (0.7)	242 (2.2)
Idaho	12 (1.4)	276 (1.8)	65 (1.5)	272 (0.9)	23 (0.9)	269 (1.4)
Illinois	8 (1.6)	267 (4.8)!	72 (3.4)	261 (2.5)	20 (3.3)	265 (4.1)
Indiana	11 (2.5)	273 (2.8)!	63 (3.7)	266 (1.6)	27 (3.5)	263 (2.3)
Iowa	11 (3.2)	280 (4.6)!	64 (4.8)	277 (1.5)	25 (4.2)	278 (2.5)
Kentucky	9 (1.9)	262 (2.8)!	66 (3.6)	255 (1.5)	25 (3.2)	257 (2.6)
Louisiana	11 (3.2)	248 (3.9)!	64 (4.2)	244 (1.8)	25 (3.6)	247 (2.4)
Maryland	5 (1.2)	269 (5.8)!	64 (3.3)	261 (2.1)	31 (3.3)	260 (2.5)
Michigan	11 (2.6)	270 (5.6)!	61 (3.7)	265 (1.9)	28 (3.5)	262 (2.7)
Minnesota	20 (3.4)	280 (2.4)	59 (4.1)	276 (1.3)	20 (3.4)	271 (2.8)
Montana	11 (1.3)	281 (5.0)	64 (2.6)	281 (0.7)	25 (2.5)	279 (2.1)
Nebraska	13 (2.6)	279 (2.2)	66 (2.8)	279 (1.1)	20 (2.5)	267 (2.4)
New Hampshire	12 (1.1)	274 (1.9)	54 (1.3)	273 (1.3)	34 (1.3)	272 (1.5)
New Jersey	8 (1.7)	268 (4.9)!	77 (2.6)	269 (1.2)	15 (2.4)	275 (4.4)
New Mexico	15 (1.0)	255 (1.8)	65 (1.4)	258 (0.9)	20 (1.1)	252 (1.9)
New York	5 (1.2)	264 (5.8)!	58 (3.2)	262 (2.2)	37 (3.5)	257 (2.6)
North Carolina	9 (1.4)	251 (3.7)	70 (2.9)	249 (1.2)	21 (2.9)	255 (2.8)
North Dakota	18 (4.0)	287 (2.6)!	62 (3.9)	283 (1.0)	21 (2.3)	274 (3.9)
Ohio	6 (1.8)	272 (5.0)!	73 (3.4)	266 (1.3)	21 (3.1)	263 (2.7)
Oklahoma	15 (2.6)	265 (3.1)	66 (3.1)	263 (1.4)	19 (2.5)	262 (2.8)
Oregon	11 (1.5)	281 (4.9)	69 (3.1)	271 (1.1)	21 (2.9)	271 (3.1)
Pennsylvania	8 (2.2)	276 (3.6)!	63 (4.3)	266 (1.9)	28 (4.0)	269 (3.1)
Rhode Island	14 (0.6)	270 (2.1)	58 (0.6)	259 (0.8)	27 (1.0)	267 (1.3)
Texas	10 (2.6)	252 (5.6)!	71 (3.0)	258 (1.8)	19 (2.9)	265 (2.7)
Virginia	9 (2.2)	264 (4.6)!	71 (3.1)	263 (1.6)	20 (2.6)	262 (3.7)
West Virginia	13 (2.8)	257 (3.3)!	65 (4.1)	256 (1.2)	22 (3.5)	257 (2.1)
Wisconsin	6 (1.8)	279 (4.1)!	66 (3.8)	275 (1.6)	28 (3.5)	276 (2.4)
Wyoming	18 (2.0)	273 (1.5)	60 (1.8)	272 (0.8)	22 (1.1)	275 (1.6)
TERRITORIES						
Guam	20 (0.7)	237 (1.4)	54 (0.8)	230 (1.1)	[illegible]	[illegible]
Virgin Islands	2 (0.1)	*** (***)	80 (0.8)	217 (0.8)	18 (0.6)	221 (1.5)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

346

TABLE 13.20 | **Teachers' Reports on the Availability of Resources**

GRADE 8 PUBLIC SCHOOLS	How well supplied are you by your school system with the instructional materials and other resources you need to teach your class?					
	I get some or none of the resources I need.		I get most of the resources I need.		I get all the resources I need.	
	Percent of students	Average Proficiency	Percent of students	Average Proficiency	Percent of students	Average Proficiency
NATION	31 (4.2)	261 (2.9)	56 (4.0)	265 (2.0)	13 (2.4)	265 (4.2)
Northeast	36(11.8)	274 (9.8)!	38(11.7)	272 (2.9)!	26 (6.6)	271 (7.2)!
Southeast	21 (9.7)	257 (8.0)!	71 (9.5)	255 (3.3)	8 (4.0)	257(12.2)!
Central	47 (7.3)	259 (3.5)	45 (7.8)	271 (2.2)	8 (2.4)	*** (***)
West	23 (6.1)	257 (3.7)!	62 (3.8)	266 (4.1)	15 (5.2)	261 (5.9)!
STATES						
Alabama	31 (4.0)	248 (2.6)	49 (4.8)	252 (2.1)	20 (4.1)	261 (2.4)!
Arizona	31 (2.6)	257 (2.3)	53 (2.8)	261 (1.7)	17 (2.6)	261 (2.4)
Arkansas	41 (4.1)	253 (1.5)	40 (3.9)	261 (1.9)	19 (3.1)	254 (3.0)
California	34 (3.8)	253 (2.4)	53 (3.7)	260 (2.1)	14 (2.1)	253 (3.4)
Colorado	23 (3.2)	263 (2.5)	61 (3.6)	268 (1.4)	15 (2.4)	266 (2.8)
Connecticut	23 (2.7)	268 (1.9)	52 (3.0)	269 (1.5)	25 (3.1)	272 (3.0)
Delaware	32 (1.1)	259 (1.2)	60 (1.3)	264 (1.0)	7 (0.4)	259 (2.9)
District of Columbia	58 (1.1)	228 (1.1)	38 (1.2)	234 (1.1)	4 (0.3)	244 (3.1)
Florida	32 (3.1)	252 (2.1)	53 (3.1)	256 (1.6)	15 (2.2)	264 (3.5)
Georgia	36 (3.1)	256 (2.2)	52 (3.7)	259 (1.5)	12 (2.4)	255 (4.6)!
Hawaii	44 (0.9)	249 (1.2)	51 (1.0)	253 (0.9)	5 (0.5)	248 (3.1)
Idaho	40 (1.1)	271 (1.0)	52 (1.9)	272 (1.3)	8 (1.7)	271 (2.6)!
Illinois	26 (4.1)	248 (3.5)	54 (4.5)	263 (2.2)	1[illegible] ([illegible].9)	275 (3.6)!
Indiana	29 (3.9)	266 (2.4)	54 (3.7)	267 (1.6)	17 (3.0)	267 (2.4)
Iowa	14 (3.0)	278 (3.9)	60 (4.6)	278 (1.3)	25 (4.2)	278 (2.0)
Kentucky	31 (4.0)	256 (1.8)	53 (4.0)	256 (1.4)	16 (2.2)	258 (2.8)
Louisiana	58 (4.3)	243 (1.7)	34 (4.1)	247 (2.3)	8 (1.7)	251 (5.3)!
Maryland	21 (2.8)	245 (3.2)	61 (3.4)	[illegible] (1.9)	18 (2.5)	269 (2.9)
Michigan	33 (3.9)	257 (2.4)	55 (4.0)	266 (1.9)	12 (2.3)	274 (2.3)
Minnesota	23 (3.8)	273 (1.9)	65 (3.7)	276 (1.2)	12 (2.1)	281 (2.8)
Montana	21 (2.7)	280 (1.3)	62 (3.0)	280 (1.1)	17 (2.2)	285 (1.9)
Nebraska	22 (1.9)	269 (1.6)	58 (2.6)	278 (1.2)	20 (2.6)	279 (2.2)
New Hampshire	23 (1.0)	268 (1.6)	61 (1.3)	275 (0.9)	15 (0.8)	274 (2.1)
New Jersey	22 (3.2)	260 (3.3)	56 (3.5)	271 (2.0)	22 (2.6)	275 (3.4)
New Mexico	39 (1.1)	256 (1.5)	50 (1.2)	256 (0.8)	11 (0.7)	254 (2.7)
New York	35 (3.9)	248 (3.0)	45 (3.5)	265 (1.9)	20 (2.7)	267 (3.1)
North Carolina	36 (3.3)	243 (2.0)	45 (3.6)	252 (1.5)	19 (2.8)	259 (2.2)
North Dakota	35 (3.4)	282 (1.8)	48 (2.9)	282 (1.7)	18 (2.7)	279 (3.2)
Ohio	34 (4.0)	259 (2.1)	54 (4.4)	266 (1.8)	12 (2.8)	268 (5.0)!
Oklahoma	33 (4.0)	261 (2.2)	55 (4.6)	266 (1.7)	12 (2.7)	258 (2.7)!
Oregon	24 (3.3)	270 (1.7)	53 (3.7)	270 (1.5)	24 (3.3)	275 (2.5)
Pennsylvania	29 (3.3)	259 (3.7)	52 (3.6)	267 (1.6)	19 (3.6)	274 (3.6)
Rhode Island	32 (0.9)	254 (1.2)	54 (1.2)	264 (1.0)	14 (0.8)	263 (2.0)
Texas	29 (3.1)	249 (2.6)	51 (3.3)	258 (1.8)	20 (2.9)	257 (3.0)
Virginia	31 (3.1)	253 (3.4)	47 (3.4)	267 (1.9)	22 (2.5)	270 (3.1)
West Virginia	45 (4.3)	253 (1.4)	47 (4.5)	257 (1.5)	8 (1.9)	265 (3.5)!
Wisconsin	23 (3.4)	267 (2.3)	58 (4.0)	278 (1.6)	18 (3.4)	280 (2.6)
Wyoming	16 (0.8)	272 (1.4)	53 (1.3)	273 (0.9)	32 (0.9)	272 (1.0)
TERRITORIES						
Guam	72 (1.0)	229 (0.8)	20 (0.7)	237 (1.6)	7 (0.8)	242 (2.4)
Virgin Islands	66 (0.6)	216 (0.8)	34 (0.6)	223 (1.1)	0 (0.0)	0 (0.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 13.21 | **Teachers' Reports on the Availability of Resources Organized by Percentage of Students in Classrooms with Only Some or None of the Necessary Resources**

GRADE 8 PUBLIC SCHOOLS	How well supplied are you by your school system with the instructional materials and other resources you need to teach your class?					
	I get some or none of the resources I need.		I get most of the resources I need.		I get all the resources I need.	
	Percent of students	Average Proficiency	Percent of students	Average Proficiency	Percent of students	Average Proficiency
STATES/TERRITORIES						
Guam	72 (1.0)	229 (0.8)	20 (0.7)	237 (1.6)	7 (0.6)	242 (2.4)
Virgin Islands	66 (0.6)	216 (0.8)	34 (0.6)	223 (1.1)	0 (0.0)	0 (0.0)
District of Columbia	58 (1.1)	228 (1.1)	38 (1.2)	234 (1.1)	4 (0.3)	244 (3.1)
Louisiana	58 (4.3)	243 (1.7)	34 (4.1)	247 (2.3)	8 (1.7)	251 (5.3)!
West Virginia	45 (4.3)	253 (1.4)	47 (4.5)	257 (1.5)	8 (1.9)	265 (3.5)!
Hawaii	44 (0.9)	249 (1.2)	51 (1.0)	253 (0.9)	5 (0.5)	248 (3.1)
Arkansas	41 (4.1)	253 (1.5)	40 (3.9)	261 (1.9)	19 (3.1)	254 (3.0)
Idaho	40 (1.1)	271 (1.0)	52 (1.6)	272 (1.3)	8 (1.7)	271 (2.6)!
New Mexico	39 (1.1)	258 (1.5)	50 (1.2)	258 (0.8)	11 (0.7)	254 (2.7)
North Carolina	36 (3.3)	243 (2.0)	45 (3.6)	252 (1.5)	19 (2.8)	259 (2.2)
Georgia	36 (3.1)	256 (2.2)	52 (3.7)	259 (1.5)	12 (2.4)	255 (4.6)!
North Dakota	35 (3.4)	282 (1.6)	48 (2.9)	282 (1.7)	18 (2.7)	279 (3.2)
New York	35 (3.9)	248 (3.0)	45 (3.5)	265 (1.9)	20 (2.7)	267 (3.1)
Ohio	34 (4.0)	259 (2.1)	54 (4.4)	266 (1.8)	12 (2.8)	268 (5.0)!
California	34 (3.6)	253 (2.4)	53 (3.7)	260 (2.1)	14 (2.1)	263 (3.4)
Michigan	33 (3.8)	257 (2.4)	55 (4.0)	266 (1.9)	12 (2.3)	274 (2.3)
Oklahoma	33 (4.0)	261 (2.2)	55 (4.6)	266 (1.7)	12 (2.7)	268 (2.7)!
Delaware	32 (1.1)	259 (1.2)	60 (1.3)	264 (1.0)	7 (0.4)	259 (2.9)
Rhode Island	32 (0.9)	254 (1.2)	54 (1.2)	264 (1.0)	14 (0.6)	263 (2.0)
Florida	32 (3.1)	252 (2.1)	53 (3.1)	256 (1.6)	15 (2.2)	264 (3.5)
Virginia	31 (3.1)	253 (3.4)	47 (3.4)	267 (1.9)	22 (2.5)	270 (3.1)
Alabama	31 (4.0)	248 (2.6)	49 (4.8)	252 (2.1)	20 (4.1)	261 (2.4)!
Arizona	31 (2.6)	257 (2.3)	53 (2.8)	261 (1.7)	17 (2.6)	261 (2.4)
Kentucky	31 (4.0)	256 (1.6)	53 (4.0)	256 (1.4)	16 (2.2)	258 (2.8)
Texas	29 (3.1)	249 (2.8)	51 (3.3)	258 (1.8)	20 (2.9)	257 (3.0)
Indiana	29 (3.2)	266 (2.4)	54 (3.7)	267 (1.6)	17 (3.0)	267 (2.4)
Pennsylvania	28 (3.3)	266 (3.7)	58 (3.6)	267 (1.8)	13 (3.6)	274 (2.8)
Illinois	28 (4.1)	248 (3.5)	54 (4.5)	263 (2.2)	18 (3.9)	275 (3.9)!
Oregon	24 (3.3)	270 (1.7)	53 (3.7)	270 (1.5)	24 (3.3)	275 (2.5)
Wisconsin	23 (3.4)	267 (2.3)	58 (4.0)	276 (1.6)	18 (3.4)	280 (2.6)
Colorado	23 (3.2)	263 (2.5)	61 (3.6)	268 (1.4)	15 (2.4)	266 (2.8)
New Hampshire	23 (1.0)	268 (1.6)	61 (1.3)	275 (0.9)	15 (0.8)	274 (2.1)
Connecticut	23 (2.7)	268 (1.9)	52 (3.0)	269 (1.5)	25 (3.1)	272 (3.0)
Minnesota	23 (3.8)	273 (1.9)	65 (3.7)	276 (1.2)	12 (2.1)	281 (2.6)
Nebraska	22 (1.8)	269 (1.8)	58 (2.6)	278 (1.2)	20 (2.6)	279 (2.2)
New Jersey	21 (3.2)	260 (3.3)	58 (3.5)	271 (2.0)	22 (2.6)	275 (3.4)
Maryland	21 (2.5)	246 (3.2)	61 (3.4)	264 (1.9)	18 (2.5)	269 (2.8)
Montana	21 (2.7)	280 (1.3)	62 (3.0)	280 (1.1)	17 (2.2)	285 (1.8)
Wyoming	16 (0.8)	272 (1.4)	53 (1.3)	273 (0.9)	32 (0.9)	272 (1.0)
Iowa	14 (3.0)	278 (3.9)	60 (4.6)	278 (1.3)	25 (4.2)	278 (2.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

348

Chapter 14

Calculators and Computers at Grade 8 in the States

INTRODUCTION

A central theme of the reform recommendations for mathematics education has been the need to incorporate calculator and computer use into the curriculum (see Chapter Seven).[101] Consistent with this focus, eighth graders participating in NAEP's 1990 Trial State Assessment Program were provided with scientific calculators for a portion of the assessment. Also, schools, teachers, and students were asked a variety of background questions about policies, access, and frequency of use related to calculators and computers.

POLICIES ON CALCULATOR USE

Teachers were asked about their policies on calculator use -- unrestricted or restricted -- and the results are presented in TABLES 14.1 and 14.2, by alphabetical order and by the percentage of students permitted unrestricted use, respectively. In all but three states, fewer than one-third of the eighth graders attending public schools were permitted unrestricted use of calculators. The percentages for those three states -- the District of Columbia (38 percent) and Oregon and Wyoming (both 36 percent) -- did not range much higher. In every participating Southeastern state, fewer than 15 percent of the students were permitted unrestricted use of a calculator, although states from other regions also fell into this category, including Hawaii, Pennsylvania, New Jersey, Oklahoma, Indiana, New York, Texas, and the Virgin Islands. Similarly, in all but four states -- the District of Columbia, Oregon, California, and Wisconsin -- the majority of the public-school eighth graders were not permitted to use calculators on tests (see TABLES 14.3 and 14.4). With the

[101] *Professional Standards for Teaching Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1991).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

Curriculum, and Evaluation Standards for Mathematics (Reston, VA: National Council of Teachers of Mathematics, 1989).

exception of New York, the data showed that eighth graders within the states being permitted more use of calculators had higher average proficiency, although it is not clear whether more calculator use led to higher proficiency or the higher-achieving students were given more calculator opportunities.

ACCESS TO CALCULATORS

There was variety across states in the degree of provision of school-owned calculators for student use, from more than 80 percent of the public-school eighth graders having access to these calculators in California, Connecticut, North Carolina, and Oregon to less than one-third having such access in Louisiana, Guam, and the Virgin Islands (see TABLE 14.4). As shown in TABLE 14.5, however, virtually all students (95 percent or more) reported that either they or their family owned a calculator, except in the Virgin Islands (92 percent). Except in the District of Columbia and Illinois, fewer than two-thirds of the public-school eighth graders in any state reported ever having experience with a scientific calculator, although the percentages never dropped much below half. For both questions, students who reported more access to calculators had higher achievement.

FREQUENCY OF CALCULATOR USE IN MATHEMATICS CLASSES

Students' and teachers' reports on the frequency of calculator usage in mathematics classes are presented in TABLES 14.6 and 14.7. Within states, students' and teachers' reports on use as frequently as several times a week were in considerable agreement. In only three states and one territory did the percentages differ by at least 10 percent. In California, Minnesota, and New Hampshire, teachers reported more eighth graders attending public schools using the calculator than did the students, and in the Virgin Islands, more students than teachers reported use this frequently.

Across states, however, reports of more frequent calculator use varied dramatically. At the high end of the continuum, with substantial percentages of both eighth graders and their teachers reporting frequent use, were Montana (53 percent and 60 percent), Wisconsin (47 and 53 percent), North Dakota (46 and 43 percent), Oregon (46 and 53 percent), Wyoming (46 and 49 percent), Iowa

(40 and 40 percent), Nebraska (38 and 39 percent), and Minnesota (38 and 48 percent). These states also performed relatively well on the assessment. At the low end of the continuum, with one-fifth or fewer of the eighth graders or teachers reporting frequent use, were Alabama (19 and 15 percent), Arkansas (20 and 18 percent), Florida (19 and 21 percent), Hawaii (17 and 11 percent), Indiana (19 and 13 percent), Louisiana (16 and 13 percent), New Jersey (13 and 9 percent), New York (11 and 6 percent), North Carolina (17 and 15 percent), Pennsylvania (17 and 18 percent), West Virginia (17 and 17 percent), Guam (14 and 16 percent), and the Virgin Islands (14 and 1 percent). The low-use states appeared to be concentrated in the Southeast, with another cluster in the Northeast -- New Jersey, New York, and Pennsylvania. Given the emphasis placed on calculator usage in the mathematics-education literature, rather high percentages of public-school eighth graders across the states reported that they never used calculators in their mathematics classes, although teachers reported the total absence of calculator use for somewhat fewer students than did the students. An association between more calculator use and higher performance was noted within many of the states, particularly in relation to the teachers' reports.

Students were asked a series of three questions about how often they used a calculator to work mathematics problems in class, to do problems at home, and to do problems on tests (see TABLES 14.8 to 14.10). In almost every state, more than one-third reported almost always using calculators to work problems in class (from 32 percent in New Hampshire to 55 percent in the District of Columbia). However, more than one-third of the eighth graders attending public schools in New Jersey, New York, Pennsylvania, and Rhode Island reported that they never used a calculator to work problems in class. Across the states, fewer eighth graders reported almost always using calculators to do problems at home (from 18 percent in Guam to 36 percent in Wyoming). A range from 17 percent in New Hampshire to 35 percent in the Virgin Islands reported almost always using calculators on tests, while more than 40 percent in Indiana, New Hampshire, New Jersey, New York, Oklahoma, Pennsylvania, and Rhode Island said they never used calculators on tests. Across the three questions, there were indications within many of the states that the students reporting using a calculator to do problems more frequently had lower average proficiency than did those who reported less frequent use.

STUDENT FACILITY IN CALCULATOR USE

On the basis of their performance on the calculator portions of the assessment, students were allocated to two groups according to their knowledge of when to use a calculator and their success in using it when appropriate. More specifically, the questions in the calculator sections were classified in three ways: calculator-active (calculator required), calculator-neutral (calculator not required, but students could choose to use it), and calculator-inactive (solution neither requires nor suggests use of calculator). Students in the "high group" used the calculator appropriately (i.e., used it for the calculator-active items and did not use it for the calculator-inactive items) at least 85 percent of the time and indicated that they had used the calculator for at least half the calculator-active items they were presented. Those who did not meet these criteria were categorized in the "other group."

The results of this analysis are presented in TABLE 14.11 (alphabetically) and TABLE 14.12 (organized by the percentage of students in the high group). Except in Guam and the Virgin Islands, where only about one-third of the eighth graders attending public schools were in the high group, student success in calculator usage did not vary much across states -- from 40 percent in Hawaii to 56 percent in North Dakota in the high group. In North Dakota, Iowa, Montana, Wisconsin, Connecticut, and Wyoming, more than half the public-school eighth graders were in the high group. Within every state, there was a clear relationship between facility with a calculator and performance on the assessment, with the more knowledgeable students having higher proficiency.

AVAILABILITY OF COMPUTERS

Both public-school administrators and teachers were asked about the availability of computers for use in mathematics classes. Their reports are summarized in TABLES 14.13 and 14.14, respectively. According to school reports, fewer than 27 percent of the eighth graders in public schools had computers in their mathematics classrooms, except in New Hampshire (36 percent). Teachers generally concurred with the view of school administrators, and there did not seem to be a systematic pattern to what disagreement there was (except for some administrators reporting low availability, where teachers reported more classrooms with computers).

Public-school administrators reported that substantial proportions of eighth graders had computers available in laboratories, and that for many of these students computers were available for use in mathematics classes. Teachers, however, reported that these computers were difficult to access for use in their classes. According to teachers, from 24 to 72 percent of the public-school eighth graders across the states were in mathematics classrooms where computers were difficult to access. They reported that for another 7 to 63 percent, computers simply were not available. Those states with the fewest eighth graders having no access to computers in public-school mathematics classes were Minnesota, Iowa, and the District of Columbia (10 percent or fewer). Those states with the most eighth graders in mathematics classrooms without any access to computers were Arkansas, Florida, Idaho, Kentucky, Louisiana, Texas, Guam and the Virgin Islands (40 percent or more).

There appeared to be little relationship, however, between achievement and access to computers. It does not seem that students are given more or less accessibility to computers on any systematic basis related to mathematics proficiency.

FREQUENCY OF COMPUTER USE IN MATHEMATICS CLASSROOMS

Both students and teachers were asked about how often computers were used in mathematics classes. Their responses are presented in TABLES 14.15 and 14.16, respectively. In most states, large percentages of eighth graders attending public schools reported never using a computer in mathematics class and their reports were supported in part by their teachers. In the majority of states, teachers also reported that more than half the eighth graders never used computers in mathematics class. Students and teachers were in close agreement about the percentage of students using computers as often as weekly -- fewer than one-fifth -- and these students tended to have lower average proficiency.

Similarly, as shown in TABLE 14.17, teachers reported that two-thirds or more of their eighth graders spent no time each week working with a computer. For those few states, Illinois, Maryland, New Jersey, and the District of

Columbia, where at least 20 percent of the students spent at least 30 minutes each week working with computers, the students tended to have lower mathematics proficiency than their counterparts who spent less time (except in the District of Columbia, where performance did not differ by level of computer use). This may be because even though computers can be effective tools to engage students and help them solve more complex mathematics tasks, they are often used for drill and practice.[102]

SUMMARY

The use of technology, particularly computers, did not appear to be prevalent in eighth-grade public-school classrooms in any of the states. Participating states in the Southeast reported comparatively low use of calculators in mathematics classrooms. The Northeastern states also appeared to be lagging behind in incorporating calculators into mathematics instruction, but may have shown more computer use than some other areas. Calculator usage was most extensive in Montana, Wisconsin, North Dakota, Oregon, Wyoming, Iowa, Nebraska, and Minnesota, all higher-performing states of those participating in NAEP's 1990 Trial State Assessment Program. Also, within states, the apparent tendency was to provide more instruction incorporating calculator usage for higher-performing students, although lower-performing students reported using a calculator more frequently to do their mathematics problems in class and at home.

Computers simply were not available in mathematics classrooms for many eighth graders attending public schools. Although public-school administrators reported considerable availability in computer laboratories, teachers tended to report that computers were difficult to access or not available. In many of the states participating in the Trial State Assessment Program, the majority of the eighth graders reported never using a computer in mathematics class.

[102]Mary Male, "Cooperative Learning and Computers in the Elementary and Middle School Math Classroom" in *Cooperative Learning in Mathematics*, Neil Davidson, editor (Menlo Park, CA: Addison-Wesley Publishing Company, 1990).

TABLE 14.1 | Teachers' Reports About Policy on Calculator Use

GRADE 8 PUBLIC SCHOOLS	Teachers' Reports on Permitting the Use of Calculators in Mathematics Class			
	Unrestricted Use		Restricted Use	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	18 (3.4)	:1 (3.4)	82 (3.4)	259 (1.5)
Northeast	20(11.8)	*** (***)	80(11.8)	267 (3.6)!
Southeast	6 (3.1)	*** (***)	94 (3.1)	254 (3.2)
Central	27 (8.1)	281 (4.7)!	73 (8.1)	257 (3.1)
West	20 (4.9)	283 (7.8)!	80 (4.9)	260 (2.7)
STATES				
Alabama	7 (1.5)	268 (6.4)!	93 (1.5)	252 (1.2)
Arizona	17 (2.3)	281 (4.3)	83 (2.3)	259 (1.4)
Arkansas	9 (1.7)	281 (6.2)	91 (1.7)	256 (1.0)
California	31 (3.0)	268 (3.2)	69 (3.0)	251 (1.8)
Colorado	30 (2.8)	276 (2.0)	70 (2.8)	263 (1.4)
Connecticut	26 (3.2)	284 (2.8)	74 (3.2)	266 (1.4)
Delaware	23 (1.1)	274 (1.9)	77 (1.1)	256 (0.9)
District of Columbia	38 (1.1)	239 (1.4)	62 (1.1)	228 (0.7)
Florida	12 (1.6)	273 (4.4)	88 (1.6)	254 (1.4)
Georgia	14 (2.1)	286 (4.2)	86 (2.1)	256 (1.3)
Hawaii	14 (0.8)	262 (2.5)	86 (0.8)	250 (0.8)
Idaho	28 (2.0)	278 (1.5)	72 (2.0)	269 (0.9)
Illinois	23 (3.6)	270 (4.1)	77 (3.6)	259 (2.0)
Indiana	8 (2.2)	285 (5.5)!	92 (2.2)	266 (1.3)
Iowa	20 (2.9)	288 (2.9)	80 (2.9)	276 (1.2)
Kentucky	12 (1.9)	266 (2.9)	88 (1.9)	255 (1.2)
Louisiana	5 (1.4)	261 (5.6)!	95 (1.4)	245 (1.3)
Maryland	19 (2.7)	278 (4.5)	81 (2.7)	258 (1.7)
Michigan	26 (3.3)	280 (3.2)	74 (3.3)	259 (1.2)
Minnesota	31 (3.1)	284 (2.0)	69 (3.1)	272 (1.2)
Montana	32 (2.7)	287 (1.4)	68 (2.7)	278 (1.0)
Nebraska	21 (2.2)	284 (2.1)	79 (2.2)	274 (1.1)
New Hampshire	21 (1.3)	281 (1.4)	79 (1.3)	271 (1.0)
New Jersey	11 (1.7)	288 (5.0)	89 (1.7)	267 (1.3)
New Mexico	18 (0.8)	264 (2.1)	82 (0.8)	255 (0.8)
New York	5 (1.2)	251 (7.1)!	95 (1.2)	261 (1.6)
North Carolina	10 (1.6)	261 (6.0)	90 (1.6)	249 (1.1)
North Dakota	24 (3.3)	283 (1.4)	76 (3.3)	281 (1.6)
Ohio	15 (2.9)	272 (3.2)	85 (2.9)	264 (1.3)
Oklahoma	10 (2.3)	275 (4.2)!	90 (2.3)	262 (1.3)
Oregon	36 (2.7)	284 (1.6)	64 (2.7)	265 (1.4)
Pennsylvania	13 (2.7)	281 (5.1)	87 (2.7)	265 (1.6)
Rhode Island	19 (0.8)	263 (1.8)	81 (0.8)	250 (0.6)
Texas	12 (2.5)	270 (4.2)!	88 (2.5)	254 (1.4)
Virginia	14 (2.4)	280 (6.3)	86 (2.4)	261 (1.6)
West Virginia	11 (2.0)	280 (3.8)	89 (2.0)	253 (0.9)
Wisconsin	29 (3.6)	286 (2.3)	71 (3.6)	271 (1.5)
Wyoming	36 (1.3)	279 (1.3)	64 (1.3)	269 (0.8)
TERRITORIES				
Guam	30 (0.8)	240 (1.7)	70 (0.8)	227 (0.8)
Virgin Islands	1 (0.0)	*** (***)	99 (0.0)	219 (0.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 14.2 | **Teachers' Reports About Policy on Calculator Use Organized by Percentage of Students Permitted Unrestricted Use**

GRADE 8 PUBLIC SCHOOLS	Teachers' Reports on Permitting the Use of Calculators in Mathematics Class			
	Unrestricted Use		Restricted Use	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
STATES/TERRITORIES				
District of Columbia	38 (1.1)	239 (1.4)	62 (1.1)	228 (0.7)
Oregon	36 (2.7)	284 (1.8)	64 (2.7)	265 (1.4)
Wyoming	36 (1.3)	279 (1.3)	64 (1.3)	269 (0.8)
Montana	32 (2.7)	287 (1.4)	68 (2.7)	278 (1.0)
Minnesota	**31 (3.1)**	**284 (2.0)**	**69 (3.1)**	**272 (1.2)**
California	**31 (3.0)**	**268 (3.2)**	**69 (3.0)**	**251 (1.8)**
Guam	**30 (0.6)**	**240 (1.7)**	**70 (0.6)**	**227 (0.8)**
Colorado	**30 (2.8)**	**276 (2.0)**	**70 (2.8)**	**263 (1.4)**
Wisconsin	**29 (3.6)**	**286 (2.3)**	**71 (3.6)**	**271 (1.5)**
Idaho	28 (2.0)	278 (1.5)	72 (2.0)	269 (0.9)
Connecticut	26 (3.2)	284 (2.8)	74 (3.2)	266 (1.4)
Michigan	26 (3.3)	280 (3.2)	74 (3.3)	259 (1.2)
North Dakota	24 (3.3)	283 (1.4)	76 (3.3)	281 (1.6)
Illinois	23 (3.6)	270 (4.1)	77 (3.6)	259 (2.0)
Delaware	**23 (1.1)**	**274 (1.9)**	**77 (1.1)**	**258 (0.9)**
Nebraska	**21 (2.2)**	**284 (2.1)**	**79 (2.2)**	**274 (1.1)**
New Hampshire	**21 (1.3)**	**281 (1.4)**	**79 (1.3)**	**271 (1.0)**
Iowa	**20 (2.9)**	**286 (2.9)**	**80 (2.9)**	**278 (1.2)**
Maryland	**19 (2.7)**	**278 (4.5)**	**81 (2.7)**	**258 (1.7)**
Rhode Island	19 (0.8)	263 (1.8)	81 (0.8)	259 (0.6)
New Mexico	18 (0.8)	264 (2.1)	82 (0.8)	255 (0.8)
Arizona	17 (2.3)	261 (4.3)	83 (2.3)	259 (1.4)
Ohio	15 (2.9)	272 (3.2)	85 (2.9)	264 (1.3)
Hawaii	14 (0.6)	262 (2.5)	86 (0.6)	250 (0.8)
Georgia	**14 (2.1)**	**269 (4.2)**	**86 (2.1)**	**258 (1.3)**
Virginia	**14 (2.4)**	**280 (6.3)**	**86 (2.4)**	**261 (1.8)**
Pennsylvania	**13 (2.7)**	**261 (5.1)**	**87 (2.7)**	**265 (1.8)**
Kentucky	**12 (1.9)**	**266 (2.9)**	**88 (1.9)**	**256 (1.2)**
Texas	**12 (2.5)**	**270 (4.2)!**	**88 (2.5)**	**254 (1.4)**
Florida	12 (1.6)	273 (4.4)	88 (1.6)	254 (1.4)
West Virginia	11 (2.0)	280 (3.8)	89 (2.0)	253 (0.9)
New Jersey	11 (1.7)	288 (5.0)	89 (1.7)	267 (1.3)
Oklahoma	10 (2.3)	275 (4.2)!	90 (2.3)	262 (1.3)
North Carolina	10 (1.6)	261 (6.0)	90 (1.6)	249 (1.1)
Arkansas	**9 (1.7)**	**251 (6.2)**	**91 (1.7)**	**256 (1.0)**
Indiana	**8 (2.2)**	**265 (5.5)!**	**92 (2.2)**	**266 (1.3)**
Alabama	**7 (1.5)**	**268 (6.4)!**	**93 (1.5)**	**252 (1.2)**
Louisiana	**5 (1.4)**	**261 (5.8)!**	**95 (1.4)**	**245 (1.3)**
New York	5 (1.2)	251 (7.1)!	95 (1.2)	261 (1.6)
Virgin Islands	1 (0.0)	*** (***)	99 (0.0)	219 (0.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 14.3 | **Teachers' Reports on Permitting the Use of Calculators on Tests and Availability of School-Owned Calculators**

GRADE 8 PUBLIC SCHOOLS	Teachers' Reports on Permitting the Use of Calculators on Mathematics Tests				Teachers' Reports on Students' Access to School-Owned Calculators			
	Yes		No		Yes		No	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	33 (4.5)	271 (2.7)	67 (4.5)	258 (1.7)	56 (4.6)	262 (2.2)	44 (4.6)	263 (2.4)
Northeast	14 (9.2)	*** (***)	86 (9.2)	268 (3.5)	28 (8.2)	263 (9.4)!	72 (8.2)	272 (2.8)
Southeast	15 (8.1)	254 (5.0)!	85 (8.1)	256 (3.7)	56(11.8)	258 (4.9)!	44(11.8)	252 (5.6)!
Central	44 (7.9)	274 (2.9)	56 (7.9)	255 (3.8)	55 (8.2)	265 (4.7)	45 (8.2)	261 (4.7)!
West	48 (8.8)	274 (4.6)!	52 (8.8)	255 (2.5)	72 (7.4)	264 (3.6)	28 (7.4)	267 (3.9)!
STATES								
Alabama	21 (3.5)	257 (3.0)	79 (3.5)	252 (1.3)	40 (5.2)	255 (2.3)	60 (5.2)	252 (1.5)
Arizona	22 (2.8)	264 (3.4)	78 (2.8)	258 (1.2)	60 (3.2)	257 (1.6)	40 (3.2)	263 (1.8)
Arkansas	13 (1.9)	265 (3.1)	87 (1.9)	255 (1.0)	35 (4.1)	259 (1.6)	65 (4.1)	255 (1.3)
California	50 (3.9)	263 (2.6)	50 (3.9)	250 (2.0)	83 (2.9)	256 (1.5)	17 (2.9)	258 (4.1)
Colorado	45 (2.9)	273 (1.4)	55 (2.9)	261 (1.6)	62 (4.0)	268 (1.4)	38 (4.0)	268 (2.0)
Connecticut	43 (3.3)	279 (2.3)	57 (3.3)	264 (1.7)	89 (2.3)	272 (1.1)	11 (2.3)	258 (4.5)!
Delaware	33 (1.4)	265 (1.4)	67 (1.4)	259 (1.0)	66 (0.9)	259 (1.0)	34 (0.9)	265 (1.5)
District of Columbia	49 (0.8)	235 (1.4)	51 (0.8)	229 (0.8)	75 (0.8)	232 (0.9)	25 (0.8)	232 (1.3)
Florida	23 (2.6)	267 (2.9)	77 (2.6)	253 (1.4)	59 (4.5)	257 (1.8)	41 (4.5)	255 (2.2)
Georgia	30 (3.0)	266 (2.4)	70 (3.0)	253 (1.5)	69 (4.1)	258 (1.6)	31 (4.1)	255 (2.7)
Hawaii	15 (0.8)	272 (2.1)	85 (0.8)	248 (0.8)	49 (0.9)	253 (0.9)	51 (0.9)	250 (1.0)
Idaho	30 (1.4)	275 (1.2)	70 (1.4)	270 (0.8)	50 (2.0)	270 (1.2)	50 (2.0)	273 (1.1)
Illinois	36 (4.3)	271 (3.5)	64 (4.3)	257 (2.1)	70 (3.5)	260 (2.4)	30 (3.5)	266 (2.8)
Indiana	15 (2.7)	273 (3.1)	85 (2.7)	267 (1.3)	63 (4.3)	267 (1.5)	37 (4.3)	266 (2.0)
Iowa	42 (4.3)	280 (1.7)	58 (4.3)	277 (1.5)	67 (4.3)	276 (1.3)	33 (4.3)	281 (2.5)
Kentucky	20 (2.0)	261 (2.5)	80 (2.0)	255 (1.3)	40 (4.0)	255 (1.5)	60 (4.0)	258 (1.7)
Louisiana	16 (3.0)	253 (3.3)	84 (3.0)	244 (1.5)	29 (4.0)	248 (2.9)	71 (4.0)	245 (1.5)
Maryland	30 (3.3)	274 (2.8)	70 (3.3)	256 (2.0)	77 (2.6)	265 (1.9)	23 (2.6)	249 (4.1)
Michigan	37 (3.6)	273 (2.3)	63 (3.6)	259 (1.4)	67 (4.2)	265 (1.6)	33 (4.2)	262 (2.4)
Minnesota	47 (3.9)	280 (1.6)	53 (3.9)	273 (1.4)	58 (4.4)	277 (1.5)	42 (4.4)	275 (1.5)
Montana	57 (3.1)	283 (1.1)	43 (3.1)	278 (1.4)	62 (2.9)	280 (1.1)	38 (2.9)	283 (1.3)
Nebraska	36 (2.3)	279 (1.4)	64 (2.3)	275 (1.3)	49 (3.3)	275 (1.1)	51 (3.3)	277 (1.5)
New Hampshire	38 (1.4)	277 (1.1)	62 (1.4)	270 (1.2)	69 (0.9)	273 (1.0)	31 (0.9)	272 (1.5)
New Jersey	14 (2.1)	287 (3.2)	86 (2.1)	286 (1.4)	55 (4.3)	278 (1.8)	45 (4.3)	281 (2.2)
New Mexico	20 (1.1)	259 (1.7)	80 (1.1)	256 (0.9)	56 (1.1)	259 (1.0)	44 (1.1)	254 (1.3)
New York	12 (2.5)	255 (4.3)	88 (2.5)	261 (1.7)	37 (4.3)	267 (2.1)	63 (4.3)	257 (2.1)
North Carolina	18 (2.3)	262 (3.4)	82 (2.3)	248 (1.1)	81 (3.2)	252 (1.2)	19 (3.2)	243 (3.0)
North Dakota	39 (3.4)	279 (2.2)	61 (3.4)	283 (1.4)	37 (2.6)	280 (2.1)	63 (2.6)	283 (1.5)
Ohio	33 (4.3)	269 (3.3)	67 (4.3)	264 (1.6)	61 (4.3)	263 (1.7)	39 (4.3)	269 (2.1)
Oklahoma	15 (3.0)	272 (3.5)!	85 (3.0)	262 (1.4)	33 (4.3)	264 (2.1)	67 (4.3)	263 (1.5)
Oregon	53 (3.3)	277 (1.7)	47 (3.3)	265 (1.7)	82 (3.1)	271 (1.3)	18 (3.1)	277 (3.0)
Pennsylvania	20 (3.2)	280 (3.1)	80 (3.2)	264 (1.8)	54 (4.0)	267 (2.3)	[illegible] (4.0)	267 (1.7)
Rhode Island	23 (0.8)	266 (1.8)	77 (0.8)	258 (0.8)	52 (1.1)	262 (1.0)	48 (1.1)	258 (0.8)
Texas	22 (3.6)	268 (3.0)	78 (3.6)	252 (1.5)	71 (3.7)	258 (1.5)	29 (3.7)	248 (2.5)
Virginia	27 (2.7)	277 (3.7)	73 (2.7)	258 (1.5)	72 (3.7)	266 (1.8)	28 (3.7)	255 (3.6)
West Virginia	20 (2.9)	267 (3.2)	80 (2.9)	254 (0.9)	45 (4.4)	258 (1.4)	55 (4.4)	255 (1.3)
Wisconsin	50 (4.6)	279 (1.9)	50 (4.6)	272 (2.2)	65 (4.3)	274 (1.7)	35 (4.3)	277 (1.7)
Wyoming	49 (1.8)	274 (1.1)	51 (1.8)	272 (1.0)	73 (1.5)	271 (0.7)	27 (1.5)	276 (1.4)
TERRITORIES								
Guam	9 (0.4)	233 (1.4)	91 (0.4)	231 (0.7)	16 (0.7)	237 (2.2)	84 (0.7)	230 (0.8)
Virgin Islands	3 (0.0)	*** (***)	97 (0.0)	218 (0.5)	25 (1.0)	223 (1.2)	75 (1.0)	218 (0.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 14.4

Teachers' Reports on Permitting the Use of Calculators on Tests and Availability of School-Owned Calculators Organized by Percentage of Students Permitted to Use Calculators on Mathematics Tests

GRADE 8 PUBLIC SCHOOLS	Teachers' Reports on Permitting the Use of Calculators on Mathematics Tests				Teachers' Reports on Students' Access to School-Owned Calculators			
	Yes		No		Yes		No	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
STATES/TERRITORIES								
Montana	57 (3.1)	283 (1.1)	43 (3.1)	278 (1.4)	62 (2.9)	280 (1.1)	38 (2.9)	283 (1.3)
Oregon	53 (3.3)	277 (1.7)	47 (3.3)	265 (1.7)	82 (3.1)	271 (1.3)	18 (3.1)	277 (3.0)
California	50 (3.9)	263 (2.6)	50 (3.9)	250 (2.0)	83 (2.9)	256 (1.5)	17 (2.9)	258 (4.1)
Wisconsin	50 (4.6)	279 (1.9)	50 (4.6)	[illegible]	65 (4.3)	274 (1.7)	35 (4.3)	277 (1.7)
Wyoming	49 (1.6)	274 (1.1)	51 (1.6)	272 (1.0)	73 (1.5)	271 (0.7)	27 (1.5)	276 (1.4)
District of Columbia	49 (0.6)	235 (1.4)	51 (0.6)	229 (0.8)	75 (0.8)	232 (0.9)	25 (0.8)	232 (1.3)
Minnesota	47 (3.9)	280 (1.8)	53 (3.9)	273 (1.4)	58 (4.4)	277 (1.5)	42 (4.4)	275 (1.5)
Colorado	45 (2.9)	273 (1.4)	55 (2.9)	261 (1.6)	62 (4.0)	266 (1.4)	38 (4.0)	268 (2.0)
Connecticut	43 (3.3)	279 (2.3)	57 (3.3)	264 (1.7)	89 (2.3)	272 (1.1)	11 (2.3)	258 (4.5)!
Iowa	42 (4.3)	280 (1.7)	58 (4.3)	277 (1.5)	67 (4.3)	276 (1.3)	33 (4.3)	281 (2.5)
North Dakota	39 (3.4)	279 (2.2)	61 (3.4)	283 (1.4)	37 (2.6)	280 (2.1)	63 (2.6)	283 (1.5)
New Hampshire	38 (1.4)	277 (1.1)	62 (1.4)	270 (1.2)	69 (0.9)	273 (1.0)	31 (0.9)	272 (1.5)
Michigan	37 (3.6)	273 (2.3)	63 (3.6)	259 (1.4)	67 (4.2)	265 (1.8)	33 (4.2)	262 (2.4)
Nebraska	36 (2.3)	279 (1.4)	64 (2.3)	275 (1.3)	49 (3.3)	275 (1.1)	51 (3.3)	277 (1.5)
Illinois	36 (4.3)	271 (3.5)	64 (4.3)	257 (2.1)	70 (3.5)	260 (2.4)	30 (3.5)	266 (2.8)
Ohio	33 (4.3)	269 (3.3)	67 (4.3)	264 (1.6)	61 (4.3)	263 (1.7)	39 (4.3)	269 (2.1)
Delaware	33 (1.4)	265 (1.4)	67 (1.4)	259 (1.0)	66 (0.9)	259 (1.0)	34 (0.9)	265 (1.5)
Georgia	30 (3.0)	268 (2.4)	70 (3.0)	253 (1.5)	69 (4.1)	258 (1.6)	31 (4.1)	255 (2.7)
Maryland	30 (3.3)	274 (2.8)	70 (3.3)	258 (2.0)	77 (2.6)	265 (1.9)	23 (2.6)	249 (4.1)
Idaho	30 (1.4)	275 (1.2)	70 (1.4)	270 (0.8)	50 (2.0)	270 (1.2)	50 (2.0)	273 (1.1)
Virginia	27 (2.7)	277 (3.7)	73 (2.7)	258 (1.5)	72 (3.7)	266 (1.8)	28 (3.7)	255 (3.6)
Florida	23 (2.6)	267 (2.9)	77 (2.6)	253 (1.4)	59 (4.5)	257 (1.8)	41 (4.5)	255 (2.2)
Rhode Island	23 (0.8)	268 (1.6)	77 (0.8)	258 (0.6)	52 (1.1)	262 (1.0)	48 (1.1)	259 (0.8)
Texas	22 (3.6)	268 (3.0)	78 (3.6)	252 (1.5)	71 (3.7)	258 (1.5)	29 (3.7)	249 (2.5)
Arizona	22 (2.8)	264 (3.4)	78 (2.8)	258 (1.2)	60 (3.2)	257 (1.6)	40 (3.2)	263 (1.8)
Alabama	21 (3.5)	257 (3.0)	79 (3.5)	252 (1.3)	40 (5.2)	255 (2.3)	60 (5.2)	252 (1.5)
West Virginia	20 (2.9)	267 (3.2)	80 (2.9)	254 (0.9)	45 (4.4)	258 (1.4)	55 (4.4)	255 (1.3)
Kentucky	20 (2.0)	261 (2.5)	80 (2.0)	255 (1.3)	40 (4.0)	255 (1.5)	60 (4.0)	258 (1.7)
New Mexico	20 (1.1)	259 (1.7)	80 (1.1)	256 (0.9)	56 (1.1)	259 (1.0)	44 (1.1)	254 (1.3)
Pennsylvania	20 (3.2)	280 (3.1)	80 (3.2)	264 (1.8)	54 (4.0)	267 (2.3)	46 (4.0)	267 (1.7)
North Carolina	18 (2.3)	262 (3.4)	82 (2.3)	248 (1.1)	81 (3.2)	252 (1.2)	19 (3.2)	243 (3.0)
Louisiana	16 (3.0)	253 (3.3)	84 (3.0)	244 (1.5)	29 (4.0)	248 (2.9)	71 (4.0)	245 (1.5)
Oklahoma	15 (3.0)	272 (3.5)!	85 (3.0)	262 (1.4)	33 (4.3)	264 (2.1)	67 (4.3)	263 (1.5)
Indiana	15 (2.7)	273 (3.1)	85 (2.7)	267 (1.3)	63 (4.3)	267 (1.5)	37 (4.3)	268 (2.0)
Hawaii	15 (0.6)	272 (2.1)	85 (0.6)	248 (0.8)	49 (0.9)	253 (0.[illegible])	51 (0.9)	250 (1.0)
New Jersey	14 (2.1)	287 (3.[illegible])	86 (2.1)	266 (1.4)	55 (4.3)	276 (1.8)	45 (4.3)	261 (2.2)
Arkansas	13 (1.9)	265 (3.1)	87 (1.9)	255 (1.0)	35 (4.1)	259 (1.6)	65 (4.1)	255 (1.3)
New York	12 (2.5)	258 (4.3)	88 (2.5)	261 (1.7)	37 (4.3)	267 (2.1)	63 (4.3)	257 (2.1)
Guam	9 (0.4)	233 (1.4)	91 (0.4)	231 (0.7)	16 (0.7)	237 (2.2)	84 (0.7)	230 (0.8)
Virgin Islands	3 (0.0)	*** (***)	97 (0.0)	218 (0.5)	25 (1.0)	223 (1.2)	75 (1.0)	218 (0.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

358

TABLE 14.5 | **Students' Reports on Their Access to Calculators and Use of Scientific Calculators**

GRADE 8 PUBLIC SCHOOLS	Student or Family Owns a Calculator				Student Ever Used a Scientific Calculator			
	Yes		No		Yes		No	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	97 (0.4)	263 (1.3)	3 (0.4)	234 (3.8)	55 (1.8)	268 (1.6)	45 (1.8)	257 (1.5)
Northeast	98 (0.7)	269 (3.3)	2 (0.7)	*** (***)	49 (3.9)	273 (5.0)	51 (3.9)	266 (2.4)
Southeast	96 (1.2)	254 (2.4)	4 (1.2)	*** (***)	56 (3.5)	257 (2.8)	44 (3.5)	248 (3.0)
Central	98 (0.6)	266 (2.5)	2 (0.6)	*** (***)	58 (3.6)	267 (3.0)	42 (3.6)	263 (3.0)
West	96 (0.6)	263 (2.6)	4 (0.6)	*** (***)	55 (3.2)	268 (3.1)	46 (3.2)	254 (2.4)
STATES								
Alabama	97 (0.4)	253 (1.2)	3 (0.4)	236 (4.1)	63 (1.1)	254 (1.3)	37 (1.1)	250 (1.4)
Arizona	97 (0.4)	260 (1.1)	3 (0.4)	241 (3.0)	52 (1.3)	265 (1.5)	48 (1.3)	255 (1.2)
Arkansas	96 (0.5)	257 (0.8)	4 (0.5)	232 (2.8)	60 (1.3)	258 (1.1)	40 (1.3)	254 (1.0)
California	97 (0.4)	257 (1.2)	3 (0.4)	232 (3.8)	55 (1.4)	263 (1.6)	45 (1.4)	248 (1.4)
Colorado	98 (0.3)	268 (1.0)	2 (0.3)	*** (***)	59 (1.6)	272 (1.0)	41 (1.6)	261 (1.3)
Connecticut	98 (0.3)	271 (1.1)	2 (0.3)	*** (***)	60 (1.0)	274 (1.2)	40 (1.0)	265 (1.3)
Delaware	97 (0.4)	262 (0.7)	3 (0.4)	*** (***)	63 (1.2)	265 (1.2)	37 (1.2)	254 (1.2)
District of Columbia	96 (0.4)	231 (0.7)	4 (0.4)	218 (2.7)	79 (1.0)	233 (0.9)	21 (1.0)	224 (1.2)
Florida	96 (0.5)	256 (1.2)	4 (0.5)	226 (3.6)	59 (1.2)	258 (1.4)	41 (1.2)	252 (1.3)
Georgia	97 (0.4)	259 (1.3)	3 (0.4)	238 (4.2)	63 (1.3)	261 (1.8)	37 (1.3)	256 (1.5)
Hawaii	96 (0.5)	252 (0.7)	4 (0.5)	228 (3.4)	45 (0.8)	255 (1.1)	55 (0.8)	248 (0.9)
Idaho	99 (0.3)	272 (0.7)	1 (0.3)	*** (***)	58 (1.3)	274 (0.9)	42 (1.3)	268 (1.1)
Illinois	98 (0.3)	261 (1.7)	2 (0.3)	234 (4.5)	70 (1.9)	261 (1.8)	30 (1.9)	259 (2.1)
Indiana	98 (0.3)	267 (1.1)	2 (0.3)	*** (***)	61 (1.4)	271 (1.2)	39 (1.4)	262 (1.3)
Iowa	99 (0.2)	279 (1.0)	1 (0.2)	*** (***)	53 (1.6)	282 (1.2)	47 (1.6)	275 (1.3)
Kentucky	97 (0.5)	257 (1.1)	3 (0.5)	239 (3.0)	60 (1.4)	260 (1.3)	40 (1.4)	252 (1.2)
Louisiana	95 (0.4)	247 (1.2)	5 (0.4)	227 (3.2)	54 (1.2)	247 (1.4)	46 (1.2)	245 (1.3)
Maryland	98 (0.3)	261 (1.5)	2 (0.3)	*** (***)	65 (1.1)	265 (1.5)	35 (1.1)	254 (1.7)
Michigan	98 (0.3)	265 (1.1)	2 (0.3)	*** (***)	59 (1.5)	268 (1.2)	41 (1.5)	259 (1.3)
Minnesota	99 (0.2)	276 (0.8)	1 (0.2)	*** (***)	57 (1.7)	280 (1.0)	43 (1.7)	270 (1.0)
Montana	98 (0.3)	281 (0.8)	2 (0.3)	*** (***)	64 (1.6)	284 (1.0)	36 (1.6)	273 (1.2)
Nebraska	99 (0.2)	276 (0.9)	1 (0.2)	*** (***)	56 (1.6)	279 (1.2)	44 (1.6)	272 (1.2)
New Hampshire	99 (0.3)	274 (0.9)	1 (0.3)	*** (***)	62 (1.3)	276 (1.2)	38 (1.3)	269 (1.1)
New Jersey	98 (0.4)	270 (1.1)	2 (0.4)	*** (***)	58 (1.2)	272 (1.4)	42 (1.2)	266 (1.2)
New Mexico	97 (0.3)	257 (0.8)	3 (0.3)	231 (3.6)	54 (1.1)	260 (1.0)	46 (1.1)	252 (1.0)
New York	96 (0.5)	262 (1.3)	4 (0.5)	236 (4.8)	52 (1.2)	266 (1.5)	48 (1.2)	257 (1.5)
North Carolina	96 (0.3)	251 (1.0)	4 (0.3)	224 (2.9)	63 (1.2)	253 (1.2)	37 (1.2)	246 (1.3)
North Dakota	99 (0.1)	281 (1.2)	1 (0.1)	*** (***)	61 (1.7)	284 (1.1)	39 (1.7)	277 (1.6)
Ohio	98 (0.3)	264 (1.0)	2 (0.3)	*** (***)	63 (1.4)	266 (1.3)	37 (1.4)	261 (1.2)
Oklahoma	98 (0.3)	263 (1.2)	2 (0.3)	*** (***)	57 (1.3)	265 (1.4)	43 (1.3)	260 (1.4)
Oregon	98 (0.4)	272 (1.0)	2 (0.4)	258 (4.5)	64 (1.6)	276 (1.1)	36 (1.6)	263 (1.3)
Pennsylvania	97 (0.4)	267 (1.6)	3 (0.4)	234 (4.2)	59 (1.2)	269 (1.8)	41 (1.2)	262 (1.6)
Rhode Island	97 (0.4)	261 (0.5)	3 (0.4)	225 (3.9)	53 (0.9)	264 (1.0)	47 (0.9)	256 (0.7)
Texas	96 (0.5)	259 (1.2)	4 (0.5)	235 (2.9)	63 (1.3)	263 (1.5)	37 (1.3)	250 (1.4)
Virginia	98 (0.3)	265 (1.5)	2 (0.3)	*** (***)	62 (1.3)	267 (1.9)	38 (1.3)	260 (1.5)
West Virginia	98 (0.3)	256 (0.9)	2 (0.3)	242 (3.9)	58 (0.9)	259 (1.1)	42 (0.9)	252 (1.0)
Wisconsin	99 (0.3)	275 (1.2)	1 (0.3)	*** (***)	62 (1.7)	277 (1.5)	38 (1.7)	270 (1.5)
Wyoming	99 (0.2)	272 (0.8)	1 (0.2)	*** (***)	60 (0.9)	276 (0.6)	40 (0.9)	266 (0.9)
TERRITORIES								
Guam	96 (0.8)	232 (0.5)	4 (0.8)	*** (***)	48 (1.3)	238 (1.2)	52 (1.3)	226 (0.9)
Virgin Islands	92 (0.8)	219 (0.5)	8 (0.8)	204 (1.7)	49 (1.6)	221 (0.8)	51 (1.6)	216 (0.7)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students.

TABLE 14.6 | Students' Reports on the Frequency of Calculator Use in Mathematics Class

GRADE 8 PUBLIC SCHOOLS	At Least Several Times a Week		Weekly or Less		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	28 (2.7)	267 (2.2)	33 (1.7)	263 (2.1)	39 (3.1)	257 (1.4)
Northeast	17 (6.1)	269(12.7)!	25 (2.7)	273 (4.1)	58 (7.3)	268 (3.2)
Southeast	20 (3.8)	253 (4.7)	32 (3.8)	257 (4.6)	47 (6.7)	250 (2.7)
Central	37 (5.7)	272 (2.3)	36 (3.7)	264 (4.0)	27 (4.7)	258 (3.8)
West	34 (5.6)	268 (3.5)	36 (3.8)	263 (3.5)	30 (5.9)	253 (2.1)
STATES						
Alabama	**19 (2.0)**	**252 (2.3)**	**28 (2.0)**	**254 (2.2)**	**53 (3.2)**	**251 (1.8)**
Arizona	**22 (1.9)**	**263 (2.4)**	**33 (1.5)**	**259 (1.8)**	**45 (2.0)**	**259 (1.2)**
Arkansas	**20 (2.1)**	**256 (2.4)**	**31 (2.3)**	**259 (1.4)**	**49 (3.2)**	**254 (1.2)**
California	**32 (2.5)**	**265 (2.2)**	**38 (1.9)**	**256 (1.8)**	**30 (2.3)**	**248 (1.8)**
Colorado	39 (2.4)	273 (1.4)	34 (2.2)	264 (1.5)	26 (2.0)	263 (1.8)
Connecticut	27 (2.1)	275 (2.2)	46 (1.8)	271 (1.5)	27 (1.9)	263 (1.9)
Delaware	27 (1.0)	261 (1.5)	34 (1.0)	260 (1.1)	39 (0.8)	261 (1.0)
District of Columbia	38 (0.9)	227 (0.9)	35 (0.9)	235 (1.6)	27 (0.8)	230 (1.5)
Florida	19 (1.8)	259 (2.5)	30 (1.5)	257 (2.0)	51 (2.5)	253 (1.4)
Georgia	**30 (2.3)**	**265 (1.8)**	**37 (2.0)**	**259 (1.8)**	**34 (2.5)**	**253 (1.8)**
Hawaii	**17 (0.7)**	**254 (2.0)**	**28 (0.7)**	**252 (1.2)**	**55 (0.8)**	**250 (0.9)**
Idaho	**35 (1.2)**	**274 (1.2)**	**27 (1.0)**	**269 (1.2)**	**38 (0.9)**	**271 (1.1)**
Illinois	**35 (3.2)**	**267 (2.4)**	**35 (2.4)**	**261 (2.3)**	**30 (2.8)**	**252 (1.9)**
Indiana	**19 (2.1)**	**265 (2.0)**	**37 (1.9)**	**268 (1.7)**	**44 (2.1)**	**267 (1.3)**
Iowa	40 (3.0)	278 (1.4)	37 (2.2)	278 (1.6)	22 (2.2)	279 (1.7)
Kentucky	20 (2.0)	257 (2.1)	30 (2.1)	256 (1.7)	50 (2.5)	257 (1.4)
Louisiana	16 (2.1)	246 (2.4)	28 (2.0)	250 (1.8)	56 (2.9)	244 (1.7)
Maryland	22 (1.9)	269 (2.3)	34 (1.8)	262 (1.8)	44 (2.3)	255 (2.2)
Michigan	33 (3.0)	271 (1.4)	29 (2.0)	264 (1.5)	38 (2.9)	259 (1.7)
Minnesota	**38 (3.1)**	**280 (1.3)**	**36 (2.4)**	**276 (1.2)**	**26 (2.2)**	**271 (1.4)**
Montana	**53 (2.0)**	**283 (1.1)**	**27 (1.0)**	**278 (1.8)**	**20 (1.7)**	**278 (2.2)**
Nebraska	**38 (2.1)**	**279 (1.4)**	**32 (1.2)**	**278 (1.2)**	**29 (1.9)**	**270 (1.8)**
New Hampshire	**27 (1.0)**	**277 (1.3)**	**39 (1.2)**	**274 (1.3)**	**34 (1.0)**	**270 (1.7)**
New Jersey	**13 (1.2)**	**272 (2.9)**	**32 (2.1)**	**275 (1.8)**	**55 (2.4)**	**266 (1.4)**
New Mexico	20 (1.0)	259 (1.6)	33 (1.1)	258 (1.0)	47 (1.1)	254 (1.2)
New York	11 (1.6)	260 (3.9)	27 (1.9)	265 (2.1)	62 (2.3)	260 (1.4)
North Carolina	17 (1.4)	251 (2.6)	40 (2.0)	253 (1.4)	44 (2.7)	247 (1.4)
North Dakota	46 (2.2)	280 (1.7)	26 (1.9)	284 (2.1)	27 (2.1)	280 (1.5)
Ohio	28 (2.7)	267 (2.1)	34 (1.9)	261 (1.7)	39 (2.3)	264 (1.6)
Oklahoma	**24 (2.4)**	**266 (2.3)**	**27 (1.5)**	**261 (1.6)**	**50 (2.6)**	**262 (1.4)**
Oregon	**48 (2.6)**	**276 (1.4)**	**38 (1.9)**	**267 (1.3)**	**18 (1.5)**	**262 (2.3)**
Pennsylvania	**17 (2.2)**	**266 (2.4)**	**31 (1.7)**	**270 (1.8)**	**52 (2.6)**	**264 (2.1)**
Rhode Island	**18 (0.6)**	**261 (1.6)**	**26 (0.6)**	**263 (1.4)**	**55 (0.6)**	**256 (0.7)**
Texas	**23 (2.8)**	**266 (2.1)**	**37 (2.2)**	**261 (1.3)**	**40 (2.9)**	**249 (1.8)**
Virginia	24 (2.0)	274 (3.1)	35 (1.5)	266 (1.7)	41 (2.4)	256 (2.1)
West Virginia	17 (2.2)	258 (2.9)	29 (1.8)	258 (1.4)	53 (2.8)	254 (1.0)
Wisconsin	47 (3.5)	277 (1.6)	32 (2.1)	276 (1.7)	21 (2.4)	267 (1.9)
Wyoming	46 (1.0)	274 (0.8)	28 (0.8)	269 (1.1)	26 (1.0)	272 (1.2)
TERRITORIES						
Guam	**14 (0.6)**	**231 (2.2)**	**22 (1.1)**	**241 (1.8)**	**65 (1.2)**	**228 (1.0)**
Virgin Islands	**14 (0.6)**	**210 (2.1)**	**25 (1.3)**	**224 (0.9)**	**61 (1.5)**	**217 (0.8)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

360

TABLE 14.7 | **Teachers' Reports on the Frequency of Calculator Use in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	At Least Several Times a Week		Weekly or Less		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	27 (4.5)	274 (3.2)	55 (4.8)	259 (2.2)	18 (4.0)	258 (3.9)!
Northeast	16(10.8)	*** (***)	48(11.0)	265 (5.5)!	35(13.3)	270 (4.3)!
Southeast	16 (7.7)	263(11.8)!	62(10.3)	258 (4.0)	22 (9.1)	248 (7.4)!
Central	37 (9.3)	275 (4.6)!	47 (8.1)	255 (4.8)	16 (7.3)	260 (9.1)!
West	31 (7.7)	278 (5.1)!	60 (9.2)	259 (4.1)	9 (4.3)	256 (4.7)!
STATES						
Alabama	**15 (3.1)**	**260 (3.3)!**	**45 (4.1)**	**250 (2.0)**	**40 (4.2)**	**253 (2.0)**
Arizona	**22 (2.6)**	**262 (3.8)**	**47 (2.9)**	**258 (1.7)**	**31 (2.9)**	**260 (2.0)**
Arkansas	**18 (3.4)**	**259 (3.4)**	**47 (4.5)**	**257 (1.5)**	**35 (4.3)**	**255 (2.0)**
California	**43 (3.4)**	**267 (2.5)**	**49 (3.1)**	**248 (1.9)**	**8 (1.8)**	**255 (8.7)!**
Colorado	46 (3.2)	273 (1.4)	42 (3.2)	261 (1.5)	12 (2.5)	264 (4.1)!
Connecticut	36 (4.0)	277 (2.5)	56 (3.8)	267 (1.7)	8 (1.4)	269 (4.3)
Delaware	28 (1.0)	267 (1.5)	47 (1.1)	257 (1.1)	26 (0.7)	261 (1.6)
District of Columbia	40 (0.8)	230 (1.1)	51 (0.8)	232 (1.2)	9 (0.6)	241 (2.0)
Florida	21 (2.6)	264 (3.8)	53 (2.9)	255 (1.6)	26 (2.4)	252 (2.4)
Georgia	**31 (3.3)**	**265 (1.9)**	**50 (3.9)**	**256 (2.1)**	**19 (3.2)**	**249 (3.4)**
Hawaii	**11 (0.6)**	**270 (2.2)**	**41 (0.8)**	**252 (1.2)**	**48 (1.0)**	**246 (1.0)**
Idaho	**38 (1.2)**	**275 (1.2)**	**37 (2.0)**	**269 (1.4)**	**25 (2.1)**	**272 (1.6)**
Illinois	**35 (4.5)**	**273 (3.0)**	**50 (3.9)**	**255 (2.5)**	**15 (3.1)**	**259 (3.7)!**
Indiana	**13 (2.9)**	**275 (2.5)!**	**58 (3.2)**	**266 (1.7)**	**29 (3.2)**	**267 (1.8)**
Iowa	40 (4.1)	278 (1.8)	52 (4.5)	278 (1.6)	9 (2.7)	276 (4.6)!
Kentucky	19 (2.6)	262 (2.9)	44 (3.9)	253 (1.7)	37 (4.1)	257 (2.2)
Louisiana	13 (2.9)	246 (3.4)!	44 (4.6)	248 (2.0)	43 (4.1)	243 (2.3)
Maryland	25 (2.5)	276 (2.5)	57 (3.8)	257 (2.2)	18 (2.8)	252 (3.9)
Michigan	34 (3.5)	275 (1.7)	48 (3.1)	259 (2.1)	18 (2.9)	257 (2.7)
Minnesota	**48 (4.2)**	**280 (1.4)**	**42 (4.1)**	**272 (1.8)**	**10 (2.7)**	**275 (2.5)!**
Montana	**60 (2.7)**	**284 (1.0)**	**31 (2.2)**	**276 (1.5)**	**9 (2.9)**	**278 (3.3)!**
Nebraska	**39 (2.4)**	**282 (1.6)**	**39 (3.4)**	**273 (1.6)**	**21 (3.5)**	**273 (2.8)**
New Hampshire	**38 (1.5)**	**278 (1.1)**	**51 (1.4)**	**266 (1.5)**	**12 (0.6)**	**274 (2.6)**
New Jersey	**9 (1.8)**	**285 (4.4)!**	**51 (3.9)**	**271 (2.0)**	**40 (3.8)**	**263 (2.0)**
New Mexico	19 (1.1)	263 (2.1)	54 (1.3)	256 (1.2)	27 (1.3)	254 (1.3)
New York	6 (1.8)	260 (6.4)!	45 (3.5)	265 (1.8)	49 (3.8)	256 (2.7)
North Carolina	15 (2.1)	258 (3.6)	66 (3.0)	250 (1.5)	19 (2.9)	245 (3.0)
North Dakota	43 (3.0)	282 (2.0)	35 (3.6)	282 (2.4)	22 (3.0)	282 (1.8)
Ohio	25 (3.8)	287 (2.8)	54 (4.1)	264 (1.7)	21 (3.3)	266 (3.1)
Oklahoma	**17 (3.2)**	**270 (3.7)!**	**45 (3.9)**	**264 (1.7)**	**38 (3.8)**	**260 (2.0)**
Oregon	**53 (3.3)**	**277 (1.5)**	**42 (3.4)**	**267 (1.9)**	**5 (1.2)**	**261 (4.8)!**
Pennsylvania	**18 (3.2)**	**274 (3.5)**	**46 (3.6)**	**266 (2.5)**	**36 (4.1)**	**265 (2.5)**
Rhode Island	**17 (0.7)**	**281 (1.7)**	**39 (1.0)**	**262 (1.2)**	**44 (1.2)**	**256 (0.9)**
Texas	**19 (3.3)**	**267 (3.2)**	**61 (3.4)**	**258 (1.6)**	**20 (2.9)**	**244 (3.1)**
Virginia	23 (2.6)	280 (3.9)	50 (3.2)	259 (1.6)	27 (3.3)	257 (2.8)
West Virginia	17 (3.0)	263 (3.2)	45 (3.7)	257 (1.4)	37 (3.6)	253 (1.6)
Wisconsin	53 (4.3)	280 (1.8)	38 (4.2)	270 (2.1)	9 (2.5)	268 (2.9)!
Wyoming	49 (1.6)	274 (1.0)	34 (1.2)	270 (1.3)	17 (1.2)	273 (1.3)
TERRITORIES						
Guam	**16 (0.5)**	**244 (2.5)**	**30 (0.8)**	**230 (1.0)**	**55 (0.7)**	**226 (1.0)**
Virgin Islands	**1 (0.0)**	***** (***)**	**53 (1.0)**	**234 (1.0)**	**46 (1.0)**	**214 (0.7)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 14.8 | **Students' Reports on the Frequency with Which They Use Calculators to Work Problems in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	Almost Always		Sometimes		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	48 (1.5)	254 (1.5)	29 (1.5)	267 (2.6)	23 (1.9)	272 (1.4)
Northeast	40 (4.0)	255 (3.9)	21 (4.1)	273 (7.4)!	39 (6.0)	282 (2.2)
Southeast	46 (3.0)	243 (2.8)	28 (2.9)	257 (4.3)	26 (4.0)	266 (3.1)
Central	51 (3.8)	260 (2.8)	32 (3.5)	270 (5.1)	18 (3.6)	270 (4.1)!
West	53 (2.1)	255 (2.6)	33 (2.4)	269 (4.2)	14 (2.4)	265 (3.0)
STATES						
Alabama	47 (1.3)	243 (1.3)	22 (1.3)	258 (2.5)	30 (2.0)	265 (1.6)
Arizona	48 (1.0)	252 (1.3)	27 (1.1)	259 (1.9)	27 (1.2)	274 (1.5)
Arkansas	50 (1.1)	247 (1.0)	25 (1.5)	261 (1.9)	25 (1.6)	269 (1.2)
California	48 (1.6)	250 (1.7)	35 (1.5)	261 (1.7)	19 (1.6)	264 (2.1)
Colorado	49 (1.4)	262 (1.2)	33 (1.2)	269 (1.2)	18 (1.3)	277 (1.7)
Connecticut	38 (1.4)	260 (1.7)	41 (1.3)	273 (1.4)	21 (1.6)	281 (1.8)
Delaware	45 (0.9)	250 (1.1)	29 (0.9)	264 (1.7)	26 (0.8)	275 (1.4)
District of Columbia	55 (0.9)	224 (0.9)	31 (0.8)	235 (1.4)	14 (0.6)	246 (1.8)
Florida	49 (1.2)	246 (1.4)	25 (1.2)	257 (2.0)	26 (1.5)	271 (1.6)
Georgia	51 (1.4)	252 (1.6)	30 (1.4)	263 (1.7)	18 (1.4)	270 (1.9)
Hawaii	39 (0.9)	242 (0.9)	31 (0.9)	244 (1.3)	31 (0.9)	270 (1.2)
Idaho	43 (1.1)	268 (1.0)	29 (0.9)	272 (1.4)	27 (1.2)	279 (1.3)
Illinois	49 (1.6)	253 (2.1)	33 (1.6)	266 (2.3)	19 (1.7)	269 (1.7)
Indiana	39 (1.2)	257 (1.2)	29 (1.5)	266 (1.5)	32 (1.6)	278 (1.4)
Iowa	44 (1.7)	271 (1.3)	36 (1.7)	281 (1.6)	20 (1.7)	288 (1.5)
Kentucky	43 (1.3)	247 (1.4)	26 (1.5)	258 (2.2)	30 (1.4)	270 (1.4)
Louisiana	48 (1.3)	237 (1.3)	21 (1.5)	250 (1.6)	31 (2.0)	257 (2.0)
Maryland	47 (1.4)	249 (1.5)	27 (1.3)	267 (2.2)	26 (1.7)	275 (2.0)
Michigan	47 (1.6)	258 (1.4)	29 (1.4)	267 (1.6)	25 (1.9)	273 (1.9)
Minnesota	45 (1.5)	269 (1.2)	35 (1.4)	279 (1.4)	20 (1.6)	285 (1.2)
Montana	48 (1.7)	277 (0.9)	38 (1.4)	283 (1.4)	18 (1.7)	286 (2.1)
Nebraska	44 (1.3)	270 (1.2)	35 (1.3)	280 (1.5)	21 (1.2)	283 (1.6)
New Hampshire	32 (1.3)	268 (1.2)	38 (1.4)	274 (1.4)	30 (1.1)	281 (1.4)
New Jersey	37 (1.5)	258 (1.5)	28 (1.7)	274 (1.7)	33 (1.9)	280 (1.6)
New Mexico	44 (1.2)	248 (1.0)	29 (0.9)	258 (1.1)	27 (1.1)	268 (1.5)
New York	40 (1.2)	247 (1.6)	22 (1.5)	259 (2.3)	38 (1.8)	277 (1.6)
North Carolina	45 (1.2)	238 (1.0)	29 (1.5)	257 (1.7)	26 (1.8)	263 (1.5)
North Dakota	46 (1.6)	277 (1.5)	32 (1.7)	282 (1.7)	23 (1.6)	288 (1.4)
Ohio	45 (1.5)	255 (1.3)	28 (1.2)	266 (1.9)	27 (1.7)	275 (1.4)
Oklahoma	44 (1.4)	254 (1.8)	25 (1.3)	266 (1.7)	31 (1.8)	272 (1.5)
Oregon	46 (1.3)	267 (1.2)	41 (1.4)	275 (1.3)	13 (1.2)	276 (2.2)
Pennsylvania	41 (1.4)	254 (1.6)	23 (1.0)	265 (2.4)	36 (1.6)	279 (1.8)
Rhode Island	39 (1.0)	247 (0.9)	23 (0.6)	261 (1.4)	38 (0.9)	273 (1.0)
Texas	51 (1.4)	251 (1.8)	29 (1.4)	263 (1.8)	19 (1.7)	266 (1.5)
Virginia	45 (1.2)	253 (1.5)	28 (1.3)	274 (2.4)	27 (1.6)	273 (2.2)
West Virginia	47 (1.1)	249 (1.1)	25 (1.4)	257 (2.0)	28 (1.6)	266 (1.3)
Wisconsin	49 (1.9)	269 (1.5)	35 (1.5)	278 (1.7)	16 (1.8)	283 (1.5)
Wyoming	52 (1.0)	269 (0.8)	31 (1.0)	271 (1.1)	18 (0.8)	282 (1.3)
TERRITORIES						
Guam	45 (1.2)	229 (1.4)	27 (1.3)	225 (1.4)	28 (1.2)	251 (1.5)
Virgin Islands	53 (1.1)	214 (0.8)	25 (1.1)	218 (1.7)	21 (1.0)	230 (1.7)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

362

TABLE 14.9 | **Students' Reports on the Frequency with Which They Use Calculators to Do Mathematics Problems at Home**

GRADE 8 PUBLIC SCHOOLS	Almost Always		Sometimes		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	30 (1.3)	261 (1.8)	51 (1.2)	261 (1.6)	19 (0.9)	263 (1.6)
Northeast	30 (3.3)	264 (5.8)	48 (2.8)	270 (4.3)	22 (2.5)	275 (2.3)
Southeast	29 (3.1)	252 (3.6)	54 (2.6)	252 (3.2)	16 (1.6)	258 (4.4)
Central	35 (2.2)	266 (2.8)	49 (1.4)	265 (3.2)	16 (2.1)	263 (3.3)
West	29 (1.7)	263 (3.3)	52 (2.3)	262 (3.2)	19 (1.6)	258 (3.7)
STATES						
Alabama	28 (1.3)	248 (1.5)	54 (1.0)	252 (1.3)	18 (1.1)	264 (1.8)
Arizona	29 (1.2)	260 (1.5)	53 (1.2)	257 (1.3)	18 (0.9)	268 (2.0)
Arkansas	27 (1.2)	252 (1.4)	57 (1.2)	256 (1.1)	17 (1.0)	262 (1.5)
California	33 (1.5)	257 (1.7)	50 (1.2)	255 (1.4)	18 (1.1)	259 (2.3)
Colorado	33 (1.4)	269 (1.3)	53 (1.1)	265 (1.1)	13 (0.9)	270 (2.1)
Connecticut	29 (1.2)	269 (1.6)	54 (1.2)	270 (1.3)	17 (0.9)	272 (2.3)
Delaware	33 (1.1)	255 (1.5)	50 (1.2)	261 (1.0)	18 (0.8)	270 (1.9)
District of Columbia	32 (0.9)	228 (1.3)	53 (1.0)	230 (1.1)	15 (0.8)	239 (1.8)
Florida	26 (1.2)	253 (1.7)	53 (1.0)	254 (1.6)	21 (1.0)	262 (1.7)
Georgia	32 (1.4)	259 (2.1)	54 (1.3)	257 (1.8)	15 (0.8)	264 (2.2)
Hawaii	29 (0.9)	249 (1.2)	50 (1.0)	247 (1.0)	21 (0.8)	263 (1.7)
Idaho	26 (1.0)	272 (1.3)	58 (1.1)	271 (0.9)	16 (0.9)	273 (1.8)
Illinois	35 (1.9)	261 (2.3)	50 (1.3)	259 (1.9)	15 (1.3)	265 (2.3)
Indiana	28 (1.1)	262 (1.5)	54 (1.1)	266 (1.4)	18 (0.9)	274 (2.0)
Iowa	30 (1.5)	276 (1.5)	57 (1.3)	278 (1.4)	13 (0.9)	282 (2.1)
Kentucky	22 (1.5)	255 (2.0)	58 (1.4)	255 (1.2)	20 (1.0)	263 (2.0)
Louisiana	30 (1.4)	241 (1.7)	53 (1.1)	245 (1.4)	17 (1.1)	255 (1.6)
Maryland	35 (1.4)	255 (1.4)	46 (1.2)	261 (1.9)	18 (1.0)	270 (2.2)
Michigan	31 (1.4)	264 (1.4)	53 (1.3)	263 (1.5)	16 (1.0)	268 (2.1)
Minnesota	29 (1.3)	275 (1.3)	57 (1.1)	276 (1.1)	15 (0.8)	277 (1.7)
Montana	35 (1.2)	263 (1.2)	54 (1.5)	279 (1.0)	11 (0.9)	279 (2.5)
Nebraska	29 (1.2)	275 (1.5)	57 (1.5)	276 (1.1)	14 (1.1)	277 (2.7)
New Hampshire	27 (1.0)	270 (1.3)	51 (1.2)	275 (1.0)	22 (1.0)	278 (1.7)
New Jersey	28 (1.3)	262 (1.6)	50 (1.1)	270 (1.3)	22 (1.1)	278 (1.9)
New Mexico	24 (0.9)	255 (1.4)	59 (0.9)	255 (1.0)	17 (0.8)	262 (2.0)
New York	29 (1.3)	251 (1.8)	47 (1.2)	261 (1.6)	24 (1.1)	273 (2.2)
North Carolina	28 (1.2)	245 (1.3)	54 (1.1)	249 (1.1)	18 (0.9)	260 (1.9)
North Dakota	31 (1.4)	281 (1.5)	56 (1.8)	281 (1.7)	12 (0.9)	282 (1.9)
Ohio	29 (1.5)	259 (1.7)	53 (1.2)	265 (1.2)	17 (1.1)	270 (1.7)
Oklahoma	27 (1.4)	258 (2.1)	55 (1.4)	262 (1.2)	18 (1.0)	270 (1.8)
Oregon	33 (1.3)	274 (1.3)	55 (1.2)	271 (1.1)	12 (0.9)	266 (2.5)
Pennsylvania	28 (1.1)	260 (1.6)	52 (1.2)	266 (1.9)	20 (1.0)	277 (2.1)
Rhode Island	30 (1.1)	256 (1.0)	47 (1.1)	259 (0.9)	23 (1.0)	267 (1.2)
Texas	26 (1.5)	259 (2.0)	56 (1.3)	256 (1.5)	17 (0.9)	262 (1.9)
Virginia	31 (1.3)	264 (1.5)	52 (1.3)	262 (1.7)	18 (1.0)	270 (3.0)
West Virginia	24 (1.2)	253 (1.3)	57 (1.2)	255 (1.1)	19 (0.9)	262 (1.8)
Wisconsin	31 (1.4)	272 (1.7)	55 (1.3)	276 (1.4)	14 (0.9)	275 (1.9)
Wyoming	36 (0.9)	271 (0.9)	52 (0.8)	272 (0.8)	13 (0.6)	276 (1.7)
TERRITORIES						
Guam	18 (1.0)	231 (2.7)	64 (1.3)	226 (0.8)	18 (0.6)	245 (1.9)
Virgin Islands	33 (1.2)	212 (1.4)	53 (1.0)	219 (1.0)	13 (1.0)	227 (2.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 14.10 | **Students' Reports on the Frequency with Which They Use Calculators on Mathematics Tests**

GRADE 8 PUBLIC SCHOOLS	Almost Always		Sometimes		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	27 (1.4)	253 (2.4)	43 (1.8)	258 (2.0)	30 (2.0)	274 (1.3)
Northeast	23 (3.3)	256 (5.6)	33 (2.5)	259 (4.8)	45 (5.1)	283 (2.1)
Southeast	31 (2.1)	240 (3.8)	35 (2.8)	247 (3.5)	35 (3.1)	270 (3.1)
Central	29 (4.5)	260 (4.0)	49 (5.7)	266 (4.3)	22 (4.8)	271 (3.4)!
West	25 (1.6)	259 (3.9)	53 (2.5)	259 (3.4)	22 (3.0)	270 (3.3)
STATES						
Alabama	28 (1.2)	240 (1.4)	35 (1.1)	248 (1.8)	37 (1.7)	268 (1.4)
Arizona	23 (1.1)	250 (1.7)	40 (1.2)	253 (1.8)	37 (1.3)	273 (1.1)
Arkansas	25 (1.4)	244 (1.6)	43 (1.5)	252 (1.1)	33 (1.4)	270 (1.0)
California	23 (1.5)	253 (2.9)	47 (1.6)	252 (1.8)	30 (1.7)	266 (1.4)
Colorado	24 (1.3)	263 (2.1)	47 (1.5)	263 (1.0)	29 (1.5)	277 (1.3)
Connecticut	20 (1.0)	259 (2.1)	47 (1.4)	267 (1.5)	33 (1.5)	281 (1.6)
Delaware	25 (0.8)	249 (1.5)	37 (1.0)	255 (1.3)	38 (1.1)	275 (1.1)
District of Columbia	32 (1.0)	225 (1.1)	43 (1.1)	225 (1.1)	26 (1.0)	248 (1.5)
Florida	28 (1.0)	243 (1.6)	38 (1.2)	249 (1.7)	34 (1.5)	272 (1.3)
Georgia	30 (1.4)	250 (2.0)	42 (1.2)	256 (1.4)	28 (1.3)	272 (1.7)
Hawaii	20 (0.8)	242 (1.4)	42 (0.9)	238 (1.0)	38 (1.0)	270 (0.9)
Idaho	19 (0.9)	269 (1.5)	43 (1.1)	265 (1.0)	38 (1.2)	280 (1.1)
Illinois	24 (1.4)	254 (2.6)	48 (1.6)	258 (2.2)	29 (1.7)	271 (1.7)
Indiana	21 (1.1)	255 (2.1)	35 (1.3)	260 (1.5)	44 (1.5)	279 (1.2)
Iowa	20 (1.4)	272 (2.0)	49 (1.8)	275 (1.3)	31 (1.8)	287 (1.4)
Kentucky	20 (1.0)	246 (1.8)	42 (1.5)	250 (1.7)	38 (1.4)	270 (1.1)
Louisiana	31 (1.3)	235 (1.4)	34 (1.4)	243 (1.3)	36 (1.8)	259 (1.8)
Maryland	22 (1.0)	247 (2.0)	42 (1.2)	255 (1.7)	36 (1.6)	276 (1.5)
Michigan	26 (1.3)	261 (1.9)	42 (1.5)	259 (1.4)	32 (1.7)	274 (1.5)
Minnesota	21 (1.5)	272 (2.1)	48 (1.4)	271 (1.0)	31 (1.6)	286 (1.2)
Montana	21 (1.4)	276 (1.3)	49 (1.4)	279 (1.2)	30 (1.7)	287 (1.3)
Nebraska	22 (1.1)	269 (1.6)	44 (1.5)	273 (1.3)	34 (1.5)	285 (1.2)
New Hampshire	17 (1.1)	266 (1.9)	36 (1.5)	268 (1.2)	47 (1.3)	281 (1.3)
New Jersey	19 (1.1)	253 (1.9)	33 (1.2)	262 (1.5)	48 (1.6)	281 (1.3)
New Mexico	19 (0.8)	245 (1.5)	43 (1.0)	249 (1.0)	38 (1.0)	270 (1.3)
New York	21 (1.3)	242 (2.0)	35 (1.4)	251 (1.9)	44 (1.4)	278 (1.3)
North Carolina	24 (1.0)	238 (1.4)	38 (1.4)	243 (1.5)	38 (1.4)	264 (1.4)
North Dakota	23 (1.2)	277 (1.9)	43 (1.7)	278 (1.7)	34 (1.7)	289 (1.2)
Ohio	25 (1.3)	253 (1.8)	39 (1.2)	260 (1.6)	36 (1.5)	275 (1.1)
Oklahoma	18 (1.0)	252 (2.2)	40 (1.6)	257 (1.7)	42 (1.5)	274 (1.3)
Oregon	22 (1.4)	277 (2.1)	51 (1.2)	266 (1.1)	27 (1.6)	276 (1.6)
Pennsylvania	18 (1.0)	250 (2.5)	39 (1.4)	260 (2.0)	43 (1.6)	279 (1.6)
Rhode Island	24 (0.7)	248 (1.3)	33 (0.7)	249 (1.0)	43 (0.9)	275 (1.0)
Texas	27 (1.5)	252 (2.5)	44 (1.6)	253 (1.7)	29 (1.6)	271 (1.3)
Virginia	26 (1.2)	251 (1.7)	37 (1.4)	263 (2.5)	37 (1.5)	275 (1.8)
West Virginia	22 (1.1)	250 (1.9)	42 (1.3)	249 (1.1)	36 (1.4)	267 (1.2)
Wisconsin	24 (1.4)	257 (2.4)	48 (1.6)	273 (1.3)	29 (2.2)	284 (1.6)
Wyoming	26 (0.9)	270 (1.2)	47 (1.0)	268 (0.9)	27 (0.9)	281 (1.0)
TERRITORIES						
Guam	18 (2.9)	221 (2.1)	50 (1.4)	221 (1.2)	33 (1.1)	253 (1.2)
Virgin Islands	36 (1.5)	212 (1.2)	38 (1.5)	213 (1.1)	27 (1.1)	232 (1.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

364

TABLE 14.11 | Students' Understanding of When to Use a Calculator

GRADE 8 PUBLIC SCHOOLS	High Group		Other Group	
	Percent	Average Proficiency	Percent	Average Proficiency
NATION	42 (1.3)	272 (1.6)	58 (1.3)	255 (1.5)
Northeast	44 (2.5)	279 (3.8)	56 (2.5)	263 (2.9)
Southeast	42 (2.4)	264 (2.9)	58 (2.4)	247 (2.6)
Central	46 (1.8)	272 (3.4)	54 (1.8)	260 (2.7)
West	38 (2.6)	273 (2.7)	62 (2.6)	253 (2.8)
STATES				
Alabama	**46 (1.2)**	**258 (1.4)**	**54 (1.2)**	**247 (1.6)**
Arizona	**44 (1.2)**	**266 (1.4)**	**56 (1.2)**	**253 (1.4)**
Arkansas	**45 (1.1)**	**262 (1.2)**	**55 (1.1)**	**250 (1.2)**
California	**43 (1.1)**	**265 (1.7)**	**57 (1.1)**	**248 (1.3)**
Colorado	49 (1.1)	274 (1.2)	51 (1.1)	261 (1.3)
Connecticut	51 (0.9)	277 (1.4)	49 (0.9)	263 (1.1)
Delaware	47 (1.5)	270 (1.4)	53 (1.5)	253 (1.5)
District of Columbia	39 (1.4)	240 (2.1)	61 (1.4)	225 (0.9)
Florida	43 (1.2)	263 (1.5)	57 (1.2)	249 (1.5)
Georgia	**46 (1.1)**	**265 (1.4)**	**54 (1.1)**	**252 (1.6)**
Hawaii	**40 (1.2)**	**263 (1.2)**	**60 (1.2)**	**242 (1.1)**
Idaho	**48 (1.3)**	**276 (0.9)**	**52 (1.3)**	**268 (1.3)**
Illinois	**47 (1.5)**	**268 (1.8)**	**53 (1.5)**	**252 (2.1)**
Indiana	**49 (1.1)**	**273 (1.4)**	**51 (1.1)**	**260 (1.2)**
Iowa	54 (1.3)	284 (1.4)	46 (1.3)	272 (1.3)
Kentucky	45 (1.1)	262 (1.5)	55 (1.1)	252 (1.2)
Louisiana	43 (1.2)	253 (1.6)	57 (1.2)	241 (1.3)
Maryland	46 (1.2)	272 (1.6)	54 (1.2)	252 (1.7)
Michigan	47 (1.4)	272 (1.4)	53 (1.4)	258 (1.3)
Minnesota	**50 (1.0)**	**282 (1.0)**	**50 (1.0)**	**269 (1.2)**
Montana	**53 (2.1)**	**286 (1.2)**	**47 (2.1)**	**275 (1.5)**
Nebraska	**50 (1.2)**	**281 (1.1)**	**50 (1.2)**	**271 (1.6)**
New Hampshire	**48 (1.5)**	**279 (1.3)**	**52 (1.5)**	**265 (1.2)**
New Jersey	**49 (1.2)**	**276 (1.2)**	**51 (1.2)**	**263 (1.4)**
New Mexico	45 (1.3)	263 (1.2)	55 (1.3)	250 (1.0)
New York	46 (1.1)	269 (1.4)	54 (1.1)	252 (1.8)
North Carolina	44 (0.9)	260 (1.4)	56 (0.9)	243 (1.2)
North Dakota	56 (1.5)	286 (1.6)	44 (1.5)	275 (1.8)
Ohio	47 (1.1)	271 (1.5)	53 (1.1)	258 (0.9)
Oklahoma	**46 (1.3)**	**266 (1.5)**	**54 (1.3)**	**258 (1.6)**
Oregon	**47 (1.2)**	**279 (1.2)**	**53 (1.2)**	**264 (1.4)**
Pennsylvania	**47 (1.2)**	**274 (1.9)**	**53 (1.2)**	**260 (1.7)**
Rhode Island	**46 (1.1)**	**268 (0.9)**	**54 (1.1)**	**252 (0.9)**
Texas	**47 (1.2)**	**265 (1.4)**	**53 (1.2)**	**251 (1.4)**
Virginia	48 (1.0)	271 (2.0)	52 (1.0)	257 (1.5)
West Virginia	44 (1.1)	263 (1.3)	56 (1.1)	249 (1.0)
Wisconsin	53 (0.9)	279 (1.6)	47 (0.9)	269 (1.3)
Wyoming	51 (1.1)	277 (0.8)	49 (1.1)	266 (1.0)
TERRITORIES				
Guam	**36 (1.6)**	**242 (1.5)**	**64 (1.6)**	**226 (1.1)**
Virgin Islands	**33 (1.5)**	**223 (1.2)**	**67 (1.5)**	**215 (1.0)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Students in the high group used the calculator for the calculator-active items and did not use it for the calculator-inactive items at least 85 percent of the time, and indicated that they used the calculator for at least half of the calculator-active items they were presented.

TABLE 14.12 | **Students' Understanding of When to Use a Calculator Organized by Percentage of Students in the High Group**

GRADE 8 PUBLIC SCHOOLS	High Group		Other Group	
	Percent	Average Proficiency	Percent	Average Proficiency
STATES/TERRITORIES				
North Dakota	56 (1.5)	286 (1.6)	44 (1.5)	275 (1.8)
Iowa	54 (1.3)	284 (1.4)	46 (1.3)	272 (1.3)
Montana	53 (2.1)	286 (1.2)	47 (2.1)	275 (1.5)
Wisconsin	53 (0.9)	279 (1.6)	47 (0.9)	269 (1.3)
Connecticut	51 (0.9)	277 (1.4)	49 (0.9)	[illegible] (1.1)
Wyoming	51 (1.1)	277 (0.8)	49 (1.1)	[illegible] (1.0)
Nebraska	50 (1.2)	281 (1.1)	50 (1.2)	271 (1.6)
Minnesota	50 (1.0)	282 (1.0)	50 (1.0)	[illegible] (1.2)
New Jersey	49 (1.2)	276 (1.2)	51 (1.2)	[illegible] (1.4)
Colorado	49 (1.1)	274 (1.2)	51 (1.1)	261 (1.3)
Indiana	49 (1.1)	273 (1.4)	51 (1.1)	260 (1.2)
New Hampshire	48 (1.5)	279 (1.3)	52 (1.5)	266 (1.2)
Virginia	48 (1.0)	271 (2.0)	52 (1.0)	257 (1.5)
Idaho	48 (1.3)	276 (0.9)	52 (1.3)	266 (1.3)
Texas	47 (1.2)	265 (1.4)	53 (1.2)	251 (1.4)
Delaware	47 (1.5)	270 (1.4)	53 (1.5)	253 (1.5)
Illinois	47 (1.5)	268 (1.6)	53 (1.5)	262 (2.1)
Ohio	47 (1.1)	271 (1.5)	53 (1.1)	[illegible] (0.9)
Pennsylvania	47 (1.2)	274 (1.9)	53 (1.2)	260 (1.7)
Oregon	47 (1.2)	279 (1.2)	53 (1.2)	264 (1.4)
Michigan	47 (1.4)	272 (1.4)	53 (1.4)	258 (1.3)
Alabama	46 (1.2)	258 (1.4)	54 (1.2)	247 (1.6)
Oklahoma	46 (1.3)	266 (1.5)	54 (1.3)	258 (1.6)
New York	46 (1.1)	269 (1.4)	54 (1.1)	252 (1.8)
Rhode Island	46 (1.1)	268 (0.9)	54 (1.1)	252 (0.9)
Maryland	46 (1.2)	272 (1.6)	54 (1.2)	252 (1.7)
Georgia	46 (1.1)	265 (1.4)	54 (1.1)	252 (1.6)
Kentucky	45 (1.1)	262 (1.5)	55 (1.1)	252 (1.2)
New Mexico	45 (1.3)	258 (1.2)	55 (1.3)	260 (1.0)
Arkansas	45 (1.1)	262 (1.2)	55 (1.1)	250 (1.2)
Arizona	44 (1.2)	266 (1.4)	56 (1.2)	253 (1.4)
North Carolina	44 (0.9)	260 (1.4)	56 (0.9)	243 (1.2)
West Virginia	44 (1.1)	263 (1.3)	56 (1.1)	249 (1.0)
California	43 (1.1)	265 (1.7)	57 (1.1)	248 (1.3)
Louisiana	43 (1.2)	253 (1.6)	57 (1.2)	241 (1.3)
Florida	43 (1.2)	263 (1.5)	57 (1.2)	249 (1.5)
Hawaii	40 (1.2)	263 (1.2)	60 (1.2)	242 (1.1)
District of Columbia	39 (1.4)	240 (2.1)	61 (1.4)	225 (0.9)
Guam	36 (1.6)	242 (1.5)	64 (1.6)	225 (1.1)
Virgin Islands	33 (1.5)	223 (1.2)	67 (1.5)	215 (1.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Students in the high group used the calculator for the calculator-active items and did not use it for the calculator-inactive items at least 85 percent of the time, and indicated that they used the calculator for at least half of the calculator-active items they were presented.

386

TABLE 14.13 | Schools' Reports on the Availability of Computers for Student Use

GRADE 8 PUBLIC SCHOOLS	Yes, Computers Available All the Time in Mathematics Classrooms	Yes, Computers Grouped in Laboratory Available to Mathematics Classrooms	Yes, Computers Available to Bring to Classroom When Needed
	Percent of Students	Percent of Students	Percent of Students
NATION	14 (4.5)	57 (6.0)	62 (5.0)
Northeast	6 (5.6)	74 (6.1)	72(11.9)
Southeast	9 (6.7)	71(10.2)	55 (8.6)
Central	18(12.1)	44(17.5)	65(14.8)
West	21 (9.8)	41(10.9)	57 (8.3)
STATES			
Alabama	11 (3.0)	69 (5.1)	47 (5.9)
Arizona	16 (2.5)	69 (3.2)	34 (3.9)
Arkansas	14 (3.4)	54 (4.7)	34 (5.0)
California	14 (4.0)	69 (4.9)	55 (5.8)
Colorado	14 (3.2)	80 (3.5)	66 (3.8)
Connecticut	10 (2.7)	79 (4.0)	54 (3.8)
Delaware	0 (0.0)	60 (0.2)	30 (0.1)
District of Columbia	7 (0.1)	91 (0.1)	28 (0.4)
Florida	22 (4.6)	58 (5.2)	62 (4.9)
Georgia	22 (3.9)	50 (5.4)	62 (4.7)
Hawaii	10 (0.3)	93 (0.1)	27 (0.3)
Idaho	8 (1.1)	62 (1.3)	27 (1.8)
Illinois	18 (4.5)	66 (4.9)	58 (5.8)
Indiana	20 (4.1)	62 (5.0)	58 (5.2)
Iowa	19 (4.3)	80 (4.0)	6[illegible] (4.6)
Kentucky	11 (3.1)	51 (5.1)	37 (4.8)
Louisiana	8 (3.0)	39 (5.2)	34 (5.1)
Maryland	16 (3.3)	89 (3.1)	59 (4.8)
Michigan	15 (4.0)	63 (5.4)	56 (4.8)
Minnesota	18 (3.6)	69 (3.6)	58 (5.1)
Montana	27 (2.7)	73 (2.7)	69 (2.0)
Nebraska	22 (2.8)	81 (2.5)	76 (2.7)
New Hampshire	36 (1.1)	66 (1.1)	70 (0.7)
New Jersey	10 (3.1)	71 (4.5)	61 (4.7)
New Mexico	15 (1.0)	77 (1.2)	53 (1.1)
New York	7 (3.0)	93 (2.6)	45 (5.5)
North Carolina	15 (3.8)	63 (5.3)	52 (4.7)
North Dakota	19 (3.3)	68 (3.1)	65 (3.3)
Ohio	18 (4.0)	67 (5.3)	62 (4.7)
Oklahoma	18 (3.8)	54 (5.0)	37 (5.2)
Oregon	11 (3.1)	75 (4.5)	59 (5.0)
Pennsylvania	13 (3.8)	61 (4.8)	58 (5.5)
Rhode Island	9 (0.2)	78 (0.4)	51 (1.0)
Texas	12 (3.4)	60 (5.4)	35 (4.9)
Virginia	16 (3.8)	83 (3.5)	70 (4.6)
West Virginia	20 (3.6)	64 (3.8)	31 (4.5)
Wisconsin	26 (4.8)	78 (4.6)	57 (5.2)
Wyoming	24 (1.0)	85 (1.0)	54 (0.8)
TERRITORIES			
Guam	0 (0.0)	39 (0.2)	15 (0.1)
Virgin Islands	0 (0.0)	79 (0.2)	0 (0.0)

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 14.14 | Teachers' Reports on the Availability of Computers for Student Use

GRADE 8 PUBLIC SCHOOLS	Available in Classroom		Difficult to Access		Not Available	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	22 (4.0)	261 (3.8)	50 (4.7)	261 (2.2)	28 (4.2)	266 (2.6)
Northeast	12 (9.1)	*** (***)	67(11.3)	269 (4.3)!	21 (8.3)	272 (7.5)!
Southeast	30 (8.4)	252 (6.0)!	51(10.4)	257 (4.6)!	19 (6.7)	260 (5.4)!
Central	28 (9.0)	263 (6.1)!	54 (7.2)	263 (4.8)	18 (6.4)	258 (7.6)!
West	16 (7.2)	271 (7.6)!	39 (8.7)	255 (3.5)!	45(10.0)	270 (2.9)!
STATES						
Alabama	**13 (3.1)**	**256 (2.7)!**	**59 (4.3)**	**253 (1.8)**	**28 (3.7)**	**252 (2.3)**
Arizona	**22 (2.7)**	**259 (3.0)**	**44 (3.2)**	**261 (1.6)**	**34 (3.2)**	**259 (2.5)**
Arkansas	**16 (3.5)**	**254 (3.3)!**	**36 (2.7)**	**257 (1.9)**	**48 (3.9)**	**257 (1.4)**
California	**28 (3.0)**	**253 (2.8)**	**45 (3.9)**	**258 (2.0)**	**27 (3.9)**	**256 (3.6)**
Colorado	16 (2.7)	269 (2.8)	69 (3.3)	268 (1.3)	15 (2.1)	257 (2.3)
Connecticut	27 (3.2)	271 (2.3)	56 (3.6)	273 (1.5)	17 (2.4)	261 (3.1)
Delaware	13 (0.9)	254 (2.8)	53 (1.1)	264 (1.1)	35 (0.9)	258 (1.2)
District of Columbia	18 (1.1)	226 (1.2)	72 (1.1)	234 (0.9)	10 (0.6)	228 (2.2)
Florida	19 (2.4)	257 (3.6)	41 (3.6)	258 (1.7)	40 (3.6)	255 (1.7)
Georgia	**28 (3.7)**	**256 (2.4)**	**46 (3.8)**	**258 (2.0)**	**26 (3.5)**	**257 (3.1)**
Hawaii	**10 (0.6)**	**254 (3.3)**	**64 (1.1)**	**252 (0.9)**	**27 (0.9)**	**250 (1.3)**
Idaho	**11 (1.1)**	**262 (2.4)**	**48 (2.0)**	**273 (1.0)**	**41 (2.1)**	**273 (1.2)**
Illinois	**23 (4.3)**	**262 (3.6)**	**52 (5.3)**	**266 (2.1)**	**24 (4.6)**	**253 (4.9)**
Indiana	**14 (2.4)**	**267 (2.8)**	**66 (3.8)**	**267 (1.6)**	**19 (3.5)**	**260 (2.5)**
Iowa	23 (4.4)	274 (2.1)!	68 (4.3)	278 (1.2)	9 (2.7)	284 (4.9)!
Kentucky	15 (3.2)	251 (3.1)	45 (3.6)	258 (1.3)	40 (4.8)	256 (2.2)
Louisiana	11 (2.6)	248 (4.4)!	32 (4.3)	248 (2.0)	57 (4.2)	244 (1.9)
Maryland	16 (2.5)	265 (3.1)	68 (3.0)	264 (2.1)	16 (1.9)	248 (3.9)
Michigan	20 (2.8)	268 (2.1)	47 (3.6)	267 (2.5)	33 (3.6)	258 (2.0)
Minnesota	**23 (3.0)**	**275 (2.2)**	**71 (3.2)**	**277 (1.0)**	**7 (1.9)**	**275 (3.4)!**
Montana	**26 (3.1)**	**280 (1.3)**	**59 (2.9)**	**281 (1.2)**	**15 (1.8)**	**281 (1.7)**
Nebraska	**17 (2.2)**	**273 (3.1)**	**61 (3.3)**	**278 (1.3)**	**23 (3.2)**	**280 (1.4)**
New Hampshire	**24 (1.3)**	**276 (1.6)**	**60 (1.3)**	**273 (1.6)**	**16 (0.9)**	**268 (1.8)**
New Jersey	**19 (3.0)**	**269 (4.0)**	**55 (4.0)**	**271 (2.3)**	**26 (3.7)**	**266 (2.5)**
New Mexico	12 (0.8)	251 (2.0)	66 (1.1)	258 (0.9)	22 (0.9)	256 (1.9)
New York	10 (2.0)	267 (4.5)	66 (3.9)	262 (1.7)	24 (3.3)	253 (4.0)
North Carolina	21 (3.1)	255 (2.5)	58 (3.6)	248 (1.5)	20 (3.1)	252 (2.9)
North Dakota	20 (3.0)	280 (4.6)	61 (3.3)	283 (1.1)	19 (2.6)	279 (2.3)
Ohio	20 (3.0)	259 (2.6)	61 (4.1)	268 (1.6)	18 (3.1)	264 (3.1)
Oklahoma	**13 (2.7)**	**260 (3.5)!**	**47 (4.1)**	**265 (2.1)**	**39 (4.3)**	**262 (1.8)**
Oregon	**23 (2.7)**	**269 (2.2)**	**55 (3.2)**	**274 (1.7)**	**23 (2.8)**	**269 (2.0)**
Pennsylvania	**15 (2.8)**	**266 (3.2)**	**60 (3.9)**	**269 (1.9)**	**24 (3.1)**	**261 (4.2)**
Rhode Island	**16 (1.0)**	**262 (2.1)**	**66 (0.8)**	**261 (0.8)**	**18 (0.8)**	**255 (1.3)**
Texas	**13 (2.5)**	**250 (3.7)**	**43 (4.1)**	**258 (2.2)**	**45 (4.3)**	**254 (2.1)**
Virginia	19 (2.8)	268 (3.1)	65 (3.4)	264 (1.9)	16 (2.5)	252 (3.7)
West Virginia	26 (3.6)	254 (1.7)	44 (4.5)	258 (1.5)	31 (3.2)	256 (1.9)
Wisconsin	21 (3.9)	272 (3.0)	68 (4.1)	277 (1.7)	11 (2.9)	273 (3.6)!
Wyoming	25 (1.7)	270 (1.2)	64 (1.7)	273 (0.7)	11 (0.8)	280 (3.0)
TERRITORIES						
Guam	**13 (0.6)**	**226 (2.0)**	**24 (0.8)**	**234 (1.5)**	**63 (0.7)**	**230 (0.9)**
Virgin Islands	**1 (0.0)**	***** (***)**	**41 (0.7)**	**225 (1.0)**	**58 (0.7)**	**214 (0.8)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

368

TABLE 14.15 | **Students' Reports on the Frequency of Computer Use in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	15 (1.2)	248 (2.5)	14 (1.3)	268 (2.8)	70 (1.6)	264 (1.4)
Northeast	16 (3.1)	256 (5.5)	14 (2.0)	272 (3.9)	68 (3.0)	272 (4.1)
Southeast	15 (2.6)	238 (5.5)	18 (2.9)	265 (4.9)	67 (4.0)	254 (2.6)
Central	14 (2.7)	251 (5.0)!	16 (3.5)	273 (6.9)!	70 (3.4)	266 (2.4)
West	15 (1.8)	247 (5.0)	11 (2.3)	266 (5.6)!	74 (2.7)	264 (2.3)
STATES						
Alabama	14 (1.9)	245 (2.1)	14 (1.6)	260 (3.2)	72 (3.0)	253 (1.3)
Arizona	15 (1.5)	250 (2.3)	10 (0.8)	261 (2.6)	74 (1.7)	262 (1.1)
Arkansas	18 (1.8)	249 (2.3)	10 (0.9)	256 (2.4)	72 (2.2)	258 (1.0)
California	17 ([illegible])	244 (2.5)	12 (1.1)	261 (2.5)	71 (2.6)	259 (1.4)
Colorado	13 ([illegible])	262 (3.1)	15 (0.9)	273 (1.9)	72 (1.7)	267 (1.1)
Connecticut	14 ([illegible])	255 (2.8)	13 (0.9)	275 (2.5)	73 (1.5)	272 (1.1)
Delaware	17 (0.8)	250 (1.7)	11 (0.8)	267 (2.1)	72 (1.1)	262 (0.7)
District of Columbia	20 (1.0)	226 (1.5)	14 (0.7)	238 (2.4)	66 (1.2)	231 (0.8)
Florida	16 (1.4)	242 (2.5)	11 (1.1)	258 (2.5)	73 (2.1)	258 (1.3)
Georgia	14 (1.1)	244 (2.8)	13 (1.2)	262 (2.4)	73 (1.7)	261 (1.4)
Hawaii	12 (0.8)	236 (2.1)	11 (0.7)	248 (2.5)	77 (1.0)	254 (0.8)
Idaho	11 (0.7)	265 (1.8)	10 (0.7)	272 (1.9)	79 (0.9)	275 (0.7)
Illinois	21 (1.9)	253 (3.3)	12 (0.9)	267 (2.8)	67 (2.1)	262 (1.7)
Indiana	11 (0.8)	258 (2.4)	15 (1.5)	265 (1.9)	75 (1.9)	269 (1.1)
Iowa	15 (1.3)	273 (2.3)	16 (1.4)	281 (1.9)	70 (2.0)	279 (1.1)
Kentucky	13 (1.7)	249 (3.1)	14 (1.5)	261 (2.1)	72 (2.6)	257 (1.2)
Louisiana	9 (0.8)	236 (2.5)	7 (0.8)	254 (3.5)	83 (1.4)	246 (1.2)
Maryland	19 (1.9)	251 (2.1)	21 (1.5)	269 (1.9)	60 (2.4)	261 (1.7)
Michigan	13 (1.6)	256 (2.9)	10 (0.8)	276 (2.2)	77 (1.9)	264 (1.2)
Minnesota	12 (1.2)	273 (2.5)	21 (1.6)	278 (1.3)	67 (2.0)	276 (0.9)
Montana	17 (1.4)	274 (1.5)	22 (1.1)	284 (1.7)	61 (1.9)	281 (1.0)
Nebraska	14 (1.4)	271 (2.2)	14 (1.0)	281 (2.3)	72 (1.7)	276 (0.9)
New Hampshire	16 (0.9)	272 (1.3)	15 (0.9)	275 (1.8)	69 (1.1)	274 (1.1)
New Jersey	17 (1.3)	255 (2.5)	13 (1.4)	274 (2.5)	70 (1.9)	273 (1.2)
New Mexico	14 (0.7)	249 (1.9)	13 (0.8)	258 (1.8)	73 (1.0)	258 (0.9)
New York	17 (1.5)	242 (2.8)	12 (1.2)	265 (2.1)	71 (1.7)	265 (1.3)
North Carolina	16 (1.2)	237 (1.8)	19 (1.5)	252 (1.6)	65 (2.0)	253 (1.2)
North Dakota	15 (1.5)	273 (3.4)	15 (0.9)	285 (1.8)	70 (1.4)	283 (1.1)
Ohio	13 (1.2)	255 (2.4)	13 (1.2)	264 (3.0)	75 (1.9)	266 (1.2)
Oklahoma	11 (1.3)	252 (2.7)	10 (1.3)	265 (2.4)	79 (2.1)	264 (1.2)
Oregon	11 (1.0)	268 (2.3)	13 (1.1)	275 (2.3)	75 (1.6)	272 (1.1)
Pennsylvania	11 (1.1)	267 (2.7)	14 (1.6)	270 (2.0)	75 (2.1)	267 (1.8)
Rhode Island	14 (0.8)	254 (1.3)	15 (0.7)	263 (1.8)	71 (0.8)	261 (0.8)
Texas	16 (1.3)	248 (2.8)	11 (1.4)	266 (2.6)	74 (2.2)	259 (1.4)
Virginia	14 (1.6)	251 (2.8)	20 (1.7)	276 (3.2)	66 (2.4)	264 (1.8)
West Virginia	13 (1.5)	250 (2.3)	11 (1.1)	258 (1.8)	76 (2.2)	257 (1.0)
Wisconsin	17 (2.0)	266 (2.9)	20 (1.8)	279 (2.2)	63 (2.9)	275 (1.3)
Wyoming	17 (0.7)	266 (1.2)	22 (0.9)	274 (1.4)	61 (1.0)	273 (0.7)
TERRITORIES						
Guam	19 (0.9)	236 (1.8)	5 (0.5)	240 (3.9)	76 (1.0)	23[illegible] (0.7)
Virgin Islands	7 ([illegible])	229 (2.0)	5 (0.5)	*** (***)	89 (0.9)	2[illegible]4 (0.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

369

TABLE 14.16 | **Teachers' Reports on the Frequency of Computer Use in Mathematics Class**

GRADE 8 PUBLIC SCHOOLS	At Least Once a Week		Less than Once a Week		Never	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	12 (3.5)	247 (5.0)!	34 (4.5)	264 (2.9)	54 (4.2)	265 (2.1)
Northeast	10 (8.4)	*** (***)	27 (8.4)	263 (8.5)!	63 (6.3)	274 (3.7)
Southeast	20(10.4)	*** (***)	36(10.7)	263 (4.8)!	44 (9.3)	255 (4.3)!
Central	10 (4.8)	*** (***)	44 (8.3)	266 (5.3)	45 (6.6)	265 (4.8)
West	9 (3.7)	*** (***)	27 (7.5)	262 (6.4)!	64 (8.5)	267 (3.6)
STATES						
Alabama	13 (2.7)	249 (3.7)!	35 (4.0)	255 (2.7)	53 (4.6)	253 (1.7)
Arizona	13 (2.2)	247 (4.1)	24 (3.1)	261 (2.2)	63 (3.6)	261 (1.7)
Arkansas	15 (2.8)	249 (3.8)	17 (3.4)	255 (3.0)!	66 (3.8)	250 (1.1)
California	15 (2.8)	244 (3.9)	26 (3.8)	259 (3.2)	59 (4.1)	259 (1.9)
Colorado	10 (2.1)	259 (5.0)!	36 (3.7)	269 (1.8)	54 (4.0)	266 (1.3)
Connecticut	15 (3.1)	265 (4.0)!	33 (4.1)	276 (2.1)	52 (4.0)	269 (1.8)
Delaware	8 (0.3)	247 (1.2)	28 (0.6)	269 (2.0)	64 (0.7)	259 (1.0)
District of Columbia	22 (0.7)	232 (1.3)	36 (0.9)	236 (1.7)	42 (0.9)	229 (1.0)
Florida	14 (2.6)	247 (3.5)	21 (3.1)	264 (3.3)	64 (3.7)	257 (1.6)
Georgia	14 (2.7)	251 (3.4)	29 (3.1)	264 (2.2)	57 (3.8)	258 (1.9)
Hawaii	5 (0.5)	242 (4.5)	27 (0.9)	248 (1.7)	68 (1.0)	253 (0.8)
Idaho	7 (0.8)	263 (3.4)	18 (1.2)	270 (1.5)	76 (1.3)	279 (0.8)
Illinois	19 (3.8)	252 (4.8)	34 (4.2)	267 (2.2)	47 (4.5)	[illegible] (3.4)
Indiana	7 (1.8)	250 (5.0)!	35 (4.3)	266 (2.3)	58 (4.3)	266 (1.7)
Iowa	13 (3.4)	272 (3.5)!	41 (4.4)	279 (1.6)	46 (4.5)	279 (1.8)
Kentucky	12 (2.6)	254 (3.7)	25 (4.1)	257 (2.5)	62 (4.6)	257 (1.5)
Louisiana	7 (2.2)	241 (7.4)!	12 (2.5)	250 (4.0)!	81 (3.5)	245 (1.4)
Maryland	18 (3.1)	254 (3.1)	44 (3.3)	270 (2.5)	38 (3.6)	255 (2.9)
Michigan	7 (2.1)	263 (3.3)!	25 (3.4)	272 (2.8)	68 (3.7)	262 (1.7)
Minnesota	6 (2.4)	269 (2.5)!	53 (3.9)	277 (1.3)	41 (3.9)	276 (1.4)
Montana	16 (2.6)	278 (2.1)	47 (2.9)	281 (1.4)	37 (3.3)	282 (1.0)
Nebraska	9 (2.1)	278 (4.1)!	29 (2.6)	273 (1.6)	62 (2.6)	278 (1.2)
New Hampshire	10 (1.0)	271 (3.1)	36 (1.3)	278 (1.8)	54 (1.4)	270 (1.5)
New Jersey	18 (3.0)	267 (4.8)	30 (3.7)	278 (2.1)	53 (4.3)	272 (2.1)
New Mexico	11 (0.9)	246 (2.6)	35 (1.2)	258 (1.3)	54 (1.1)	258 (1.0)
New York	10 (2.1)	241 (4.4)	31 (3.7)	268 (2.4)	58 (4.0)	260 (2.3)
North Carolina	16 (2.5)	245 (3.2)	39 (3.7)	254 (1.6)	45 (3.6)	250 (2.1)
North Dakota	11 (2.1)	271 (5.2)	37 (3.7)	284 (2.1)	52 (2.8)	282 (1.0)
Ohio	11 (2.1)	253 (4.5)	32 (3.7)	269 (2.4)	57 (3.8)	265 (1.7)
Oklahoma	10 (2.8)	257 (4.5)!	26 (4.2)	267 (2.3)	64 (4.2)	263 (1.6)
Oregon	10 (2.4)	273 (4.6)!	30 (3.1)	272 (2.4)	61 (3.5)	271 (1.7)
Pennsylvania	5 (1.4)	259(11.6)!	40 (4.0)	269 (2.0)	55 (4.3)	267 (2.8)
Rhode Island	8 (0.4)	263 (2.4)	29 (1.6)	259 (1.4)	62 (1.4)	260 (0.7)
Texas	13 (2.0)	242 (7.0)	20 (3.3)	262 (2.8)	70 (3.9)	258 (1.7)
Virginia	8 (1.6)	252 (4.2)	44 (3.7)	269 (2.4)	48 (3.7)	260 (2.4)
West Virginia	12 (2.2)	250 (3.1)	25 (3.3)	256 (1.9)	63 (3.8)	256 (1.4)
Wisconsin	14 (3.1)	270 (3.5)!	37 (3.9)	277 (2.1)	49 (4.7)	275 (2.1)
Wyoming	14 (0.5)	272 (1.4)	43 (0.9)	271 (0.9)	43 (1.0)	274 (1.0)
TERRITORIES						
Guam	13 (0.5)	232 (2.4)	9 (0.3)	236 (1.4)	78 (0.5)	231 (0.8)
Virgin Islands	1 (0.4)	*** (***)	21 (0.9)	212 (1.5)	78 (1.0)	221 (0.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 14.17 | **Teachers' Reports on the Amount of Time that Students Spend Each Week Working with Computers**

GRADE 8 PUBLIC SCHOOLS	None		15 Minutes		30 Minutes or More	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	74 (3.7)	267 (1.7)	19 (4.0)	254 (3.3)!	7 (2.5)	245 (7.3)!
Northeast	71 (8.5)	270 (2.3)	17 (6.7)	*** (***)	13 (6.9)	*** (***)
Southeast	61 (5.8)	261 (4.1)	32 (9.0)	252 (4.9)!	7 (5.6)	*** (***)
Central	79 (5.4)	268 (3.3)	11 (4.9)	*** (***)	10 (4.7)	241 (8.6)!
West	81 (8.7)	268 (2.9)	16 (6.5)	251 (3.5)!	3 (1.9)	*** (***)
STATES						
Alabama	74 (4.1)	253 (1.5)	11 (3.2)	257 (2.4)!	15 (3.4)	252 (2.7)!
Arizona	81 (2.9)	262 (1.4)	8 (1.7)	250 (4.9)!	12 (2.5)	249 (4.8)!
Arkansas	79 (3.1)	258 (1.2)	6 (1.3)	254 (6.0)!	16 (2.9)	248 (3.7)
California	75 (3.5)	259 (1.5)	10 (2.4)	263 (5.3)!	15 (2.8)	245 (3.4)
Colorado	84 (2.2)	267 (1.0)	10 (1.7)	274 (3.7)	7 (1.7)	249 (4.1)!
Connecticut	70 (3.6)	271 (1.4)	14 (2.3)	275 (2.8)	16 (2.9)	266 (4.2)
Delaware	81 (0.9)	262 (0.9)	10 (0.7)	258 (2.5)	10 (0.4)	255 (1.6)
District of Columbia	67 (1.1)	232 (1.1)	8 (0.7)	228 (2.0)	25 (0.8)	233 (1.2)
Florida	78 (2.9)	258 (1.5)	9 (1.7)	257 (3.7)	13 (2.4)	245 (4.6)
Georgia	78 (3.3)	259 (1.5)	14 (2.6)	254 (3.3)	8 (1.9)	249 (3.2)!
Hawaii	90 (0.6)	252 (0.7)	4 (0.4)	255 (4.7)	5 (0.5)	239 (3.5)
Idaho	83 (1.9)	272 (0.8)	10 (1.7)	270 (3.1)	7 (0.7)	268 (2.6)
Illinois	71 (3.6)	262 (2.5)	9 (2.6)	268 (5.9)!	20 (3.6)	257 (5.0)
Indiana	84 (3.2)	269 (1.3)	13 (3.0)	262 (3.3)!	2 (0.9)	*** (***)
Iowa	72 (4.6)	279 (1.2)	22 (4.3)	276 (2.5)!	6 (2.4)	271 (3.4)!
Kentucky	77 (2.9)	256 (1.3)	12 (2.4)	257 (3.2)	10 (2.5)	257 (3.6)!
Louisiana	88 (2.7)	246 (1.4)	5 (2.0)	252(10.4)!	7 (1.8)	238 (3.5)!
Maryland	69 (3.5)	262 (2.0)	10 (1.7)	271 (4.9)	22 (3.4)	254 (2.9)
Michigan	88 (2.6)	264 (1.4)	8 (1.8)	266 (2.9)!	4 (1.9)	263 (5.2)!
Minnesota	81 (2.5)	277 (1.1)	11 (1.5)	273 (2.8)	8 (2.1)	274 (3.2)!
Montana	73 (2.6)	281 (1.0)	13 (1.9)	276 (1.9)	14 (2.1)	283 (3.0)
Nebraska	83 (2.6)	277 (1.1)	10 (1.9)	276 (3.6)	7 (2.0)	270 (3.6)!
New Hampshire	78 (1.3)	272 (1.2)	12 (0.6)	270 (2.7)	10 (1.1)	262 (2.6)
New Jersey	66 (3.6)	273 (1.5)	9 (1.9)	270 (5.7)	25 (3.5)	260 (4.6)
New Mexico	77 (0.8)	258 (0.9)	9 (0.7)	253 (2.3)	13 (0.9)	249 (2.2)
New York	77 (3.1)	262 (1.8)	8 (1.9)	267 (4.7)!	15 (2.5)	249 (4.5)
North Carolina	67 (3.4)	252 (1.5)	15 (2.9)	250 (2.7)	18 (3.2)	243 (3.1)
North Dakota	77 (2.8)	283 (1.3)	17 (2.4)	280 (3.9)	7 (1.4)	270 (4.0)
Ohio	73 (3.7)	267 (1.6)	13 (2.8)	257 (4.3)!	13 (3.2)	267 (6.0)!
Oklahoma	85 (3.0)	264 (1.4)	8 (2.1)	261 (4.2)!	7 (2.3)	253 (4.2)!
Oregon	84 (2.5)	272 (1.3)	10 (2.1)	274 (5.1)!	7 (2.0)	264 (5.3)!
Pennsylvania	85 (2.5)	267 (1.8)	6 (1.5)	266 (6.1)!	8 (1.9)	263(10.2)!
Rhode Island	74 (1.6)	258 (0.7)	14 (0.9)	265 (1.9)	12 (0.9)	265 (1.8)
Texas	79 (2.6)	257 (1.5)	9 (2.3)	254 (5.8)!	12 (2.5)	244 (5.3)!
Virginia	79 (3.3)	264 (2.0)	11 (2.3)	265 (4.7)!	10 (2.2)	255 (3.8)!
West Virginia	78 (3.1)	258 (1.1)	13 (2.5)	253 (3.0)	9 (2.1)	249 (4.5)!
Wisconsin	72 (4.0)	276 (1.6)	16 (3.4)	272 (3.0)!	11 (2.8)	272 (3.8)!
Wyoming	76 (0.8)	273 (0.8)	15 (0.8)	269 (1.3)	9 (0.3)	272 (2.1)
TERRITORIES						
Guam	86 (0.5)	231 (0.8)	3 (0.3)	*** (***)	11 (0.5)	218 (3.1)
Virgin Islands	100 (0.0)	219 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

371

Chapter 15

Instructional Emphasis on Mathematics and on Specific Mathematics Content Areas at Grade 8 in the States

INTRODUCTION

Because students' exposure to mathematics content can set the boundaries for growth in mathematics learning, a series of background questions included in NAEP's 1990 Trial State Assessment program attempted to collect information about the emphasis generally placed on mathematics and on particular mathematics content areas.[103] Public-school administrators were asked several questions related to the priority of mathematics in their schools, and teachers were asked about the amount of instructional time they provided for mathematics. The teachers were also asked about the emphasis they placed on learning for each of the five content areas included in the mathematics assessment and the degree of emphasis placed on various skill areas. This information provides a context for comparing students' current opportunity to learn various aspects of mathematics with the balanced approach across content areas and emphasis on reasoning as well as communication skills suggested by the *NCTM Standards* and other research.[104]

OVERALL SCHOOL SUPPORT AND EMPHASIS ON MATHEMATICS

To obtain some information about overall school support for learning mathematics in each state, public-school administrators were asked if mathematics was receiving special emphasis in their schools, if algebra was offered for high-school placement or credit, and if teachers concentrated their

[103] Curtis McKnight, et al., *The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective, A National Report on the Second International Mathematics Study* (Champaign, IL: International Association for the Evaluation of Educational Achievement, Stipes Publishing Company, 1987).

[104] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics, 1989).

Reshaping School Mathematics: A Philosophy and Framework for Curriculum (Washington, DC: Mathematical Sciences Education Board and National Research Council, National Academy Press, 1990).

efforts by only teaching mathematics or were responsible for teaching other subjects too. The results are presented in TABLE 15.1. In only the District of Columbia, New Jersey, and Guam were at least four-fifths of the eighth graders in public schools where mathematics was identified as a special priority. Yet in about half the participating states, at least four-fifths of the eighth graders were in public schools that offered algebra for high-school placement or credit. In most states, except Illinois, Montana, North Carolina, and North Dakota, at least four-fifths of the eighth graders were in public schools where mathematics was taught by teachers who taught solely mathematics.

ALGEBRA COURSE TAKING

TABLE 15.2 presents the enrollment of students in eighth-grade mathematics, pre-algebra, or algebra courses, and associated proficiency levels. Within each state, higher average mathematics proficiency was associated with successively higher levels of mathematics course taking. However, the pattern did not hold across states. For example, the District of Columbia had the largest percentage of public-school eighth graders taking algebra (32 percent), but its overall average mathematic proficiency was among the lowest of the participating states and territories. North Dakota, on the other hand, had one of the lowest percentages of eighth graders taking algebra (8 percent), but its overall average proficiency was one of the highest.

INSTRUCTIONAL TIME AND HOMEWORK

The amount of mathematics instructional time provided to eighth-grade public-schools students in each state can be gauged through responses to questions about the time spent on instruction in the classroom and the amount of homework done by students. For the latter question, the results are presented for both students' and teachers' reports in TABLES 15.3 through 15.5.

Teachers' reports on the amount of instructional time provided did not appear to vary a great deal from state to state, although a 60- to 90-minute difference per week can amount to substantial variation across a school year. The distributions of time spent across the states are worth noting. For example, in Arizona, Idaho, Michigan, New Mexico, Oklahoma, Texas, Wyoming, and the Virgin Islands, at least one-third of the eighth graders attending public schools were provided two and one-half hours or less of mathematics instruction each week. In Alabama, Georgia, and Louisiana, at least half the eighth-grade students attending public schools were provided four hours or more of instruction each week. In contrast, in Iowa, New York, and Ohio, only about 10 percent of the eighth graders were provided this much instruction.

Because NAEP data are not causal in nature, it is difficult to estimate the impact of differences in instructional time on achievement. States may elect to provide more instructional time for poorer students, in a special effort to help those students having the most difficulty. Also, NAEP course-taking results as well as research on time-on-task and opportunity to learn indicate that time spent on mathematics is related to learning outcomes. The apparent lack of a strong relationship between instructional time and mathematics performance suggested by the data should not be interpreted as evidence for reducing mathematics instructional time.

The homework results suggest a similar phenomenon. In some states, those students who reported doing more homework had lower proficiency levels. However, it is possible that less proficient students were given more supplementary work, or that they took a longer period of time to complete their homework. Eighth graders' reports about the amount of time they spent on homework showed striking consistency across states. Teachers, more so than students reported that they were assigning most students 15 to 30 minutes of mathematics homework each day. These reports also were strikingly consistent across states. In contrast to students' reports, with the exception of the "one hour or more" classification in some states, the students for whom teachers reported assigning more homework had higher performance. North Dakota, where achievement levels did not vary by teachers' reports on amount of homework, was a notable exception to this pattern.

INSTRUCTIONAL EMPHASIS ON NUMBERS AND OPERATIONS

TABLE 15.7 presents teachers' reports on the degree of instructional emphasis they placed on numbers and operations, organized by the percentages of students receiving heavy emphasis. In 15 states, the majority of eighth graders attending public schools were still receiving heavy emphasis in numbers and operations, according to their teachers. This content area covers essentially the same material considered to be the heart of the elementary school curriculum. In only Colorado, Wisconsin, New Hampshire, Minnesota, Maryland, and Oregon were less than 40 percent of the students receiving heavy emphasis in numbers and operations. On average, however, those students receiving the greater emphasis had lower numbers and operations proficiency levels. These results may reflect the placement of higher-performing students into algebra classes and lower-performing students into eighth-grade mathematics classes. They may also reflect a perspective that those eighth graders having the greatest difficulty with numbers and operations need the most instruction in this area. For whatever reasons, however, it appears that many of these eighth graders are being asked to perfect their arithmetic before receiving much instruction in other mathematics content areas.

INSTRUCTIONAL EMPHASIS ON MEASUREMENT

Across the states, fewer eighth graders in public schools were receiving heavy instructional emphasis in the area of measurement than in numbers and operations (see TABLE 15.9). With the exception of Georgia and the Virgin Islands, fewer than one-third of the eighth graders in any state were receiving heavy instructional emphasis in this area. Similar to the pattern found for numbers and operations, the students receiving the greater emphasis in the measurement area had lower proficiency, with the exception of Kentucky, New York, Nebraska, Oklahoma, the Virgin Islands, and Guam.

INSTRUCTIONAL EMPHASIS ON GEOMETRY

Because middle school can be seen as a transition period to the study of geometry, the lack of emphasis in the measurement area may be understandable. However, compared to the emphasis received in numbers and operations, eighth graders were also receiving less emphasis in the area of geometry, although there was considerable difference across states in the emphasis teachers reported placing on geometry. For example, in New York, 40 percent of the eighth graders attending public schools were receiving heavy emphasis in geometry, compared to 20 percent or fewer of the students in 22 of the other participating states (see TABLE 15.11). Further, the relationship between emphasis in geometry instruction and geometry achievement was erratic across states. For example, New York's emphasis on geometry instruction appeared to be yielding dividends, since the students receiving greater emphasis in the subject had higher performance -- or geometry instruction may be part of a more advanced curriculum. Also, for Hawaii, Iowa, Montana, Nebraska, Rhode Island, and Guam, students receiving greater instructional emphasis had higher proficiency. In contrast, in several other states, including Connecticut, the District of Columbia, Maryland, New Jersey, and Pennsylvania, the lower-performing students were receiving heavy or moderate emphasis in geometry, while the higher-performing ones were receiving little or no emphasis, perhaps because they were concentrating on algebra. For most states, however, there appeared to be little relationship between emphasis on geometry instruction and proficiency.

INSTRUCTIONAL EMPHASIS ON DATA ANALYSIS, STATISTICS, AND PROBABILITY

Despite recommendations to the contrary in the *NCTM Standards*, few states were giving much attention to eighth graders' learning in data analysis, statistics, and probability. One-fifth of the students or more were given heavy emphasis in this area in the District of Columbia, Georgia, New York, and Texas, but fewer received heavy emphasis in this area in other states. In 17 states, 10 percent or fewer of the students were given heavy instructional emphasis in data analysis, statistics, and probability.

When the degree of emphasis placed on instruction in this area was associated with proficiency, similar to the patterns for geometry, the results indicated different patterns for different states. In about 10 states, students receiving a greater instructional emphasis in data analysis, statistics, and probability were more proficient in that content area, which may indicate some balance with the emphasis given to algebra and functions in these students' curriculum. In the District of Columbia and New Jersey, the eighth graders receiving little or no emphasis tended to have the higher proficiency. However, in the remaining states there appeared to be no systematic relationships between instructional emphasis in data analysis, statistics, and probability and proficiency in that area.

INSTRUCTIONAL EMPHASIS ON ALGEBRA AND FUNCTIONS

Teachers reported that almost as many public-school eighth graders received heavy instructional emphasis in algebra and functions as in numbers and operations. In 16 states, the majority of the eighth graders received heavy instructional emphasis in this area. For each state and territory, at least one-third of the students received heavy instructional emphasis in algebra and functions except Hawaii. However, across the states, considerable percentages of eighth graders -- from 8 to 36 percent -- were receiving little or no emphasis in algebra and functions.

Unlike the results for the other four content areas, the results for average proficiency in algebra and functions in relation to the degree of instructional emphasis reflect the data for eighth-graders taking pre-algebra and algebra courses. Just as eighth graders taking algebra courses had higher proficiency than did those in eighth-grade mathematics, students receiving more instructional emphasis in algebra had higher algebra and functions proficiency. Without exception, across the individual states, students receiving heavy instructional emphasis in algebra and functions had higher average proficiency than did those receiving less instructional emphasis.

INSTRUCTIONAL EMPHASIS IN SKILL AREAS

In concert with developing strong proficiency in mathematics content areas, students should also develop important general mathematics skills. The *NCTM Standards* suggest that by the eighth grade, students should be able to use mathematics as a way to solve practical problems, to be able to communicate mathematical ideas to others, and to be able to reason properly.

Paralleling areas in the *NCTM Standards*, NAEP asked teachers how much instructional emphasis they placed on four skill areas -- learning mathematics facts and concepts, learning procedures needed to solve problems, developing reasoning ability to solve unique problems, and learning how to communicate ideas in mathematics effectively. The results are presented in TABLE 15.16.

In all states except the District of Columbia, teachers reported more emphasis on the first two areas than on the second two areas, although the pattern was less clear-cut in California, Colorado, Maryland, and Oregon. Between the first two skill areas, teachers in most states reported emphasizing procedures somewhat more than facts and concepts, particularly in Alabama, Colorado, Iowa, Minnesota, North Dakota, Pennsylvania, Virginia, Wisconsin, Wyoming, and the Virgin Islands, where the difference was 10 percent or greater.

Teachers reported placing comparatively low emphasis on reasoning skills, in contrast to the strong emphasis that recommendations for school mathematics reform place on this area (see Chapter Eight). In only California, Colorado, the District of Columbia, Georgia, and Maryland were even half the students receiving heavy instructional emphasis in how to apply reasoning skills to solve new problems. Across the states, less emphasis tended to be placed on the ability to communicate mathematics ideas effectively than on developing the reasoning ability necessary to apply mathematics to unfamiliar and unique situations.

SUMMARY

Across the states participating in NAEP's 1990 Trial State Assessment Program, teachers reported the greatest instructional emphasis in two mathematics content areas -- numbers and operations and algebra and functions. The results suggest that relatively few eighth graders attending public schools were provided the opportunity for in-depth learning in measurement or geometry, and very few were given the opportunity for in-depth learning in data analysis, statistics, and probability.

It appeared that the more mathematically proficient eighth graders were receiving considerable instructional emphasis in the area of algebra and functions, whereas the less-proficient eighth graders appeared to be given little or no opportunity to learn this subject and were receiving heavy instructional emphasis in numbers and operations. Nevertheless, there were some variations from state to state. For example, 40 percent of the eighth graders in New York were receiving heavy instructional emphasis in geometry.

For eighth graders attending public schools, regardless of the content area emphasis -- numbers and operations as opposed to algebra and functions -- teachers reported emphasizing learning facts and concepts as well as procedures more than learning reasoning and communication skills. This finding was pervasive, although teachers in some states reported a somewhat more balanced approach, particularly in the District of Columbia, and to some extent in California, Colorado, Maryland, and Oregon.

TABLE 15.1 | Schools' Reports on Emphasis on Mathematics

GRADE 8 PUBLIC SCHOOLS	Yes, Mathematics Identified as Receiving Special Emphasis	Yes, Algebra Course Offered for High School Placement or Credit	Yes, Students Taught by Teachers Who Only Teach Mathematics
	Percent of Students	Percent of Students	Percent of Students
NATION	63 (5.9)	78 (4.6)	91 (3.3)
Northeast	45(16.5)	90 (7.3)	100 (0.0)
Southeast	70(10.6)	60(10.9)	77(10.6)
Central	79(13.8)	69(15.4)	87 (7.8)
West	61 (8.6)	92 (4.7)	98 (1.6)
STATES			
Alabama	60 (4.9)	65 (4.4)	90 (3.0)
Arizona	64 (3.9)	87 (3.1)	84 (3.3)
Arkansas	59 (4.2)	50 (4.2)	89 (3.2)
California	69 (4.4)	91 (1.8)	65 (3.6)
Colorado	45 (3.9)	82 (3.3)	84 (3.3)
Connecticut	74 (4.4)	92 (2.5)	95 (2.3)
Delaware	55 (0.3)	98 (0.1)	100 (0.0)
District of Columbia	83 (0.3)	86 (0.3)	96 (0.1)
Florida	74 (4.9)	84 (3.8)	95 (2.3)
Georgia	77 (4.3)	81 (4.3)	81 (4.2)
Hawaii	72 (0.3)	78 (0.2)	90 (0.2)
Idaho	67 (1.3)	69 (1.1)	96 (1.8)
Illinois	75 (4.3)	75 (3.0)	78 (4.0)
Indiana	44 (5.4)	65 (4.0)	93 (2.5)
Iowa	41 (4.7)	54 (4.1)	89 (2.8)
Kentucky	62 (5.0)	60 (4.9)	83 (3.8)
Louisiana	79 (4.6)	72 (4.4)	80 (3.6)
Maryland	78 (4.4)	92 (2.1)	100 (0.0)
Michigan	67 (4.8)	73 (4.3)	87 (3.6)
Minnesota	52 (4.8)	60 (4.1)	[illegible] (3.5)
Montana	50 (3.0)	45 (2.8)	[illegible] (3.0)
Nebraska	40 (2.5)	56 (3.0)	82 (3.0)
New Hampshire	36 (0.7)	62 (1.0)	93 (0.6)
New Jersey	83 (3.9)	79 (3.6)	81 (3.4)
New Mexico	61 (1.2)	60 (1.0)	88 (0.9)
New York	74 (4.9)	86 (3.6)	97 (2.0)
North Carolina	71 (4.6)	85 (3.5)	71 (3.7)
North Dakota	43 (3.2)	48 (2.6)	65 (2.9)
Ohio	66 (4.7)	81 (4.0)	90 (3.0)
Oklahoma	59 (4.8)	64 (4.2)	87 (3.2)
Oregon	48 (5.1)	88 (3.6)	83 (3.8)
Pennsylvania	74 (4.5)	88 (3.8)	94 (2.1)
Rhode Island	47 (1.0)	90 (1.6)	98 (0.1)
Texas	77 (4.7)	65 (3.4)	92 (2.7)
Virginia	74 (4.5)	97 (1.7)	94 (1.6)
West Virginia	72 (4.7)	75 (4.7)	88 (3.1)
Wisconsin	45 (5.4)	63 (4.6)	81 (3.1)
Wyoming	43 (0.8)	72 (0.7)	87 (1.6)
TERRITORIES			
Guam	100 (0.0)	62 (0.2)	65 (0.2)
Virgin Islands	[illegible] (0.3)	86 (0.1)	81 (0.2)

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 15.2 | **Students' Reports on Their Current Mathematics Course**

GRADE 8 PUBLIC SCHOOLS	Eighth-Grade Mathematics		Pre-Algebra		Algebra	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	62 (2.1)	251 (1.4)	19 (1.9)	272 (2.4)	15 (1.2)	296 (2.4)
Northeast	63 (5.8)	259 (2.9)	16 (3.9)	278 (6.7)!	18 (3.3)	297 (3.6)
Southeast	64 (3.7)	241 (3.4)	23 (4.4)	269 (4.6)	11 (2.2)	296 (4.8)!
Central	58 (4.8)	255 (3.1)	22 (4.3)	276 (3.1)!	15 (2.8)	289 (5.4)
West	63 (2.7)	252 (2.4)	15 (2.7)	266 (3.6)	17 (1.8)	299 (4.5)
STATES						
Alabama	66 (2.5)	243 (1.8)	20 (1.9)	268 (2.1)	11 (1.2)	287 (3.0)
Arizona	48 (1.5)	246 (1.3)	29 (1.5)	266 (1.6)	16 (1.3)	289 (2.4)
Arkansas	72 (2.2)	248 (1.0)	16 (1.9)	270 (2.3)	10 (1.1)	289 (2.4)
California	59 (1.9)	242 (1.1)	21 (1.4)	272 (2.2)	16 (1.0)	293 (2.0)
Colorado	46 (2.5)	255 (1.4)	32 (2.1)	270 (1.2)	18 (1.1)	295 (2.0)
Connecticut	50 (1.9)	251 (1.3)	30 (1.8)	280 (1.0)	17 (1.0)	308 (1.1)
Delaware	48 (1.2)	243 (0.7)	25 (1.2)	264 (1.3)	24 (0.9)	295 (1.7)
District of Columbia	57 (1.0)	217 (0.6)	10 (0.6)	241 (1.7)	32 (0.9)	253 (1.4)
Florida	63 (1.6)	242 (1.4)	19 (1.2)	271 (1.8)	14 (1.0)	298 (1.8)
Georgia	57 (2.5)	244 (1.1)	28 (1.9)	271 (1.8)	14 (1.3)	300 (2.4)
Hawaii	61 (1.0)	237 (0.8)	24 (0.9)	273 (1.3)	10 (0.6)	298 (2.2)
Idaho	47 (1.1)	264 (0.7)	32 (1.2)	271 (1.1)	18 (1.1)	301 (1.2)
Illinois	63 (2.4)	251 (1.7)	18 (2.0)	268 (3.7)	16 (1.3)	290 (2.6)
Indiana	66 (2.1)	256 (1.1)	16 (1.6)	262 (2.2)	13 (1.1)	306 (2.4)
Iowa	69 (2.8)	272 (1.1)	19 (2.7)	287 (2.1)	10 (1.0)	311 (2.4)
Kentucky	67 (2.2)	247 (1.1)	18 (1.7)	270 (1.9)	12 (1.2)	289 (2.2)
Louisiana	53 (2.9)	238 (1.5)	34 (2.6)	251 (2.3)	12 (1.1)	265 (4.2)
Maryland	38 (2.0)	237 (1.4)	32 (1.4)	261 (1.6)	27 (1.5)	291 (1.7)
Michigan	59 (2.8)	253 (1.4)	24 (2.1)	272 (1.5)	14 (1.4)	300 (2.1)
Minnesota	54 (3.0)	266 (1.3)	25 (2.4)	281 (1.1)	17 (1.4)	303 (1.6)
Montana	59 (2.4)	276 (1.0)	26 (1.9)	281 (1.1)	12 (1.5)	299 (3.8)
Nebraska	66 (2.5)	271 (1.2)	20 (2.1)	277 (1.4)	11 (1.0)	307 (2.0)
New Hampshire	55 (1.3)	262 (1.0)	28 (1.0)	280 (1.0)	14 (0.9)	308 (1.6)
New Jersey	55 (2.2)	255 (1.2)	24 (2.1)	275 (2.0)	18 (1.1)	306 (1.4)
New Mexico	62 (1.2)	247 (0.7)	23 (1.1)	265 (1.5)	11 (0.6)	288 (1.9)
New York	73 (1.8)	252 (1.4)	8 (1.2)	273 (2.7)	13 (1.1)	291 (2.7)
North Carolina	58 (1.8)	234 (1.1)	22 (1.4)	262 (1.4)	17 (1.3)	290 (1.3)
North Dakota	73 (2.0)	277 (1.4)	17 (1.9)	289 (2.4)	8 (1.0)	307 (4.4)
Ohio	63 (2.2)	254 (1.2)	20 (2.0)	270 (1.9)	16 (1.1)	300 (1.5)
Oklahoma	53 (2.7)	254 (1.5)	30 (2.7)	267 (1.8)	13 (1.1)	290 (2.8)
Oregon	43 (1.5)	254 (1.2)	30 (1.2)	276 (1.4)	20 (1.1)	305 (1.5)
Pennsylvania	49 (2.5)	248 (1.6)	24 (2.2)	275 (1.5)	25 (1.6)	296 (1.4)
Rhode Island	52 (1.1)	243 (0.7)	29 (0.8)	272 (0.9)	18 (0.6)	296 (1.7)
Texas	72 (2.0)	249 (1.4)	14 (1.5)	274 (2.8)	12 (1.0)	296 (1.3)
Virginia	46 (2.0)	244 (1.5)	35 (1.8)	271 (1.5)	16 (1.0)	305 (2.4)
West Virginia	63 (2.0)	244 (1.2)	19 (1.8)	267 (1.3)	16 (1.2)	291 (1.8)
Wisconsin	68 (2.5)	266 (1.4)	17 (1.8)	284 (2.3)	13 (1.3)	307 (1.9)
Wyoming	48 (1.0)	266 (0.9)	31 (0.9)	270 (1.1)	16 (0.8)	303 (1.2)
TERRITORIES						
Guam	77 (1.0)	225 (0.8)	12 (0.7)	255 (2.1)	7 (0.8)	250 (4.1)
Virgin Islands	88 (0.7)	216 (0.6)	3 (0.5)	*** (***)	8 (0.6)	240 (4.3)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. The percentages may not add to 100 percent because a small number of students reported taking other mathematics courses. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

381

TABLE 15.3 | **Teachers' Reports on the Amount of Time Spent on Mathematics Instruction Each Week**

GRADE 8 PUBLIC SCHOOLS	Average Hours Instruction Provided Each Week	Two and One-Half Hours or Less Each Week		More than Two and One-Half Hours, but Less than Four Hours Each Week		Four Hours or More Each Week	
		Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	3.5	19 (2.4)	260 (2.8)	51 (4.7)	265 (1.9)	30 (4.5)	261 (3.0)
Northeast	3.4	10 (4.7)	*** (***)	77 (8.8)	271 (2.7)	14 (5.5)	*** (***)
Southeast	3.8	14 (3.9)	254 (8.9)!	35(10.7)	262 (5.2)!	51(11.1)	253 (3.7)!
Central	3.3	21 (5.2)	260 (6.9)!	54 (9.8)	264 (4.8)!	25 (9.1)	265 (8.4)!
West	3.4	26 (4.5)	263 (3.2)	50 (7.8)	263 (3.1)	25 (5.9)	267 (5.9)!
STATES							
Alabama	3.7	27 (4.2)	255 (2.3)	23 (3.1)	252 (2.0)	50 (4.3)	253 (1.7)
Arizona	3.3	34 (2.8)	259 (1.7)	33 (2.9)	257 (2.6)	33 (3.8)	261 (2.4)
Arkansas	3.4	31 (3.3)	256 (2.0)	28 (3.0)	259 (2.4)	41 (3.1)	255 (1.3)
California	3.5	21 (2.5)	249 (3.5)	41 (3.0)	263 (2.2)	38 (3.6)	257 (2.3)
Colorado	3.3	32 (2.8)	265 (1.9)	45 (3.8)	267 (1.8)	23 (2.9)	269 (2.1)
Connecticut	3.5	11 (2.8)	269 (3.6)!	75 (3.4)	271 (1.3)	13 (2.4)	267 (4.2)
Delaware	3.5	18 (0.9)	249 (2.0)	50 (1.0)	263 (1.3)	32 (1.2)	264 (1.3)
District of Columbia	3.5	25 (0.9)	223 (1.2)	37 (0.9)	235 (1.5)	38 (1.0)	235 (1.2)
Florida	3.5	27 (2.7)	253 (2.8)	34 (3.2)	259 (2.4)	39 (2.9)	258 (1.7)
Georgia	3.8	19 (2.0)	254 (2.8)	24 (3.1)	256 (2.9)	57 (3.4)	260 (1.8)
Hawaii	3.4	22 (0.7)	240 (1.6)	44 (0.8)	253 (1.2)	35 (0.8)	253 (1.3)
Idaho	3.1	43 (1.5)	273 (1.1)	27 (1.4)	274 (1.5)	29 (1.2)	269 (1.5)
Illinois	3.3	24 (4.1)	264 (2.9)	54 (4.7)	260 (2.9)	23 (4.3)	264 (4.3)
Indiana	3.3	28 (3.6)	263 (2.0)	42 (4.0)	267 (1.9)	30 (3.9)	273 (2.7)
Iowa	3.2	28 (4.4)	275 (2.4)	62 (4.7)	278 (1.1)	9 (2.5)	284 (4.3)!
Kentucky	3.6	26 (3.7)	252 (1.7)	30 (3.8)	259 (2.2)	44 (4.5)	257 (2.7)
Louisiana	3.7	18 (3.2)	246 (2.5)	27 (3.5)	246 (2.7)	54 (3.4)	246 (1.9)
Maryland	3.7	16 (2.5)	262 (3.9)	44 (2.8)	264 (2.1)	39 (3.0)	260 (2.7)
Michigan	3.3	35 (3.6)	262 (2.9)	32 (3.5)	267 (2.5)	33 (3.9)	265 (2.3)
Minnesota	3.4	32 (3.3)	272 (1.7)	26 (2.9)	279 (1.8)	42 (4.0)	277 (1.8)
Montana	3.6	21 (3.2)	280 (1.3)	30 (1.9)	282 (1.5)	49 (2.9)	281 (1.3)
Nebraska	3.2	30 (3.3)	275 (1.7)	46 (3.3)	275 (1.1)	23 (3.3)	280 (2.6)
New Hampshire	3.3	25 (1.2)	280 (1.9)	45 (1.3)	274 (1.3)	30 (1.1)	274 (1.4)
New Jersey	3.6	13 (2.8)	280 (2.8)!	69 (3.5)	275 (1.7)	18 (2.8)	249 (4.3)
New Mexico	3.3	36 (1.0)	256 (1.2)	34 (1.4)	259 (1.3)	30 (1.3)	254 (1.8)
New York	3.4	11 (2.1)	261 (4.6)	79 (2.8)	263 (1.5)	10 (2.0)	244 (4.3)
North Carolina	3.8	14 (2.2)	250 (2.3)	38 (3.6)	248 (2.0)	47 (4.0)	253 (2.0)
North Dakota	3.5	21 (2.9)	283 (2.0)	35 (3.4)	281 (2.4)	44 (2.3)	282 (2.0)
Ohio	3.2	28 (3.3)	262 (2.5)	62 (3.7)	266 (1.8)	10 (2.2)	270 (3.4)!
Oklahoma	3.0	46 (4.0)	262 (1.8)	34 (3.5)	262 (1.7)	20 (3.2)	269 (3.2)
Oregon	3.3	26 (3.0)	268 (2.2)	57 (3.5)	274 (1.5)	17 (3.1)	272 (3.4)
Pennsylvania	3.4	21 (3.7)	265 (3.2)	59 (4.5)	268 (1.5)	20 (3.4)	265 (4.8)
Rhode Island	3.6	17 (1.0)	246 (1.7)	40 (1.2)	264 (1.2)	43 (0.8)	262 (1.0)
Texas	3.3	34 (3.8)	257 (2.4)	36 (3.5)	255 (2.4)	30 (3.3)	255 (2.2)
Virginia	3.4	25 (2.6)	259 (3.4)	43 (3.3)	263 (2.0)	32 (3.5)	267 (3.1)
West Virginia	3.4	29 (2.9)	252 (2.1)	41 (3.7)	256 (1.7)	30 (3.3)	260 (1.9)
Wisconsin	3.5	19 (3.3)	276 (2.0)	58 (4.3)	278 (1.6)	24 (4.0)	270 (3.4)
Wyoming	3.2	35 (1.4)	271 (1.2)	44 (1.7)	274 (0.9)	21 (1.0)	272 (1.7)
TERRITORIES							
Guam	3.6	20 (0.4)	237 (1.6)	46 (0.5)	231 (0.9)	34 (0.8)	231 (1.4)
Virgin Islands	3.0	41 (1.0)	214 (1.2)	34 (0.8)	213 (1.0)	25 (0.8)	235 (1.2)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 15.4 | **Students' Reports on the Amount of Time Spent on Mathematics Homework Each Day**

GRADE 8 PUBLIC SCHOOLS	None		15 Minutes		30 Minutes		45 Minutes		An Hour or More	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	9 (0.8)	251 (2.8)	31 (2.0)	264 (1.9)	32 (1.2)	263 (1.9)	16 (1.0)	266 (1.9)	12 (1.1)	258 (3.1)
Northeast	6 (1.2)	*** (***)	37 (3.3)	269 (2.4)	34 (2.6)	271 (6.0)	15 (2.3)	272 (6.5)	8 (1.7)	*** (***)
Southeast	11 (1.9)	237 (5.4)	25 (1.6)	253 (3.3)	33 (2.5)	258 (3.0)	17 (2.2)	261 (2.5)	14 (1.4)	247 (4.6)
Central	7 (1.4)	*** (***)	34 (4.8)	269 (3.8)	32 (2.3)	264 (3.6)	15 (1.2)	265 (4.0)	12 (3.4)	262 (8.2)!
West	12 (1.7)	254 (4.2)	31 (4.5)	263 (3.8)	28 (1.7)	261 (2.9)	15 (1.6)	267 (4.2)	14 (1.7)	261 (4.3)
STATES										
Alabama	9 (1.0)	252 (2.1)	27 (1.1)	256 (1.7)	32 (0.9)	252 (1.5)	16 (0.8)	251 (2.3)	16 (1.0)	250 (2.2)
Arizona	9 (0.9)	257 (2.2)	24 (0.6)	260 (1.8)	32 (0.9)	261 (1.5)	17 (0.9)	26* (1.8)	18 (1.0)	258 (1.9)
Arkansas	9 (0.8)	250 (2.5)	28 (1.1)	259 (1.3)	33 (1.0)	258 (1.2)	16 (0.8)	252 (1.8)	14 (0.8)	253 (1.8)
California	7 (0.8)	247 (2.8)	29 (1.1)	254 (1.5)	35 (1.0)	260 (1.8)	16 (0.7)	258 (2.0)	13 (0.9)	255 (3.0)
Colorado	9 (0.8)	265 (2.8)	28 (1.1)	269 (1.3)	31 (0.9)	268 (1.3)	16 (0.9)	267 (1.7)	16 (1.1)	266 (1.9)
Connecticut	5 (0.7)	257 (2.9)	36 (1.0)	271 (1.4)	38 (1.1)	271 (1.4)	13 (0.8)	272 (2.3)	8 (0.6)	268 (3.6)
Delaware	7 (0.7)	243 (2.8)	37 (1.1)	258 (1.4)	34 (1.1)	267 (1.0)	13 (0.7)	265 (3.2)	9 (0.8)	259 (2.6)
District of Columbia	7 (0.6)	220 (2.2)	25 (0.9)	232 (1.6)	33 (1.0)	235 (1.3)	19 (0.7)	231 (1.5)	16 (0.7)	227 (1.8)
Florida	12 ([illegible])	248 (2.0)	31 (1.0)	255 (1.4)	31 (1.0)	259 (1.8)	15 (0.7)	254 (2.2)	11 (0.7)	257 (2.9)
Georgia	10 (0.8)	255 (2.6)	29 (1.2)	260 (1.5)	31 (1.0)	263 (1.8)	16 (0.7)	257 (2.5)	13 (0.9)	251 (2.2)
Hawaii	7 (0.5)	239 (2.3)	22 (0.6)	244 (1.5)	31 (1.0)	254 (1.3)	18 (0.9)	257 (1.8)	21 (0.6)	254 (1.5)
Idaho	14 (0.6)	272 (1.9)	29 (1.1)	274 (1.1)	28 (1.1)	271 (1.3)	14 (0.8)	271 (1.9)	15 (0.7)	269 (1.7)
Illinois	7 (1.1)	253 (3.4)	29 (1.3)	261 (2.1)	35 (1.1)	264 (1.8)	17 (0.7)	259 (2.6)	12 (0.9)	256 (2.7)
Indiana	8 (0.6)	256 (2.7)	30 (1.4)	267 (1.5)	34 (1.1)	267 (1.4)	15 (1.0)	271 (2.3)	12 (0.9)	266 (2.5)
Iowa	7 (0.9)	278 (2.2)	32 (1.5)	281 (1.3)	35 (1.1)	279 (1.3)	16 (0.9)	277 (1.8)	10 (0.9)	270 (2.3)
Kentucky	11 (0.8)	258 (2.2)	27 (0.8)	260 (1.3)	31 (1.0)	259 (1.3)	17 (0.8)	253 (1.9)	14 (0.9)	249 (2.7)
Louisiana	7 (0.7)	242 (2.3)	32 (1.4)	249 (1.6)	31 (0.9)	248 (1.4)	15 (0.9)	244 (1.9)	15 (1.1)	240 (2.5)
Maryland	4 (0.5)	239 (4.3)	39 (1.1)	259 (1.4)	36 (1.1)	263 (1.8)	13 (0.7)	267 (2.5)	9 (0.5)	260 (3.5)
Michigan	9 (0.7)	267 (2.4)	28 (1.3)	267 (1.4)	32 (1.0)	264 (1.5)	15 (0.8)	265 (2.2)	16 (1.0)	260 (2.7)
Minnesota	10 (0.7)	271 (2.4)	33 (1.3)	278 (1.2)	30 (1.0)	276 (1.3)	15 (1.0)	276 (1.8)	12 (1.0)	274 (1.8)
Montana	9 (0.8)	279 (2.9)	29 (1.3)	284 (1.3)	33 (1.1)	280 (1.3)	16 (0.7)	280 (1.4)	13 (0.6)	275 (1.9)
Nebraska	8 (0.7)	275 (2.6)	29 (1.3)	276 (1.6)	35 (1.0)	277 (1.0)	16 (0.9)	277 (2.4)	12 (0.9)	274 (1.8)
New Hampshire	5 (0.5)	258 (2.7)	34 (1.2)	272 (1.3)	38 (1.5)	277 (1.3)	15 (0.9)	275 (1.7)	8 (0.6)	274 (2.6)
New Jersey	4 (0.4)	264 (3.4)	38 (1.3)	271 (1.3)	37 (0.9)	272 (1.3)	14 (0.9)	268 (2.5)	9 (0.7)	263 (3.5)
New Mexico	9 (0.6)	259 (2.7)	26 (1.1)	257 (1.3)	29 (1.0)	255 (1.2)	18 (0.9)	257 (1.7)	18 (0.9)	255 (2.1)
New York	4 (0.5)	255 (3.2)	40 (1.6)	262 (1.7)	36 (1.3)	265 (1.8)	12 (0.8)	259 (2.6)	8 (0.6)	246 (3.0)
North Carolina	9 (0.7)	239 (2.4)	29 (1.1)	250 (1.4)	33 (0.9)	254 (1.4)	17 (0.8)	250 (2.1)	13 (0.8)	249 (2.1)
North Dakota	9 (0.6)	287 (2.6)	31 (1.4)	284 (1.4)	33 (1.4)	280 (1.5)	16 (1.1)	278 (2.3)	12 (0.7)	279 (3.0)
Ohio	6 (0.7)	258 (2.2)	36 (1.1)	264 (1.0)	35 (1.1)	267 (1.4)	14 (0.7)	262 (2.3)	9 (0.6)	258 (2.5)
Oklahoma	10 (0.7)	264 (2.8)	24 (1.1)	267 (1.9)	29 (1.1)	263 (1.8)	18 (0.7)	264 (2.1)	20 (1.0)	257 (1.7)
Oregon	10 (0.9)	262 (1.7)	35 (1.1)	270 (1.2)	30 (0.9)	274 (1.3)	15 (0.7)	275 (2.1)	10 (0.9)	274 (2.7)
Pennsylvania	5 (0.6)	249 (3.5)	41 (1.1)	266 (1.6)	35 (0.7)	269 (1.9)	11 (0.7)	264 (2.8)	8 (0.6)	265 (3.1)
Rhode Island	7 (0.5)	248 (2.2)	33 (0.8)	259 (1.0)	37 (0.9)	263 (1.1)	15 (0.7)	266 (1.8)	9 (0.8)	256 (3.0)
Texas	12 (1.0)	257 (2.2)	28 (1.0)	259 (1.5)	30 (1.0)	259 (1.5)	16 (0.7)	254 (2.1)	15 (1.0)	258 (2.8)
Virginia	6 (0.7)	247 (2.3)	31 (1.1)	261 (1.7)	35 (1.1)	267 (1.9)	16 (0.8)	269 (2.7)	11 (0.7)	269 (3.1)
West Virginia	15 (1.1)	258 (1.8)	30 (1.1)	256 (1.1)	29 (1.0)	256 (1.5)	15 (0.8)	254 (1.4)	11 (0.9)	255 (2.4)
Wisconsin	8 (1.0)	270 (2.9)	37 (1.3)	278 (1.2)	33 (1.1)	274 (1.7)	13 (0.8)	273 (2.0)	9 (0.7)	269 (3.0)
Wyoming	10 (0.5)	267 (2.1)	29 (1.0)	274 (1.0)	31 (0.9)	275 (1.0)	16 (0.7)	270 (1.4)	14 (0.7)	267 (1.9)
TERRITORIES										
Guam	9 (0.8)	229 (2.7)	22 (1.1)	231 (2.2)	30 (1.0)	234 (1.5)	16 (0.6)	229 (2.4)	23 (1.2)	225 (1.9)
Virgin Islands	8 (0.7)	219 (3.4)	33 (1.5)	219 (1.4)	28 (1.1)	220 (1.1)	16 (1.1)	217 (1.9)	18 (0.9)	214 (1.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 15.5 | Teachers' Reports on the Amount of Time that Students Spend on Mathematics Homework Each Day

GRADE 8 PUBLIC SCHOOLS	None		15 Minutes		30 Minutes		45 Minutes		An Hour or More	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	1 (0.3)	*** (***)	43 (4.2)	256 (2.3)	43 (4.3)	266 (2.6)	10 (1.9)	272 (5.7)!	4 (0.9)	278 (5.1)
Northeast	0 (0.0)	0 (0.0)	54(13.2)	264 (4.7)!	35(12.5)	270 (4.1)!	8 (2.7)	*** (***)	3 (0.6)	*** (***)
Southeast	1 (1.0)	*** (***)	44 (7.5)	248 (5.1)!	44 (7.6)	260 (5.4)!	8 (2.7)	*** (***)	3 (1.3)	*** (***)
Central	1 (0.8)	*** (***)	34 (7.1)	255 (4.7)	46 (9.6)	272 (3.5)	13 (6.0)	261(12.5)!	6 (2.3)	*** (***)
West	1 (0.3)	*** (***)	42 (6.7)	258 (4.2)	43 (6.2)	264 (4.7)	9 (2.3)	270 (6.5)!	5 (1.9)	*** (***)
STATES										
Alabama	4 (1.1)	243 (6.8)!	39 (3.7)	247 (1.9)	41 (3.2)	253 (1.8)	13 (2.5)	264 (4.3)	3 (0.8)	283 (7.7)!
Arizona	3 (0.5)	*** (***)	36 (2.5)	253 (1.8)	46 (2.6)	261 (1.7)	10 (1.5)	271 (3.7)	5 (0.8)	276 (4.8)
Arkansas	1 (0.3)	*** (***)	34 (3.4)	253 (2.1)	54 (3.4)	258 (1.2)	10 (2.6)	261 (4.2)!	1 (0.5)	*** (***)
California	2 (0.5)	*** (***)	30 (3.1)	247 (2.0)	52 (2.9)	257 (2.0)	10 (1.2)	273 (5.2)	6 (0.9)	280 (5.7)
Colorado	1 (0.5)	*** (***)	40 (3.5)	261 (1.8)	45 (3.3)	267 (1.6)	10 (1.8)	288 (3.3)	3 (1.1)	286 (6.1)!
Connecticut	1 (0.4)	*** (***)	27 (2.6)	256 (2.4)	53 (3.1)	271 (1.8)	15 (2.6)	288 (3.4)	3 (0.9)	306 (3.7)!
Delaware	2 (0.5)	*** (***)	42 (1.1)	246 (1.0)	41 (1.2)	267 (1.7)	11 (0.7)	296 (1.7)	4 (0.8)	*** (***)
District of Columbia	3 (0.4)	*** (***)	44 (0.9)	221 (0.8)	32 (0.8)	238 (1.7)	15 (0.7)	242 (2.3)	6 (0.4)	245 (1.8)
Florida	4 (0.9)	235 (5.8)!	34 (2.8)	246 (1.9)	47 (2.6)	259 (2.0)	11 (1.3)	277 (3.6)	5 (1.1)	270 (7.9)!
Georgia	3 (0.9)	236 (8.6)!	38 (1.0)	251 (2.1)	43 (2.9)	261 (2.1)	12 (1.9)	288 (4.7)	4 (1.2)	273 (7.5)!
Hawaii	2 (0.4)	*** (***)	21 (0.8)	236 (1.6)	51 (0.9)	249 (1.0)	16 (0.8)	269 (1.8)	8 (0.6)	275 (2.6)
Idaho	4 (0.5)	245 (2.7)	43 (1.4)	269 (1.0)	43 (1.5)	273 (1.1)	6 (1.1)	285 (3.8)	2 (0.3)	*** (***)
Illinois	1 (0.6)	*** (***)	35 (4.1)	257 (2.9)	49 (3.9)	262 (2.9)	10 (2.4)	271 (7.2)!	5 (1.4)	273 (8.3)!
Indiana	3 (1.4)	247(12.6)!	36 (2.8)	257 (1.9)	48 (3.0)	269 (1.7)	10 (1.7)	296 (3.5)	3 (1.0)	293(10.2)!
Iowa	1 (0.6)	*** (***)	40 (4.1)	272 (1.6)	49 (4.4)	280 (2.0)	8 (1.9)	296 (4.4)!	2 (1.2)	*** (***)
Kentucky	7 (1.7)	235 (4.4)!	37 (3.7)	252 (1.8)	43 (4.4)	258 ([illegible])	9 (1.8)	271 (4.1)!	4 (1.6)	277 (8.4)!
Louisiana	3 (1.2)	235 (9.2)!	47 (3.7)	243 (1.9)	38 (3.3)	248 (2.2)	8 (1.9)	248 (3.7)!	4 (1.4)	256 (8.8)!
Maryland	3 (1.1)	237 (7.1)!	39 (2.9)	252 (2.1)	46 (2.5)	265 (2.2)	8 (1.2)	289 (5.1)	4 (1.3)	273 (8.6)!
Michigan	3 (0.8)	249 (4.5)!	42 (3.7)	261 (1.5)	43 (3.[illegible])	265 (1.8)	10 (1.6)	279 (5.5)	3 (0.9)	*** (***)
Minnesota	2 (0.5)	*** (***)	46 (3.4)	273 (1.5)	42 (3.3)	276 (1.6)	7 (1.6)	290 (4.0)	2 (1.1)	287 (6.3)!
Montana	3 (0.4)	*** (***)	36 (2.9)	280 (1.2)	50 (2.8)	283 (1.2)	6 (1.7)	280 (2.6)!	3 (0.5)	282(12.1)
Nebraska	2 (0.3)	*** (***)	35 (2.8)	271 (1.8)	44 (3.4)	278 (1.3)	17 (2.8)	280 (2.9)	3 (0.4)	*** (***)
New Hampshire	2 (0.5)	*** (***)	33 (0.9)	265 (1.2)	55 (1.0)	274 (1.3)	6 (0.8)	293 (3.2)	3 (0.4)	300 (3.4)
New Jersey	2 (0.7)	*** (***)	24 (2.7)	262 (2.1)	59 (3.3)	271 (2.0)	11 (1.9)	277 (6.2)	4 (1.1)	273(11.5)!
New Mexico	3 (0.5)	240 (3.5)	33 (1.1)	255 (1.0)	44 (1.5)	253 (1.1)	12 (1.0)	268 (2.8)	7 (0.8)	273 (2.6)
New York	2 (0.6)	*** (***)	38 (3.0)	255 (2.5)	49 (3.0)	264 (2.4)	10 (1.8)	270 (5.3)	1 (0.7)	*** (***)
North Carolina	3 (0.9)	218 (2.8)!	40 (2.8)	242 (1.7)	46 (2.5)	254 (2.1)	8 (1.5)	271 (5.4)	3 (0.7)	284 (6.0)!
North Dakota	1 (0.8)	*** (***)	37 (2.6)	279 (2.2)	51 (3.7)	283 (1.6)	10 (1.6)	282 (3.7)	2 (0.3)	*** (***)
Ohio	1 (0.4)	*** (***)	36 (3.8)	258 (2.4)	52 (3.7)	267 (1.5)	7 (1.4)	283 (5.2)	4 (1.1)	285 (8.6)!
Oklahoma	2 (0.5)	*** (***)	24 (3.2)	258 (2.2)	54 (2.9)	263 (1.7)	11 (1.7)	273 (3.4)	9 (2.0)	271 (4.8)!
Oregon	5 (1.1)	238 (4.5)!	44 (2.8)	265 (1.4)	43 (2.3)	277 (2.0)	6 (1.2)	305 (3.5)!	3 (0.6)	*** (***)
Pennsylvania	2 (0.7)	*** (***)	41 (2.9)	258 (1.9)	44 (3.2)	274 (2.4)	12 (2.2)	274 (7.0)	2 (0.8)	*** (***)
Rhode Island	2 (0.3)	*** (***)	29 (1.1)	245 (1.3)	45 (1.1)	261 (0.9)	19 (0.6)	282 (1.6)	4 (0.3)	272 (4.9)
Texas	5 (1.1)	232 (4.5)!	46 (3.2)	252 (1.8)	41 (3.0)	258 (1.9)	7 (1.2)	269 (6.3)	2 (0.7)	*** (***)
Virginia	2 (0.5)	*** (***)	41 (2.7)	252 (2.2)	42 (1.9)	268 (2.3)	11 (1.4)	285 (4.5)	3 (1.0)	276 (9.8)!
West Virginia	5 (1.9)	252 (4.6)!	48 (3.3)	251 (1.3)	35 (3.2)	261 (2.3)	9 (1.8)	268 (5.3)	3 (1.0)	*** (***)
Wisconsin	2 (0.5)	*** (***)	46 (3.8)	271 (1.7)	42 (3.7)	277 (2.1)	7 (1.7)	286 (3.9)!	3 (0.9)	298 (4.4)!
Wyoming	3 (0.2)	257 (2.4)	47 (1.0)	269 (0.9)	36 (1.0)	274 (0.9)	12 (0.8)	283 (2.3)	2 (0.3)	*** (***)
TERRITORIES										
Guam	8 (0.5)	207 (1.9)	37 (0.8)	231 (1.3)	39 (0.8)	232 (1.0)	7 (0.6)	248 (2.6)	9 (0.5)	239 (2.0)
Virgin Islands	3 (0.3)	*** (***)	31 (0.8)	212 (0.6)	33 (0.8)	225 (1.4)	23 (0.8)	220 (1.2)	10 (0.5)	221 (2.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 15.6 | **Teachers' Reports on the Instructional Emphasis Placed on Numbers and Operations**

GRADE 8 PUBLIC SCHOOLS	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Numbers and Operations Proficiency	Percent of Students	Numbers and Operations Proficiency	Percent of Students	Numbers and Operations Proficiency
NATION	49 (3.8)	260 (1.8)	36 (3.9)	267 (2.8)	15 (2.1)	287 (3.4)
Northeast	41 (6.9)	268 (2.9)	38(10.5)	266 (4.0)!	21 (6.5)	*** (***)
Southeast	59 (7.3)	256 (3.1)	26 (8.4)	264(11.2)!	15 (4.8)	282 (7.7)!
Central	54 (7.2)	264 (4.3)	33 (5.3)	269 (4.9)	13 (4.5)	285 (6.8)!
West	42 (7.4)	257 (3.6)	45 (6.8)	268 (4.8)	13 (2.1)	291 (6.6)
STATES						
Alabama	58 (3.0)	254 (1.8)	36 (3.0)	263 (2.2)	6 (1.4)	282 (5.7)!
Arizona	52 (3.3)	259 (1.9)	36 (2.7)	265 (1.8)	12 (1.6)	286 (4.3)
Arkansas	60 (3.3)	259 (1.2)	32 (3.1)	263 (2.1)	8 (1.1)	288 (4.7)
California	40 (3.1)	251 (1.7)	38 (2.7)	257 (2.5)	22 (2.2)	282 (3.5)
Colorado	37 (3.0)	262 (1.7)	49 (3.1)	269 (1.5)	14 (1.8)	288 (3.7)
Connecticut	41 (3.4)	266 (1.9)	37 (2.4)	270 (2.1)	22 (2.5)	297 (3.7)
Delaware	43 (1.5)	255 (1.3)	39 (1.6)	266 (1.5)	18 (0.7)	290 (2.1)
District of Columbia	47 (0.9)	231 (1.4)	37 (1.0)	239 (1.2)	16 (0.8)	264 (2.9)
Florida	56 (2.4)	253 (1.6)	31 (2.5)	264 (2.3)	12 (1.3)	292 (3.4)
Georgia	57 (2.7)	255 (1.6)	34 (2.4)	266 (1.8)	9 (1.4)	290 (7.9)
Hawaii	46 (1.0)	248 (1.2)	39 (1.0)	261 (1.5)	15 (0.6)	278 (2.2)
Idaho	48 (1.8)	271 (1.1)	41 (1.5)	274 (1.3)	11 (0.7)	292 (2.7)
Illinois	41 (4.3)	257 (2.7)	44 (3.1)	268 (2.6)	15 (2.5)	289 (4.1)
Indiana	55 (2.8)	266 (1.9)	34 (2.9)	271 (2.4)	11 (1.5)	296 (4.1)
Iowa	48 (4.1)	278 (1.7)	43 (4.1)	282 (1.7)	10 (1.5)	303 (4.5)
Kentucky	58 (3.8)	255 (1.5)	33 (3.7)	261 (2.2)	10 (1.6)	289 (2.6)
Louisiana	57 (4.4)	248 (1.5)	37 (4.0)	255 (2.2)	7 (1.8)	272 (4.8)!
Maryland	35 (2.6)	249 (1.9)	41 (2.6)	261 (1.9)	24 (2.1)	296 (2.3)
Michigan	44 (3.7)	259 (2.3)	43 (3.9)	271 (2.0)	13 (1.8)	288 (3.3)
Minnesota	36 (3.3)	275 (1.8)	51 (3.0)	277 (1.6)	13 (1.7)	301 (2.7)
Montana	40 (2.6)	280 (2.0)	46 (2.8)	282 (1.4)	14 (1.3)	293 (2.9)
Nebraska	41 (3.0)	277 (1.4)	49 (3.0)	279 (1.5)	9 (1.0)	297 (3.9)
New Hampshire	36 (1.8)	269 (1.9)	47 (1.7)	272 (1.6)	17 (1.5)	292 (2.8)
New Jersey	50 (3.4)	263 (1.5)	34 (3.3)	273 (2.3)	16 (1.8)	308 (3.0)
New Mexico	54 (1.2)	254 (1.0)	34 (1.1)	259 (1.2)	12 (0.7)	280 (3.2)
New York	44 (3.7)	255 (2.2)	42 (3.3)	264 (2.0)	13 (1.6)	290 (4.0)
North Carolina	49 (2.7)	246 (1.4)	37 (2.6)	256 (1.9)	14 (1.7)	287 (2.9)
North Dakota	49 (3.2)	283 (1.9)	41 (3.2)	289 (1.9)	10 (0.8)	295 (2.4)
Ohio	48 (3.7)	261 (1.8)	38 (3.5)	272 (1.6)	14 (2.2)	294 (3.7)
Oklahoma	58 (3.8)	263 (1.4)	34 (3.5)	271 (1.8)	9 (1.7)	290 (6.7)
Oregon	34 (3.0)	267 (2.3)	44 (2.9)	272 (1.5)	22 (2.4)	286 (2.3)
Pennsylvania	47 (3.0)	260 (1.7)	34 (3.3)	271 (2.5)	19 (2.3)	293 (3.9)
Rhode Island	52 (1.0)	252 (0.7)	30 (0.9)	270 (1.1)	18 (1.1)	289 (2.1)
Texas	61 (3.5)	257 (1.7)	32 (3.1)	262 (1.8)	7 (1.4)	278 (4.7)
Virginia	46 (2.4)	256 (1.8)	35 (2.6)	266 (1.9)	18 (2.1)	297 (4.3)
West Virginia	48 (3.7)	255 (1.6)	40 (3.6)	260 (1.7)	13 (1.6)	281 (3.9)
Wisconsin	37 (3.4)	272 (1.9)	47 (3.0)	278 (1.5)	16 (2.0)	295 (3.3)
Wyoming	42 (1.2)	274 (0.9)	39 (1.6)	275 (1.3)	19 (1.5)	281 (1.8)
TERRITORIES						
Guam	55 (0.8)	231 (1.0)	29 (0.7)	243 (1.2)	16 (0.5)	264 (2.1)
Virgin Islands	53 (1.1)	227 (1.1)	34 (1.0)	227 (1.1)	13 (0.5)	242 (2.5)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. To determine the emphasis placed on Numbers and Operations, responses were averaged across five topics: whole number operations, common fractions, decimal fractions, ratio or proportion, and percent. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

395

TABLE 15.7 | **Teachers' Reports on the Instructional Emphasis Placed on Numbers and Operations Organized by the Percentage of Students Receiving Heavy Emphasis**

GRADE 8 PUBLIC SCHOOLS	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Numbers and Operations Proficiency	Percent of Students	Numbers and Operations Proficiency	Percent of Students	Numbers and Operations Proficiency
STATES/TERRITORIES						
Texas	61 (3.5)	257 (1.7)	32 (3.1)	262 (1.8)	7 (1.4)	278 (4.7)
Arkansas	60 (3.3)	259 (1.2)	32 (3.1)	263 (2.1)	8 (1.1)	288 (4.7)
Alabama	58 (3.0)	254 (1.8)	36 (3.0)	263 (2.2)	6 (1.4)	282 (5.7)!
Kentucky	58 (3.8)	255 (1.5)	33 (3.7)	261 (2.2)	10 (1.6)	289 (2.6)
Oklahoma	**58 (3.6)**	**263 (1.4)**	**34 (3.5)**	**271 (1.8)**	**9 (1.7)**	**290 (6.7)**
Georgia	**57 (2.7)**	**255 (1.6)**	**34 (2.4)**	**266 (1.8)**	**9 (1.4)**	**290 (7.9)**
Louisiana	**57 (4.4)**	**248 (1.5)**	**37 (4.0)**	**255 (2.2)**	**7 (1.8)**	**272 (4.8)!**
Florida	**56 (2.4)**	**253 (1.8)**	**31 (2.5)**	**264 (2.3)**	**12 (1.3)**	**292 (3.4)**
Indiana	**55 (2.6)**	**266 (1.9)**	**34 (2.9)**	**271 (2.4)**	**11 (1.5)**	**296 (4.1)**
Guam	55 (0.8)	231 (1.0)	29 (0.7)	243 (1.2)	16 (0.5)	264 (2.1)
New Mexico	54 (1.2)	254 (1.0)	34 (1.1)	259 (1.2)	12 (0.7)	280 (3.2)
Virgin Islands	53 (1.1)	227 (1.1)	34 (1.0)	227 (1.1)	13 (0.5)	242 (2.5)
Arizona	52 (3.3)	259 (1.9)	36 (2.7)	265 (1.8)	12 (1.6)	286 (4.3)
Rhode Island	52 (1.0)	252 (0.7)	30 (0.9)	270 (1.1)	18 (1.1)	289 (2.1)
New Jersey	**50 (3.4)**	**263 (1.5)**	**34 (3.3)**	**273 (2.3)**	**16 (1.6)**	**306 (3.0)**
North Carolina	**49 (2.7)**	**246 (1.4)**	**37 (2.6)**	**256 (1.9)**	**14 (1.7)**	**267 (2.9)**
North Dakota	**49 (3.2)**	**283 (1.9)**	**41 (3.2)**	**289 (1.9)**	**10 (0.6)**	**295 (2.4)**
Ohio	**48 (3.7)**	**261 (1.8)**	**38 (3.6)**	**272 (1.6)**	**14 (2.2)**	**294 (3.7)**
Idaho	**48 (1.6)**	**271 (1.1)**	**41 (1.5)**	**274 (1.3)**	**11 (0.7)**	**292 (2.7)**
West Virginia	48 (3.7)	255 (1.6)	40 (3.6)	260 (1.7)	13 (1.6)	281 (3.8)
Iowa	48 (4.1)	278 (1.7)	43 (4.1)	282 (1.7)	10 (1.5)	303 (4.5)
District of Columbia	47 (0.9)	231 (1.4)	37 (1.0)	239 (1.2)	16 (0.8)	264 (2.9)
Pennsylvania	47 (3.0)	260 (1.7)	34 (3.3)	271 (2.5)	19 (2.3)	293 (3.9)
Virginia	46 (2.4)	256 (1.8)	35 (2.6)	266 (1.9)	18 (2.1)	297 (4.3)
Hawaii	**46 (1.0)**	**246 (1.2)**	**39 (1.0)**	**261 (1.5)**	**15 (0.6)**	**278 (2.2)**
New York	**44 (3.7)**	**255 (2.2)**	**42 (3.3)**	**264 (2.0)**	**13 (1.6)**	**290 (4.0)**
Michigan	**44 (3.7)**	**259 (2.3)**	**43 (3.8)**	**271 (2.0)**	**13 (1.8)**	**288 (3.3)**
Delaware	**43 (1.5)**	**255 (1.3)**	**39 (1.6)**	**266 (1.5)**	**18 (0.7)**	**290 (2.1)**
Wyoming	**42 (1.2)**	**274 (0.9)**	**39 (1.6)**	**275 (1.3)**	**19 (1.5)**	**281 (1.8)**
Nebraska	41 (3.0)	277 (1.4)	49 (3.0)	279 (1.5)	9 (1.0)	297 (3.9)
Connecticut	41 (3.4)	266 (1.9)	37 (2.4)	270 (2.1)	22 (2.5)	297 (3.7)
Illinois	41 (4.3)	257 (2.7)	44 (4.1)	268 (2.6)	15 (2.5)	289 (4.1)
California	40 (3.1)	251 (1.7)	38 (2.7)	257 (2.5)	22 (2.2)	282 (3.5)
Montana	40 (2.8)	280 (2.0)	46 (2.8)	282 (1.4)	14 (1.3)	293 (2.9)
Colorado	**37 (3.0)**	**262 (1.7)**	**49 (3.1)**	**269 (1.5)**	**14 (1.8)**	**288 (3.7)**
Wisconsin	**37 (3.4)**	**272 (1.9)**	**47 (3.0)**	**278 (1.5)**	**16 (2.0)**	**295 (3.3)**
New Hampshire	**36 (1.8)**	**269 (1.9)**	**47 (1.7)**	**272 (1.6)**	**17 (1.5)**	**292 (2.8)**
Minnesota	**36 (3.3)**	**275 (1.8)**	**51 (3.0)**	**277 (1.6)**	**13 (1.7)**	**301 (2.7)**
Maryland	35 (2.6)	249 (1.9)	41 (2.6)	261 (1.9)	24 (2.1)	296 (2.3)
Oregon	34 (3.0)	267 (2.3)	44 (2.9)	272 (1.5)	22 (2.4)	288 (2.3)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. To determine the emphasis placed on Numbers and Operations, responses were averaged across five topics: whole number operations, common fractions, decimal fractions, ratio or proportion, and percent. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

386

TABLE 15.8 | Teachers' Reports on the Instructional Emphasis Placed on Measurement

GRADE 8 PUBLIC SCHOOLS	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Measurement Proficiency	Percent of Students	Measurement Proficiency	Percent of Students	Measurement Proficiency
NATION	17 (3.0)	250 (5.6)	50 (3.9)	256 (2.5)	33 (4.0)	272 (4.0)
Northeast	32(11.5)	257(11.7)!	35(10.1)	263 (4.8)!	34 (6.3)	282 (4.8)!
Southeast	13 (6.8)	242 (7.6)!	65 (9.3)	249 (5.4)	22 (8.1)	259(10.7)!
Central	17 (5.7)	247(12.5)!	41 (8.2)	260 (4.1)	42 (9.7)	270 (7.7)!
West	11 (2.8)	251 (7.7)!	53 (4.8)	256 (3.9)	36 (5.3)	275 (6.3)
STATES						
Alabama	24 (3.3)	244 (3.7)	56 (3.5)	245 (1.6)	19 (3.0)	280 (3.9)
Arizona	10 (1.8)	250 (4.5)	46 (2.8)	250 (2.1)	43 (2.7)	266 (2.1)
Arkansas	17 (2.7)	246 (3.4)	60 (3.4)	252 (1.6)	24 (2.9)	267 (3.1)
California	21 (2.5)	246 (2.7)	54 (2.8)	247 (2.2)	25 (2.7)	268 (3.3)
Colorado	7 (1.2)	259 (4.5)	50 (3.8)	259 (2.0)	43 (3.5)	272 (2.4)
Connecticut	28 (3.3)	263 (3.8)	47 (2.9)	263 (2.2)	26 (2.3)	287 (3.0)
Delaware	20 (1.1)	251 (2.2)	50 (1.4)	253 (1.9)	30 (1.1)	271 (2.2)
District of Columbia	25 (0.8)	217 (1.8)	56 (1.1)	220 (1.1)	20 (0.9)	236 (2.9)
Florida	19 (2.3)	240 (2.9)	52 (2.6)	249 (2.0)	28 (2.5)	267 (3.2)
Georgia	33 (2.6)	242 (2.2)	47 (2.8)	253 (2.2)	20 (2.4)	265 (4.6)
Hawaii	15 (0.8)	239 (2.5)	49 (1.0)	248 (1.3)	36 (1.0)	258 (1.9)
Idaho	10 (1.1)	266 (2.5)	49 (1.5)	266 (1.5)	41 (1.2)	276 (2.1)
Illinois	17 (3.4)	235 (9.0)!	49 (3.8)	259 (1.9)	34 (3.4)	268 (4.5)
Indiana	9 (1.9)	255 (4.2)!	51 (3.2)	258 (2.0)	41 (3.1)	275 (2.6)
Iowa	14 (2.8)	272 (4.7)	54 (4.7)	271 (2.1)	32 (4.1)	286 (3.7)
Kentucky	19 (3.0)	257 (3.4)	51 (3.7)	246 (2.5)	29 (3.5)	262 (2.4)
Louisiana	13 (2.3)	232 (5.2)	55 (3.6)	240 (2.1)	33 (3.8)	246 (3.1)
Maryland	21 (2.6)	237 (3.9)	42 (2.9)	248 (2.5)	37 (2.7)	278 (3.1)
Michigan	12 (2.2)	247 (4.6)	50 (3.6)	256 (2.3)	38 (3.4)	270 (2.8)
Minnesota	12 (2.2)	266 (4.1)	41 (3.3)	269 (2.1)	47 (2.6)	277 (1.8)
Montana	9 (1.0)	277 (5.7)	58 (2.1)	277 (1.8)	33 (1.9)	285 (3.3)
Nebraska	12 (2.3)	276 (3.2)	49 (3.4)	274 (2.4)	39 (3.1)	275 (2.7)
New Hampshire	15 (0.9)	261 (2.0)	49 (1.3)	271 (1.6)	36 (1.1)	278 (2.0)
New Jersey	24 (3.1)	255 (3.2)	45 (2.7)	281 (2.3)	30 (3.1)	286 (4.0)
New Mexico	16 (1.1)	245 (3.1)	51 (1.5)	251 (1.2)	33 (1.5)	260 (1.7)
New York	13 (2.3)	258 (4.9)	46 (3.3)	254 (3.1)	40 (3.5)	255 (3.0)
North Carolina	17 (2.3)	228 (3.2)	52 (2.9)	239 (1.9)	31 (2.7)	255 (3.0)
North Dakota	13 (2.6)	277 (5.0)!	53 (3.4)	279 (2.5)	35 (3.3)	284 (3.1)
Ohio	17 (2.8)	243 (4.2)	50 (3.0)	258 (1.7)	33 (3.1)	275 (2.4)
Oklahoma	11 (2.5)	258 (3.5)!	50 (4.2)	254 (1.9)	39 (3.6)	264 (3.0)
Oregon	13 (2.2)	265 (4.7)	52 (3.0)	268 (2.1)	35 (3.0)	276 (3.0)
Pennsylvania	15 (2.2)	252 (3.7)	42 (2.9)	259 (2.6)	43 (2.9)	276 (3.9)
Rhode Island	13 (0.5)	250 (2.6)	47 (1.4)	254 (1.5)	40 (1.5)	264 (1.5)
Texas	29 (3.7)	246 (3.0)	52 (3.1)	250 (2.1)	19 (2.4)	280 (3.7)
Virginia	12 (2.0)	245 (3.9)	47 (2.9)	251 (2.0)	41 (3.1)	272 (3.2)
West Virginia	13 (2.4)	241 (3.6)	47 (3.9)	249 (1.7)	41 (3.7)	262 (2.7)
Wisconsin	11 (2.5)	264 (4.3)!	45 (3.7)	269 (2.5)	44 (4.4)	281 (2.2)
Wyoming	7 (0.4)	268 (3.7)	42 (1.8)	270 (1.5)	51 (1.7)	272 (1.6)
TERRITORIES						
Guam	24 (0.7)	233 (2.0)	47 (0.8)	222 (1.6)	29 (0.8)	230 (1.5)
Virgin Islands	35 (0.7)	218 (1.6)	45 (1.0)	216 (1.9)	19 (0.8)	212 (2.5)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

387

TABLE 15.9

Teachers' Reports on the Instructional Emphasis Placed on Measurement Organized by the Percentage of Students Receiving Heavy Emphasis

GRADE 8 PUBLIC SCHOOLS	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Measurement Proficiency	Percent of Students	Measurement Proficiency	Percent of Students	Measurement Proficiency
STATES/TERRITORIES						
Virgin Islands	35 (0.7)	216 (1.6)	45 (1.0)	216 (1.9)	19 (0.8)	212 (2.5)
Georgia	33 (2.6)	242 (2.2)	47 (2.8)	253 (2.2)	20 (2.4)	265 (4.6)
Texas	29 (3.7)	246 (3.0)	52 (3.1)	250 (2.1)	19 (2.4)	260 (3.7)
Connecticut	28 (3.3)	263 (3.8)	47 (2.9)	263 (2.2)	26 (2.3)	287 (3.0)
District of Columbia	**25 (0.8)**	**217 (1.8)**	**55 (1.1)**	**220 (1.1)**	**20 (0.9)**	**235 (2.9)**
New Jersey	**24 (3.1)**	**255 (3.2)**	**45 (2.7)**	**261 (2.3)**	**30 (3.1)**	**266 (4.0)**
Alabama	**24 (3.3)**	**244 (3.7)**	**58 (3.5)**	**245 (1.8)**	**19 (3.0)**	**260 (3.9)**
Guam	**24 (0.7)**	**233 (2.0)**	**47 (0.8)**	**222 (1.6)**	**29 (0.6)**	**230 (1.5)**
Maryland	**21 (2.6)**	**237 (3.9)**	**42 (2.9)**	**248 (2.5)**	**37 (2.7)**	**278 (3.1)**
California	21 (2.5)	246 (2.7)	54 (2.8)	247 (2.2)	25 (2.7)	268 (3.3)
Delaware	20 (1.1)	251 (2.2)	50 (1.4)	253 (1.9)	30 (1.1)	271 (2.2)
Florida	19 (2.3)	240 (2.9)	52 (2.6)	249 (2.0)	28 (2.5)	267 (3.2)
Kentucky	19 (3.0)	257 (3.4)	51 (3.7)	246 (2.5)	29 (3.5)	262 (2.4)
Ohio	17 (2.8)	243 (4.2)	50 (3.0)	258 (1.7)	33 (3.1)	275 (2.4)
Illinois	**17 (3.4)**	**235 (9.0)!**	**49 (3.6)**	**259 (1.9)**	**34 (3.4)**	**268 (4.5)**
North Carolina	**17 (2.3)**	**228 (3.2)**	**52 (2.9)**	**239 (1.9)**	**31 (2.7)**	**255 (3.0)**
Arkansas	**17 (2.7)**	**246 (3.4)**	**60 (3.4)**	**252 (1.8)**	**24 (2.6)**	**267 (3.1)**
New Mexico	**16 (1.1)**	**245 (3.1)**	**51 (1.6)**	**251 (1.2)**	**33 (1.5)**	**260 (1.7)**
Pennsylvania	**15 (2.2)**	**25[illegible] (3.7)**	**42 (2.9)**	**259 (2.6)**	**43 (2.9)**	**276 (3.9)**
New Hampshire	15 (0.9)	261 (2.0)	49 (1.3)	271 (1.6)	36 (1.1)	278 (2.0)
Hawaii	15 (0.8)	239 (2.5)	49 (1.0)	248 (1.3)	36 (1.0)	258 (1.9)
Iowa	14 (2.8)	272 (4.7)	54 (4.7)	271 (2.1)	32 (4.1)	288 (3.7)
New York	13 (2.3)	258 (4.9)	46 (3.3)	254 (3.1)	40 (3.5)	255 (3.0)
Louisiana	13 (2.3)	232 (5.2)	55 (3.6)	240 (2.1)	33 (3.8)	248 (3.1)
West Virginia	**13 (2.4)**	**241 (3.6)**	**47 (3.9)**	**249 (1.7)**	**41 (3.7)**	**262 (2.7)**
North Dakota	**13 (2.6)**	**277 (5.0)!**	**53 (3.4)**	**279 (2.5)**	**35 (3.3)**	**284 (3.1)**
Rhode Island	**13 (0.5)**	**250 (2.8)**	**47 (1.4)**	**254 (1.5)**	**40 (1.5)**	**264 (1.5)**
Oregon	**13 (2.2)**	**265 (4.7)**	**52 (3.0)**	**268 (2.1)**	**35 (3.0)**	**276 (3.0)**
Nebraska	**12 (2.3)**	**276 (3.2)**	**49 (3.4)**	**274 (2.4)**	**39 (3.1)**	**275 (2.7)**
Minnesota	12 (2.2)	266 (4.1)	41 (3.3)	269 (2.1)	47 (3.6)	277 (1.8)
Virginia	12 (2.0)	245 (3.9)	47 (2.9)	251 (2.0)	41 (3.1)	272 (3.2)
Michigan	12 (2.2)	247 (4.6)	50 (3.6)	256 (2.3)	38 (3.4)	270 (2.8)
Wisconsin	11 (2.5)	264 (4.3)!	45 (3.7)	269 (2.5)	44 (4.4)	281 (2.2)
Oklahoma	11 (2.5)	258 (3.5)!	50 (4.2)	254 (1.9)	39 (3.6)	264 (3.0)
Arizona	**10 (1.8)**	**250 (4.5)**	**48 (2.8)**	**250 (2.1)**	**43 (2.7)**	**265 (2.1)**
Idaho	**10 (1.1)**	**266 (2.5)**	**49 (1.5)**	**266 (1.5)**	**41 (1.2)**	**276 (2.1)**
Indiana	**9 (1.9)**	**255 (4.2)!**	**51 (3.2)**	**258 (2.0)**	**41 (3.1)**	**275 (2.6)**
Montana	**9 (1.0)**	**277 (5.7)**	**58 (2.1)**	**277 (1.8)**	**33 (1.9)**	**285 (3.3)**
Wyoming	7 (0.4)	268 (3.7)	42 (1.8)	270 (1.5)	51 (1.7)	272 (1.6)
Colorado	7 (1.2)	259 (4.5)	50 (3.8)	259 (2.0)	43 (3.5)	272 (2.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 15.10 | Teachers' Reports on the Instructional Emphasis Placed on Geometry

GRADE 8 PUBLIC SCHOOLS	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Geometry Proficiency	Percent of Students	Geometry Proficiency	Percent of Students	Geometry Proficiency
NATION	28 (3.8)	260 (3.2)	51 (4.3)	260 (2.0)	21 (3.3)	264 (5.4)
Northeast	46(11.9)	264 (6.1)!	45(11.7)	273 (2.7)!	9 (1.9)	*** (***)
Southeast	22 (7.0)	253 (7.5)!	56(10.7)	252 (3.8)!	22 (8.8)	253 (8.7)!
Central	26 (7.0)	261 (7.9)!	39 (6.7)	260 (3.5)	35 (7.2)	261 (9.0)!
West	24 (6.3)	260 (2.8)!	59 (6.5)	260 (3.2)	16 (4.5)	277(11.4)!
STATES						
Alabama	**26 (3.0)**	**251 (2.4)**	**50 (3.9)**	**247 (1.7)**	**24 (3.2)**	**249 (3.4)**
Arizona	**14 (1.8)**	**260 (3.7)**	**53 (2.4)**	**258 (1.5)**	**33 (2.3)**	**256 (2.1)**
Arkansas	**16 (2.5)**	**254 (2.7)**	**57 (3.1)**	**252 (1.5)**	**27 (2.9)**	**256 (1.9)**
California	**25 (3.1)**	**259 (2.7)**	**53 (3.0)**	**254 (2.0)**	**22 (2.5)**	**256 (2.6)**
Colorado	20 (3.1)	269 (2.4)	48 (3.5)	264 (1.6)	31 (2.8)	263 (1.9)
Connecticut	27 (2.9)	268 (2.5)	52 (2.7)	263 (1.9)	20 (2.0)	275 (2.9)
Delaware	17 (0.9)	256 (1.9)	57 (1.4)	253 (1.5)	26 (1.1)	262 (2.1)
District of Columbia	25 (0.9)	229 (1.9)	56 (0.9)	225 (1.2)	19 (1.0)	246 (3.4)
Florida	18 (2.4)	255 (2.7)	50 (3.3)	252 (1.8)	32 (3.1)	251 (2.6)
Georgia	**30 (2.6)**	**255 (2.5)**	**48 (3.1)**	**254 (1.7)**	**22 (2.7)**	**259 (3.7)**
Hawaii	**17 (0.7)**	**264 (1.7)**	**49 (0.9)**	**250 (1.1)**	**34 (0.9)**	**251 (1.6)**
Idaho	**14 (0.7)**	**269 (2.2)**	**53 (1.5)**	**269 (1.2)**	**34 (1.5)**	**266 (1.7)**
Illinois	**29 (4.0)**	**258 (3.6)**	**44 (4.1)**	**258 (2.3)**	**26 (3.5)**	**255 (3.7)**
Indiana	**15 (2.4)**	**263 (2.8)**	**55 (3.1)**	**263 (1.7)**	**30 (3.0)**	**268 (3.0)**
Iowa	25 (3.5)	282 (2.8)	54 (4.1)	271 (1.6)	21 (3.3)	274 (2.8)
Kentucky	25 (3.4)	256 (2.5)	49 (3.6)	251 (1.7)	26 (3.4)	253 (2.6)
Louisiana	14 (2.4)	238 (4.1)	56 (4.0)	243 (2.1)	30 (3.9)	241 (2.7)
Maryland	22 (2.5)	254 (3.1)	48 (2.7)	254 (2.2)	30 (2.2)	264 (2.7)
Michigan	20 (2.9)	261 (3.0)	49 (3.6)	260 (1.7)	31 (3.3)	263 (2.4)
Minnesota	**19 (3.0)**	**270 (2.5)**	**54 (3.5)**	**273 (1.6)**	**27 (2.9)**	**275 (2.1)**
Montana	**31 (2.5)**	**286 (1.5)**	**57 (2.7)**	**277 (1.3)**	**13 (1.4)**	**279 (2.6)**
Nebraska	**19 (2.8)**	**279 (1.8)**	**58 (3.3)**	**273 (1.7)**	**23 (2.3)**	**271 (2.6)**
New Hampshire	**27 (1.4)**	**272 (2.2)**	**47 (1.6)**	**270 (1.5)**	**25 (1.2)**	**274 (2.3)**
New Jersey	**37 (3.2)**	**264 (1.7)**	**43 (2.6)**	**262 (2.0)**	**21 (2.5)**	**278 (4.2)**
New Mexico	25 (1.1)	256 (2.0)	43 (1.2)	258 (1.4)	33 (1.3)	258 (1.3)
New York	40 (3.0)	265 (2.7)	52 (3.1)	257 (2.5)	9 (1.3)	246 (4.9)
North Carolina	17 (2.4)	254 (2.5)	54 (3.0)	247 (1.6)	29 (2.7)	253 (2.8)
North Dakota	23 (3.0)	280 (1.8)	57 (3.2)	278 (2.3)	20 (1.8)	279 (1.8)
Ohio	23 (3.1)	264 (2.7)	50 (3.0)	259 (1.9)	27 (2.6)	264 (2.4)
Oklahoma	**17 (2.8)**	**262 (2.4)**	**54 (4.2)**	**261 (1.6)**	**28 (3.2)**	**258 (2.7)**
Oregon	**19 (2.1)**	**271 (2.9)**	**55 (3.2)**	**269 (1.7)**	**26 (2.7)**	**271 (2.4)**
Pennsylvania	**17 (2.7)**	**259 (2.5)**	**49 (2.9)**	**261 (2.2)**	**34 (3.0)**	**270 (4.3)**
Rhode Island	**17 (0.7)**	**261 (2.1)**	**44 (1.5)**	**255 (1.2)**	**39 (1.3)**	**258 (1.6)**
Texas	**37 (3.0)**	**257 (2.4)**	**51 (2.9)**	**255 (1.7)**	**12 (2.0)**	**255 (4.8)**
Virginia	18 (2.1)	266 (3.5)	48 (2.4)	259 (1.9)	34 (2.4)	259 (2.7)
West Virginia	14 (2.6)	252 (2.5)	49 (4.0)	254 (1.2)	37 (3.9)	256 (2.2)
Wisconsin	17 (2.7)	278 (2.9)	60 (3.8)	270 (1.7)	23 (3.1)	275 (3.0)
Wyoming	15 (0.9)	274 (1.5)	50 (0.8)	268 (1.0)	35 (1.2)	272 (1.4)
TERRITORIES						
Guam	**22 (0.9)**	**253 (1.6)**	**50 (0.6)**	**234 (1.1)**	**28 (0.8)**	**226 (1.5)**
Virgin Islands	**11 (0.2)**	**219 (1.6)**	**38 (1.0)**	**227 (1.4)**	**51 (1.0)**	**222 (1.3)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 15.11 | **Teachers' Reports on the Instructional Emphasis Placed on Geometry Organized by the Percentage of Students Receiving Heavy Emphasis**

GRADE 8 PUBLIC SCHOOLS	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Geometry Proficiency	Percent of Students	Geometry Proficiency	Percent of Students	Geometry Proficiency
STATES/TERRITORIES						
New York	40 (3.0)	265 (2.7)	52 (3.1)	257 (2.5)	9 (1.3)	246 (4.9)
Texas	37 (3.0)	257 (2.4)	51 (2.9)	255 (1.7)	12 (2.0)	255 (4.8)
New Jersey	37 (3.2)	264 (1.7)	43 (2.6)	262 (2.0)	21 (2.5)	278 (4.2)
Montana	31 (2.5)	286 (1.5)	57 (2.7)	277 (1.3)	13 (1.4)	279 (2.6)
Georgia	**30 (2.6)**	**255 (2.5)**	**48 (3.1)**	**254 (1.7)**	**22 (2.7)**	**259 (3.7)**
Illinois	**29 (4.0)**	**258 (3.6)**	**44 (4.1)**	**258 (2.3)**	**28 (3.5)**	**255 (3.7)**
New Hampshire	**27 (1.4)**	**272 (2.2)**	**47 (1.6)**	**270 (1.5)**	**25 (1.2)**	**274 (2.3)**
Connecticut	**27 (2.9)**	**266 (2.5)**	**52 (2.7)**	**263 (1.9)**	**20 (2.0)**	**275 (2.9)**
Alabama	**26 (3.0)**	**251 (2.4)**	**50 (3.9)**	**247 (1.7)**	**24 (3.2)**	**249 (3.4)**
Iowa	25 (3.5)	282 (2.8)	54 (4.1)	271 (1.6)	21 (3.3)	274 (2.8)
California	25 (3.1)	259 (2.7)	53 (3.0)	254 (2.0)	22 (2.5)	256 (2.6)
Kentucky	25 (3.4)	256 (2.5)	49 (3.6)	251 (1.7)	26 (3.4)	253 (2.6)
District of Columbia	25 (0.9)	229 (1.9)	56 (0.9)	225 (1.2)	19 (1.0)	246 (3.4)
New Mexico	25 (1.1)	256 (2.0)	43 (1.2)	258 (1.4)	33 (1.3)	258 (1.3)
Ohio	**23 (3.1)**	**264 (2.7)**	**50 (3.0)**	**259 (1.9)**	**27 (2.6)**	**264 (2.4)**
North Dakota	**23 (3.0)**	**280 (1.8)**	**57 (3.2)**	**276 (2.3)**	**20 (1.8)**	**279 (1.8)**
Maryland	**22 (2.5)**	**254 (3.1)**	**48 (2.7)**	**254 (2.2)**	**30 (2.2)**	**264 (2.7)**
Guam	**22 (0.9)**	**253 (1.6)**	**50 (0.6)**	**234 (1.1)**	**28 (0.8)**	**226 (1.5)**
Colorado	**20 (3.1)**	**269 (2.4)**	**48 (3.5)**	**264 (1.6)**	**31 (2.8)**	**263 (1.9)**
Michigan	20 (2.9)	261 (3.0)	49 (3.6)	260 (1.7)	31 (3.3)	263 (2.4)
Minnesota	19 (3.0)	270 (2.5)	54 (3.5)	273 (1.6)	27 (2.9)	275 (2.1)
Oregon	19 (2.1)	271 (2.9)	55 (3.2)	269 (1.7)	26 (2.7)	271 (2.4)
Nebraska	19 (2.6)	279 (1.8)	58 (3.3)	273 (1.7)	23 (2.3)	271 (2.6)
Virginia	18 (2.1)	266 (3.5)	48 (2.4)	259 (1.9)	34 (2.4)	259 (2.7)
Florida	**18 (2.4)**	**255 (2.7)**	**50 (3.3)**	**252 (1.8)**	**32 (3.1)**	**251 (2.6)**
Hawaii	**17 (0.7)**	**264 (1.7)**	**49 (0.9)**	**250 (1.1)**	**34 (0.9)**	**251 (1.6)**
Oklahoma	**17 (2.6)**	**262 (2.4)**	**54 (4.2)**	**261 (1.8)**	**28 (3.2)**	**256 (2.7)**
North Carolina	**17 (2.4)**	**254 (2.5)**	**54 (3.0)**	**247 (1.6)**	**29 (2.7)**	**253 (2.8)**
Wisconsin	**17 (2.7)**	**278 (2.9)**	**60 (3.6)**	**270 (1.7)**	**23 (3.1)**	**275 (3.0)**
Rhode Island	17 (0.7)	261 (2.1)	44 (1.5)	255 (1.2)	39 (1.3)	255 (1.6)
Pennsylvania	17 (2.7)	259 (2.6)	49 (2.9)	261 (2.2)	34 (3.0)	270 (4.3)
Delaware	17 (0.9)	256 (1.9)	57 (1.4)	253 (1.5)	26 (1.1)	262 (2.1)
Arkansas	16 (2.5)	254 (2.7)	57 (3.1)	252 (1.5)	27 (2.9)	256 (1.9)
Indiana	15 (2.4)	263 (2.8)	55 (3.1)	263 (1.7)	30 (3.0)	268 (3.0)
Wyoming	**15 (0.9)**	**274 (1.5)**	**50 (0.6)**	**266 (1.0)**	**35 (1.2)**	**272 (1.4)**
Arizona	**14 (1.6)**	**260 (3.7)**	**53 (2.4)**	**258 (1.5)**	**33 (2.3)**	**256 (2.1)**
Louisiana	**14 (2.4)**	**238 (4.1)**	**56 (4.0)**	**243 (2.1)**	**30 (3.9)**	**241 (2.7)**
West Virginia	**14 (2.6)**	**252 (2.5)**	**49 (4.0)**	**254 (1.2)**	**37 (3.9)**	**256 (2.2)**
Idaho	14 (0.7)	269 (2.2)	53 (1.5)	269 (1.2)	34 (1.5)	268 (1.7)
Virgin Islands	11 (0.2)	219 (1.6)	38 (1.0)	227 (1.4)	51 (1.0)	222 (1.3)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

390

TABLE 15.12 | **Teachers' Reports on the Instructional Emphasis Placed on Data Analysis, Statistics, and Probability**

GRADE 8 PUBLIC SCHOOLS	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Data Analysis Proficiency	Percent of Students	Data Analysis Proficiency	Percent of Students	Data Analysis Proficiency
NATION	14 (2.2)	269 (4.3)	32 (3.6)	264 (3.5)	53 (4.4)	261 (2.9)
Northeast	12 (6.1)	*** (***)	42 (6.9)	265 (5.7)	46(10.1)	279 (5.4)!
Southeast	19 (5.9)	274 (5.8)!	27 (8.0)	258 (9.9)!	54(10.4)	246 (5.4)!
Central	12 (2.5)	262 (7.5)	31 (7.5)	260 (8.3)!	57 (8.8)	264 (5.6)
West	14 (3.7)	264(10.6)!	32 (6.2)	270 (6.3)	54 (6.3)	262 (4.9)
STATES						
Alabama	**11 (1.8)**	**242 (5.6)**	**34 (3.3)**	**255 (2.3)**	**55 (3.2)**	**251 (2.2)**
Arizona	**7 (1.3)**	**252 (3.9)**	**25 (3.0)**	**261 (3.2)**	**67 (3.1)**	**257 (1.8)**
Arkansas	**9 (2.3)**	**259 (5.1)!**	**27 (3.5)**	**257 (2.5)**	**63 (3.9)**	**253 (1.9)**
California	**17 (2.7)**	**263 (5.0)**	**34 (2.8)**	**256 (2.6)**	**48 (3.1)**	**251 (2.8)**
Colorado	14 (2.0)	271 (2.8)	23 (3.0)	266 (2.9)	63 (3.5)	270 (1.5)
Connecticut	16 (3.2)	279 (3.3)	30 (3.5)	273 (2.9)	55 (3.1)	270 (2.1)
Delaware	17 (0.7)	274 (2.0)	22 (1.1)	252 (2.4)	61 (1.1)	261 (1.3)
District of Columbia	31 (0.8)	220 (1.7)	41 (1.0)	219 (2.3)	28 (1.0)	236 (1.8)
Florida	16 (2.0)	256 (3.1)	26 (2.2)	258 (3.1)	58 (2.7)	255 (2.4)
Georgia	**24 (2.6)**	**256 (3.0)**	**34 (3.1)**	**260 (2.4)**	**42 (3.4)**	**259 (2.8)**
Hawaii	**9 (0.6)**	**250 (3.2)**	**18 (0.8)**	**254 (2.7)**	**73 (0.8)**	**240 (1.4)**
Idaho	**9 (0.8)**	**273 (3.3)**	**21 (1.1)**	**277 (1.6)**	**70 (1.3)**	**273 (1.1)**
Illinois	**14 (3.0)**	**253 (6.3)!**	**29 (3.5)**	**263 (3.2)**	**57 (3.8)**	**265 (3.2)**
Indiana	**4 (1.3)**	**282 (5.0)!**	**21 (2.5)**	**269 (4.2)**	**75 (2.7)**	**269 (1.6)**
Iowa	4 (1.7)	293 (8.6)!	29 (3.9)	281 (2.9)	67 (4.3)	279 (1.3)
Kentucky	15 (2.7)	262 (2.9)	30 (3.3)	259 (2.8)	55 (3.6)	255 (2.1)
Louisiana	11 (2.2)	243 (7.4)	28 (3.5)	247 (3.8)	60 (3.8)	241 (2.3)
Maryland	14 (2.0)	257 (4.5)	29 (2.2)	254 (3.0)	57 (2.5)	265 (2.1)
Michigan	10 (2.1)	259 (7.4)!	26 (3.3)	262 (4.2)	64 (3.3)	266 (2.1)
Minnesota	**8 (1.8)**	**287 (3.3)!**	**22 (2.3)**	**280 (2.2)**	**69 (2.6)**	**279 (1.3)**
Montana	**13 (2.3)**	**287 (3.0)**	**29 (2.6)**	**285 (1.8)**	**59 (2.5)**	**281 (1.4)**
Nebraska	**8 (1.5)**	**287 (3.3)**	**25 (3.0)**	**277 (2.3)**	**67 (2.8)**	**279 (1.5)**
New Hampshire	**15 (0.8)**	**269 (3.6)**	**29 (1.6)**	**275 (1.8)**	**55 (1.5)**	**276 (1.6)**
New Jersey	**14 (1.8)**	**263 (3.7)**	**24 (3.0)**	**261 (3.9)**	**62 (3.3)**	**275 (2.0)**
New Mexico	14 (0.9)	255 (3.3)	30 (1.3)	260 (2.6)	56 (1.3)	249 (1.3)
New York	24 (2.8)	272 (3.9)	33 (3.1)	268 (3.1)	43 (2.8)	254 (3.0)
North Carolina	13 (2.2)	251 (4.0)	27 (2.7)	249 (2.6)	60 (3.0)	247 (1.9)
North Dakota	9 (2.6)	286 (3.7)!	17 (2.2)	286 (4.9)	74 (2.6)	286 (1.4)
Ohio	13 (2.3)	270 (4.4)	23 (2.9)	270 (3.4)	64 (3.2)	266 (2.1)
Oklahoma	**6 (1.6)**	**264 (6.7)!**	**26 (3.4)**	**271 (2.7)**	**68 (3.7)**	**263 (1.9)**
Oregon	**17 (1.8)**	**287 (3.7)**	**31 (3.4)**	**276 (2.5)**	**52 (3.4)**	**270 (2.1)**
Pennsylvania	**6 (1.1)**	**266 (3.5)**	**17 (2.4)**	**265 (4.6)**	**77 (2.6)**	**269 (2.4)**
Rhode Island	**10 (0.5)**	**274 (2.6)**	**19 (0.7)**	**265 (1.8)**	**71 (0.9)**	**254 (1.1)**
Texas	**20 (2.5)**	**259 (4.4)**	**33 (3.2)**	**251 (2.7)**	**47 (3.3)**	**253 (2.3)**
Virginia	10 (1.8)	270 (5.0)	29 (2.8)	267 (2.5)	60 (2.9)	260 (2.2)
West Virginia	8 (2.0)	259 (3.7)!	27 (3.5)	256 (2.1)	65 (3.6)	256 (1.8)
Wisconsin	8 (1.8)	284 (3.7)!	29 (3.3)	275 (2.4)	63 (3.7)	279 (1.8)
Wyoming	6 (0.7)	278 (2.6)	18 (1.4)	274 (1.5)	75 (1.9)	274 (0.9)
TERRITORIES						
Guam	**12 (0.6)**	**248 (3.4)**	**34 (0.9)**	**226 (1.4)**	**55 (1.1)**	**198 (1.6)**
Virgin Islands	**11 (0.4)**	**197 (2.6)**	**21 (0.9)**	**191 (3.0)**	**68 (1.0)**	**190 (1.6)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. To determine the emphasis placed on Data Analysis, Statistics, and Probability, teacher responses were averaged across two topics: tables and graphs, and probability and statistics. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 15.13 | **Teachers' Reports on the Instructional Emphasis Placed on Data Analysis, Statistics, and Probability Organized by the Percentage of Students Receiving Heavy Emphasis**

GRADE 8 PUBLIC SCHOOLS	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Data Analysis Proficiency	Percent of Students	Data Analysis Proficiency	Percent of Students	Data Analysis Proficiency
STATES/TERRITORIES						
District of Columbia	31 (0.8)	220 (1.7)	41 (1.0)	219 (2.3)	28 (1.0)	236 (1.8)
Georgia	24 (2.6)	256 (3.0)	34 (3.1)	260 (2.4)	42 (3.4)	259 (2.8)
New York	24 (2.8)	272 (3.9)	33 (3.1)	268 (3.1)	43 (2.8)	254 (3.0)
Texas	20 (2.5)	259 (4.4)	33 (3.2)	251 (2.7)	47 (3.3)	253 (2.3)
California	**17 (2.7)**	**263 (5.0)**	**34 (2.6)**	**256 (2.8)**	**48 (3.1)**	**251 (2.8)**
Delaware	**17 (0.7)**	**274 (2.0)**	**22 (1.1)**	**252 (2.4)**	**61 (1.1)**	**261 (1.3)**
Oregon	**17 (1.6)**	**267 (3.7)**	**31 (3.4)**	**276 (2.5)**	**52 (3.4)**	**270 (2.1)**
Florida	**16 (2.0)**	**256 (3.1)**	**26 (2.2)**	**258 (3.1)**	**58 (2.7)**	**255 (2.4)**
Connecticut	**16 (3.2)**	**279 (3.3)**	**30 (3.5)**	**273 (2.9)**	**55 (3.1)**	**270 (2.1)**
New Hampshire	16 (0.8)	269 (3.8)	29 (1.6)	275 (1.8)	55 (1.5)	276 (1.6)
Kentucky	15 (2.7)	262 (2.9)	30 (3.3)	259 (2.8)	55 (3.6)	255 (2.1)
Colorado	14 (2.0)	271 (2.8)	23 (3.0)	266 (2.9)	63 (3.5)	270 (1.5)
New Jersey	14 (1.6)	263 (3.7)	24 (3.0)	261 (3.9)	62 (3.3)	275 (2.0)
Illinois	14 (3.0)	253 (6.3)!	29 (3.5)	263 (3.2)	57 (3.8)	265 (3.2)
New Mexico	**14 (0.9)**	**255 (3.3)**	**30 ([illegible])**	**260 (2.6)**	**56 (1.3)**	**249 (1.3)**
Maryland	**14 (2.0)**	**257 (4.5)**	**29 (2.2)**	**254 (3.0)**	**57 (2.5)**	**265 (2.1)**
North Carolina	**13 (2.2)**	**251 (4.0)**	**27 (2.7)**	**249 (2.5)**	**60 (3.0)**	**247 (1.9)**
Ohio	**13 (2.3)**	**270 (4.4)**	**23 (2.9)**	**270 (3.4)**	**64 (3.2)**	**266 (2.1)**
Montana	**13 (2.3)**	**267 (3.0)**	**29 (2.6)**	**265 (1.8)**	**59 (2.5)**	**281 (1.4)**
Guam	12 (0.6)	248 (3.4)	34 (0.9)	226 (1.4)	55 (1.1)	198 (1.6)
Alabama	11 (1.8)	242 (5.6)	34 (3.3)	255 (2.3)	55 (3.2)	251 (2.2)
Louisiana	11 (2.2)	243 (7.4)	28 (3.5)	247 (3.8)	60 (3.8)	241 (2.3)
Virgin Islands	11 (0.4)	197 (2.8)	21 (0.9)	191 (3.0)	68 (1.0)	199 (1.6)
Virginia	10 (1.8)	270 (5.0)	29 (2.8)	267 (2.5)	60 (2.9)	260 (2.2)
Michigan	**10 (2.1)**	**259 (7.4)!**	**26 (3.3)**	**262 (4.2)**	**64 (3.3)**	**266 (2.1)**
Rhode Island	**10 (0.5)**	**274 (2.8)**	**19 (0.7)**	**265 (1.8)**	**71 (0.9)**	**254 (1.1)**
Arkansas	**9 (2.3)**	**259 (5.1)!**	**27 (3.5)**	**257 (2.5)**	**63 (3.9)**	**253 (1.9)**
North Dakota	**9 (2.6)**	**286 (3.7)!**	**17 (2.2)**	**266 (4.9)**	**74 (2.6)**	**288 (1.4)**
Hawaii	**9 (0.6)**	**250 (3.2)**	**18 (0.8)**	**254 (2.7)**	**73 (0.8)**	**240 (1.4)**
Idaho	9 (0.8)	273 (3.3)	21 (1.1)	277 (1.6)	70 (1.3)	273 (1.1)
West Virginia	8 (2.0)	259 (3.7)!	27 (3.5)	256 (2.1)	65 (3.6)	256 (1.8)
Minnesota	8 (1.8)	287 (3.3)!	22 (2.3)	280 (2.2)	69 (2.6)	279 (1.3)
Wisconsin	8 (1.8)	284 (3.[illegible])!	29 (3.3)	275 (2.4)	63 (3.7)	279 (1.8)
Nebraska	8 (1.5)	287 (3.3)	25 (3.0)	277 (2.3)	67 (2.8)	279 (1.5)
Arizona	**7 (1.3)**	**252 (3.9)**	**25 (3.0)**	**261 (3.2)**	**67 (3.1)**	**257 (1.8)**
Pennsylvania	**6 (1.1)**	**266 (3.5)**	**17 (2.4)**	**265 (4.8)**	**77 (2.6)**	**269 (2.4)**
Wyoming	**6 (0.7)**	**278 (2.6)**	**18 (1.4)**	**274 (1.5)**	**75 (1.9)**	**274 (0.9)**
Oklahoma	**5 (1.6)**	**264 (6.7)!**	**26 (3.4)**	**271 (2.7)**	**68 (3.7)**	**263 (1.9)**
Iowa	4 (1.7)	293 (8.6)!	29 (3.9)	281 (2.9)	67 (4.3)	279 (1.3)
Indiana	4 (1.3)	282 (5.0)!	21 (2.5)	269 (4.2)	75 (2.7)	269 (1.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. To determine the emphasis placed on Data Analysis, Statistics, and Probability, teacher responses were averaged across two topics: tables and graphs, and probability and statistics. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 15.14 | **Teachers' Reports on the Instructional Emphasis Placed on Algebra and Functions**

GRADE 8 PUBLIC SCHOOLS	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Algebra and Functions Proficiency	Percent of Students	Algebra and Functions Proficiency	Percent of Students	Algebra and Functions Proficiency
NATION	46 (3.6)	275 (2.5)	34 (3.2)	252 (2.3)	20 (3.0)	243 (3.0)
Northeast	52(11.5)	273 (8.6)!	34 (7.1)	258 (5.8)!	14 (6.6)	*** (***)
Southeast	42 (6.0)	277 (5.6)	37 (5.8)	246 (3.7)	21 (8.1)	238 (6.7)!
Central	50 (7.6)	273 (3.6)	31 (6.7)	251 (3.7)!	19 (3.9)	242 (5.5)!
West	43 (5.6)	277 (5.2)	34 (5.4)	256 (4.3)	23 (5.1)	243 (4.2)!
STATES						
Alabama	41 (3.0)	266 (1.8)	38 (3.2)	246 (2.3)	21 (2.9)	234 (3.0)
Arizona	51 (2.8)	271 (2.0)	32 (2.8)	249 (2.2)	17 (1.9)	234 (2.5)
Arkansas	33 (2.8)	273 (2.1)	37 (3.6)	247 (1.6)	30 (3.7)	240 (1.9)
California	45 (2.4)	273 (2.4)	36 (2.8)	248 (2.3)	19 (1.9)	236 (2.3)
Colorado	51 (3.5)	276 (1.7)	35 (2.7)	257 (1.6)	14 (2.6)	242 (3.5)
Connecticut	48 (2.6)	287 (1.6)	29 (2.3)	259 (2.2)	24 (2.2)	242 (2.1)
Delaware	39 (1.1)	285 (1.5)	32 (1.1)	253 (1.9)	30 (1.3)	233 (2.0)
District of Columbia	46 (1.0)	251 (1.4)	44 (1.0)	225 (1.2)	10 (0.6)	220 (2.0)
Florida	42 (2.2)	279 (2.0)	29 (2.2)	247 (1.8)	29 (2.3)	233 (2.1)
Georgia	47 (2.2)	272 (2.0)	25 (2.3)	248 (2.1)	28 (2.5)	236 (2.4)
Hawaii	29 (0.8)	283 (1.4)	34 (0.9)	245 (1.4)	36 (1.1)	226 (1.8)
Idaho	56 (1.5)	281 (0.9)	31 (1.5)	259 (1.3)	13 (0.9)	243 (2.4)
Illinois	55 (3.5)	272 (2.2)	34 (3.7)	254 (3.8)	12 (2.4)	239 (5.1)!
Indiana	45 (2.9)	284 (1.9)	33 (3.1)	259 (2.0)	22 (2.8)	241 (2.9)
Iowa	49 (4.4)	284 (2.1)	35 (3.9)	267 (1.5)	16 (3.2)	257 (3.1)
Kentucky	46 (2.9)	272 (1.8)	34 (3.1)	247 (1.5)	20 (2.8)	236 (2.8)
Louisiana	59 (2.7)	252 (1.6)	33 (2.8)	238 (2.7)	8 (1.9)	231 (3.4)!
Maryland	51 (2.4)	283 (2.3)	27 (2.0)	251 (2.7)	22 (2.0)	232 (2.8)
Michigan	47 (3.0)	277 (2.2)	35 (3.1)	258 (2.1)	17 (2.7)	243 (3.2)
Minnesota	50 (3.2)	285 (1.5)	41 (3.4)	266 (1.5)	8 (1.3)	248 (3.4)
Montana	58 (3.0)	281 (1.5)	32 (2.5)	278 (1.6)	10 (2.9)	268 (3.2)!
Nebraska	51 (3.5)	282 (1.9)	37 (3.5)	260 (1.5)	12 (1.7)	255 (4.4)
New Hampshire	47 (1.9)	284 (1.8)	29 (1.4)	264 (1.7)	24 (1.3)	253 (1.9)
New Jersey	55 (2.8)	280 (2.0)	32 (2.5)	258 (2.0)	13 (1.8)	245 (3.4)
New Mexico	53 (1.2)	267 (1.4)	32 (1.2)	249 (1.8)	15 (1.0)	236 (1.8)
New York	49 (3.0)	274 (2.0)	37 (2.8)	252 (2.2)	14 (1.7)	231 (3.3)
North Carolina	44 (2.6)	273 (1.8)	28 (2.7)	241 (1.8)	28 (2.3)	227 (1.7)
North Dakota	56 (3.4)	281 (1.2)	35 (3.7)	270 (2.9)	9 (1.9)	268 (4.6)!
Ohio	50 (3.0)	277 (1.8)	30 (3.0)	255 (2.0)	20 (2.8)	243 (2.0)
Oklahoma	55 (3.4)	270 (1.6)	30 (3.2)	257 (2.1)	15 (1.9)	246 (2.9)
Oregon	43 (2.7)	289 (1.5)	34 (2.8)	261 (2.3)	23 (2.5)	247 (2.2)
Pennsylvania	48 (2.8)	283 (1.9)	32 (2.7)	256 (1.9)	20 (2.3)	237 (2.6)
Rhode Island	43 (1.0)	286 (1.1)	30 (3.9)	253 (1.4)	27 (0.8)	232 (1.5)
Texas	52 (2.8)	284 (1.9)	35 (3.0)	246 (2.4)	13 (1.9)	237 (3.8)
Virginia	52 (2.3)	282 (2.3)	24 (2.1)	256 (3.0)	23 (2.0)	234 (2.2)
West Virginia	41 (2.6)	275 (1.7)	32 (3.8)	245 (1.9)	27 (3.6)	235 (2.0)
Wisconsin	48 (3.7)	284 (2.2)	38 (3.5)	262 (1.7)	14 (2.3)	255 (3.4)
Wyoming	48 (1.3)	282 (1.3)	39 (1.5)	264 (1.1)	13 (0.8)	247 (2.1)
TERRITORIES						
Guam	37 (0.8)	255 (1.1)	31 (0.9)	224 (1.3)	33 (0.8)	210 (1.3)
Virgin Islands	47 (0.8)	227 (1.0)	34 (0.7)	214 (1.2)	19 (0.7)	209 (3.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 15.15 | **Teachers' Reports on the Instructional Emphasis Placed on Algebra and Functions Organized by the Percentage of Students Receiving Heavy Emphasis**

GRADE 8 PUBLIC SCHOOLS	Heavy Emphasis		Moderate Emphasis		Little or No Emphasis	
	Percent of Students	Algebra and Functions Proficiency	Percent of Students	Algebra and Functions Proficiency	Percent of Students	Algebra and Functions Proficiency
STATES/TERRITORIES						
Louisiana	59 (2.7)	252 (1.6)	33 (2.6)	238 (2.7)	8 (1.9)	231 (3.4)!
Montana	58 (3.0)	281 (1.5)	32 (2.5)	276 (1.6)	10 (2.9)	268 (3.2)!
Idaho	56 (1.5)	281 (0.9)	31 (1.5)	259 (1.3)	13 (0.9)	243 (2.4)
North Dakota	56 (3.4)	281 (1.2)	35 (3.7)	270 (2.9)	9 (1.9)	268 (4.6)!
New Jersey	**55 (2.6)**	**260 (2.0)**	**32 (2.5)**	**258 (2.0)**	**13 (1.8)**	**245 (3.4)**
Illinois	**55 (3.5)**	**272 (2.2)**	**34 (3.7)**	**254 (3.8)**	**12 (2.4)**	**239 (5.1)!**
Oklahoma	**55 (3.4)**	**270 (1.6)**	**30 (3.2)**	**257 (2.1)**	**15 (1.9)**	**246 (2.9)**
New Mexico	**53 (1.2)**	**267 (1.4)**	**32 (1.2)**	**249 (1.8)**	**15 (1.0)**	**236 (1.8)**
Virginia	**52 (2.3)**	**262 (2.3)**	**24 (2.1)**	**256 (3.0)**	**23 (2.0)**	**234 (2.2)**
Texas	52 (2.8)	264 (1.9)	35 (3.0)	248 (2.4)	13 (1.9)	237 (3.8)
Maryland	51 (2.4)	283 (2.3)	27 (2.0)	251 (2.7)	22 (2.0)	232 (2.8)
Arizona	51 (2.8)	271 (2.0)	32 (2.8)	249 (2.2)	17 (1.9)	234 (2.5)
Nebraska	51 (3.5)	282 (1.9)	37 (3.5)	269 (1.5)	12 (1.7)	255 (4.4)
Colorado	51 (3.5)	276 (1.7)	36 (2.7)	257 (1.6)	14 (2.6)	242 (3.5)
Minnesota	**50 (3.2)**	**285 (1.5)**	**41 (3.4)**	**268 (1.5)**	**8 (1.3)**	**248 (3.4)**
Ohio	**50 (3.0)**	**277 (1.8)**	**30 (3.0)**	**256 (2.0)**	**20 (2.6)**	**243 (2.0)**
New York	**49 (3.0)**	**274 (2.0)**	**37 (2.6)**	**252 (2.2)**	**14 (1.7)**	**231 (3.3)**
Iowa	**49 (4.4)**	**284 (2.1)**	**35 (3.9)**	**267 (1.5)**	**16 (3.2)**	**257 (3.1)**
Pennsylvania	**48 (2.6)**	**283 (1.9)**	**32 (2.7)**	**256 (1.9)**	**20 (2.3)**	**237 (2.6)**
Wisconsin	48 (3.7)	284 (2.2)	38 (3.5)	262 (1.7)	14 (2.3)	255 (3.4)
Wyoming	48 (1.3)	282 (1.3)	39 (1.5)	264 (1.1)	13 (0.6)	247 (2.1)
Connecticut	48 (2.6)	287 (1.6)	29 (2.3)	259 (2.2)	24 (2.2)	242 (2.1)
Michigan	47 (3.0)	277 (2.2)	35 (3.1)	258 (2.1)	17 (2.7)	243 (3.2)
Georgia	47 (2.2)	272 (2.0)	25 (2.3)	248 (2.1)	28 (2.5)	236 (2.4)
New Hampshire	**47 (1.9)**	**284 (1.8)**	**29 (1.4)**	**264 (1.7)**	**24 (1.3)**	**253 (1.9)**
Virgin Islands	**47 (0.6)**	**227 (1.0)**	**34 (0.7)**	**214 (1.2)**	**19 (0.7)**	**209 (3.8)**
Kentucky	**46 (2.9)**	**272 (1.8)**	**34 (3.1)**	**247 (1.5)**	**20 (2.6)**	**236 (2.8)**
District of Columbia	**46 (1.0)**	**251 (1.4)**	**44 (1.0)**	**225 (1.2)**	**10 (0.6)**	**220 (2.0)**
California	**46 (2.4)**	**273 (2.4)**	**36 (2.6)**	**248 (2.3)**	**19 (1.9)**	**236 (2.3)**
Indiana	45 (2.9)	284 (1.9)	33 (3.1)	259 (2.0)	22 (2.8)	241 (2.9)
North Carolina	44 (2.6)	273 (1.8)	28 (2.7)	241 (1.8)	28 (2.3)	227 (1.7)
Oregon	43 (2.7)	289 (1.5)	34 (2.6)	261 (2.3)	23 (2.5)	247 (2.2)
Rhode Island	43 (1.0)	286 (1.1)	30 (0.9)	253 (1.4)	27 (0.8)	232 (1.5)
Florida	42 (2.2)	279 (2.0)	29 (2.2)	247 (1.8)	29 (2.3)	233 (2.1)
Alabama	**41 (3.0)**	**266 (1.8)**	**38 (3.2)**	**246 (2.3)**	**21 (2.9)**	**234 (3.0)**
West Virginia	**41 (2.6)**	**275 (1.7)**	**32 (3.6)**	**245 (1.9)**	**27 (3.6)**	**235 (2.0)**
Delaware	**39 (1.1)**	**265 (1.5)**	**32 (1.1)**	**253 (1.9)**	**30 (1.3)**	**233 (2.0)**
Guam	**37 (0.8)**	**255 (1.1)**	**31 (0.9)**	**224 (1.3)**	**33 (0.8)**	**210 (1.3)**
Arkansas	33 (2.8)	273 (2.1)	37 (3.6)	247 (1.6)	30 (3.7)	240 (1.9)
Hawaii	29 (0.8)	283 (1.4)	34 (0.9)	245 (1.4)	36 (1.1)	226 (1.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 15.16 | **Teachers' Reports on Placing Heavy Instructional Emphasis on Specific Mathematics Skills and Abilities**

GRADE 8 PUBLIC SCHOOLS	Learning Mathematics Facts and Concepts		Learning Skills and Procedures Needed to Solve Problems		Developing Reasoning Ability to Solve Unique Problems		Learning How to Communicate Ideas in Mathematics Effectively	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	55 (4.2)	264 (2.1)	67 (3.9)	264 (1.9)	45 (3.4)	269 (2.7)	37 (3.6)	264 (3.1)
Northeast	57(12.8)	268 (6.5)!	69(13.7)	269 (4.8)!	47(10.7)	272 (8.0)!	25 (8.7)	259(15.2)!
Southeast	69 (9.1)	260 (2.6)	74 (8.2)	256 (2.9)	49 (6.8)	265 (5.1)	47 (8.0)	256 (4.3)!
Central	41 (7.7)	263 (5.1)	55 (6.2)	264 (3.9)	29 (4.7)	273 (5.6)	23 (6.1)	264 (7.8)!
West	53 (5.7)	265 (4.3)	69 (5.4)	265 (3.7)	54 (6.0)	270 (4.4)	46 (5.8)	271 (5.0)
STATES								
Alabama	60 (4.2)	253 (1.6)	70 (3.2)	254 (1.5)	48 (3.7)	258 (1.6)	43 (3.8)	257 (2.0)
Arizona	58 (3.0)	258 (1.6)	60 (2.7)	259 (1.7)	43 (2.7)	267 (2.4)	38 (2.9)	263 (2.6)
Arkansas	61 (3.5)	258 (1.2)	65 (3.7)	256 (1.3)	36 (3.1)	266 (1.7)	31 (3.4)	263 (2.4)
California	54 (2.9)	257 (1.8)	61 (3.4)	256 (1.8)	50 (2.9)	268 (2.2)	41 (3.4)	264 (2.5)
Colorado	52 (3.2)	265 (1.8)	64 (3.1)	267 (1.6)	50 (3.1)	273 (1.5)	45 (2.9)	272 (1.5)
Connecticut	53 (3.3)	270 (1.8)	61 (3.2)	272 (1.5)	47 (3.1)	282 (1.6)	41 (3.1)	279 (1.7)
Delaware	60 (1.8)	263 (1.1)	61 (1.7)	265 (1.1)	47 (1.5)	273 (1.3)	37 (1.4)	275 (1.7)
District of Columbia	62 (1.1)	232 (0.9)	68 (0.9)	233 (1.0)	65 (1.1)	236 (1.0)	63 (1.0)	236 (1.0)
Florida	62 (3.1)	257 (1.6)	68 (2.6)	258 (1.6)	46 (2.6)	267 (2.0)	43 (3.1)	262 (2.0)
Georgia	65 (2.8)	255 (1.5)	72 (2.5)	256 (1.6)	50 (2.4)	265 (1.9)	52 (3.2)	261 (1.8)
Hawaii	60 (0.9)	252 (0.9)	66 (1.0)	253 (0.9)	42 (0.8)	264 (1.2)	34 (1.0)	264 (1.3)
Idaho	59 (1.4)	271 (0.9)	65 (2.3)	273 (1.0)	39 (1.5)	280 (1.1)	41 (2.1)	277 (1.2)
Illinois	61 (4.0)	261 (2.5)	69 (3.8)	261 (2.3)	48 (3.9)	271 (1.9)	36 (3.6)	265 (3.3)
Indiana	65 (3.6)	265 (1.7)	69 (3.3)	268 (1.8)	35 (3.4)	281 (2.7)	35 (3.7)	276 (2.8)
Iowa	54 (4.2)	278 (1.6)	64 (4.0)	279 (1.5)	38 (4.2)	284 (2.0)	28 (3.6)	285 (2.5)
Kentucky	72 (3.5)	256 (1.5)	69 (3.3)	256 (1.5)	44 (3.4)	265 (1.8)	44 (3.7)	262 (2.4)
Louisiana	64 (3.7)	244 (1.6)	68 (3.8)	245 (1.6)	38 (3.9)	251 (1.9)	40 (4.3)	248 (2.4)
Maryland	55 (2.8)	260 (1.9)	64 (2.7)	261 (1.8)	53 (2.8)	271 (2.3)	48 (3.2)	268 (2.2)
Michigan	58 (3.4)	265 (1.8)	64 (3.4)	266 (1.8)	43 (3.6)	271 (2.4)	35 (3.2)	270 (2.8)
Minnesota	47 (3.3)	278 (1.6)	62 (3.7)	277 (1.3)	36 (3.3)	283 (1.9)	29 (3.4)	282 (2.3)
Montana	52 (2.9)	280 (1.2)	56 (2.5)	280 (1.2)	45 (2.8)	284 (1.2)	33 (2.0)	286 (1.6)
Nebraska	57 (2.3)	278 (1.4)	62 (3.2)	279 (1.2)	39 (3.1)	283 (1.4)	31 (2.9)	282 (1.3)
New Hampshire	63 (1.9)	274 (1.1)	62 (1.8)	273 (1.3)	45 (1.6)	282 (1.3)	37 (1.7)	281 (1.4)
New Jersey	70 (3.0)	270 (1.8)	72 (2.9)	269 (1.5)	49 (3.5)	278 (2.2)	46 (3.6)	276 (2.2)
New Mexico	61 (1.1)	256 (1.1)	70 (1.0)	256 (0.9)	48 (1.5)	262 (1.2)	40 (1.4)	263 (1.4)
New York	56 (3.6)	261 (2.1)	63 (3.6)	260 (2.1)	41 (3.0)	271 (2.4)	37 (3.5)	264 (2.6)
North Carolina	59 (3.4)	250 (1.5)	65 (3.4)	251 (1.3)	46 (3.2)	262 (1.7)	44 (3.1)	258 (1.7)
North Dakota	49 (3.7)	283 (2.1)	64 (2.6)	284 (1.5)	33 (2.9)	288 (1.6)	25 (2.9)	286 (1.9)
Ohio	59 (3.4)	265 (1.9)	67 (3.5)	266 (1.4)	42 (3.6)	273 (2.3)	36 (4.0)	271 (2.3)
Oklahoma	64 (3.7)	263 (1.3)	66 (3.5)	265 (1.3)	41 (3.4)	270 (1.8)	40 (4.0)	268 (1.7)
Oregon	52 (3.2)	272 (1.7)	56 (3.3)	272 (1.6)	49 (3.2)	281 (1.7)	36 (2.6)	279 (2.2)
Pennsylvania	65 (3.4)	270 (1.9)	75 (2.2)	267 (1.8)	48 (3.8)	275 (2.5)	43 (3.5)	275 (2.8)
Rhode Island	69 (1.2)	260 (0.8)	65 (1.0)	260 (0.8)	43 (1.3)	274 (1.1)	37 (1.3)	268 (1.2)
Texas	61 (3.1)	258 (1.8)	66 (3.4)	258 (1.7)	45 (3.1)	261 (2.2)	42 (3.1)	257 (2.6)
Virginia	64 (2.9)	265 (1.7)	75 (2.6)	263 (1.5)	46 (2.5)	275 (2.4)	46 (2.9)	271 (2.4)
West Virginia	62 (3.9)	256 (1.2)	69 (3.3)	257 (1.2)	44 (3.5)	265 (1.9)	38 (3.1)	263 (2.2)
Wisconsin	53 (4.1)	273 (1.3)	63 (3.6)	274 (1.9)	38 (2.9)	283 (1.7)	24 (3.0)	282 (2.9)
Wyoming	48 (1.9)	273 (0.9)	61 (1.8)	2,2 (0.9)	37 (1.2)	280 (1.1)	37 (1.1)	279 (1.0)
TERRITORIES								
Guam	42 (0.8)	230 (1.0)	37 (0.8)	241 (1.2)	15 (0.7)	258 (2.6)	19 (0.4)	243 (1.8)
Virgin Islands	43 (0.9)	214 (0.9)	55 (0.9)	217 (0.7)	30 (0.7)	221 (0.8)	36 (0.8)	221 (1.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

3?5

Chapter 16

Students' Perceptions of Mathematics at Grade 8 in the States

INTRODUCTION

Many new national reforms in mathematics education highlight the importance of developing a lasting appreciation and positive attitude toward the use of mathematics to solve problems. Also, the attrition in the mathematics pipeline as students progress through school suggests that greater effort needs to be exerted in helping all students understand the power and utility of mathematics.[105]

To collect information about their perceptions of mathematics, eighth graders were asked to agree or disagree with a set of five statements about their experiences with the subject area and its utility (see Chapter Nine). The responses were averaged across statements to create a summary index of students' overall perceptions and the results are presented in TABLE 16.1. The summary measure indicates only a small range of variation across states. In almost all the states, between one-fourth and one-third of the students reported strong positive perceptions and attitudes toward mathematics, on average. However, slightly beyond the ends of this narrow range, more than one-third of the students in the District of Columbia (38 percent) and the Virgin Islands (37 percent), and slightly fewer than one-fifth of the students in Guam (19 percent) reported a strong positive perception.

In every state, there was a direct relationship between the degree of students' positive perceptions and mathematics proficiency, with those having the most positive perceptions also having the higher mathematics achievement.

---

[105] *Curriculum and Evaluation Standards for School Mathematics* (Reston, VA: National Council of Teachers of Mathematics 1990).

Everybody Counts: A Report to the Nation on the Future of Mathematics Education (Washington, DC: National Research Council, National Academy Press, 1989).

PERSONAL EXPERIENCE WITH MATHEMATICS

Students' responses to the statement "I like mathematics" are presented in TABLE 16.2. Similar to the results for the summary measure, those students who reported more interest in mathematics had higher average proficiency. Although 32 percent of the eighth graders in the District of Columbia reported a strong liking of mathematics, students in other states were less enthusiastic, with only 14 to 25 percent strongly agreeing. Across the other states and territories, from 35 to 46 percent of the students reported either neutral or negative feelings about liking mathematics.

Confidence in one's mathematical abilities are shown to be a strong predictor of mathematics performance.[106] Students' responses to the statement "I am good at mathematics" are presented in TABLE 16.3 (alphabetically) and in TABLE 16.5 (organized by percentage of strong agreement). Within each state, the NAEP results support research showing a link between a higher degree of confidence and better performance. However, the results across states do not follow this pattern, because fewer public-school eighth graders in some of the higher-performing states (e.g., North Dakota, Montana, and Idaho) reported strong confidence in their mathematical abilities than did students in some of the lower-performing states. For example, more students in the District of Columbia (28 percent) than in any other state strongly agreed that they were good at mathematics. In most states, about two-thirds of the students strongly agreed or agreed that they were good in mathematics. United States students' high degree of confidence in their mathematical abilities despite lower performance levels, parallels that found in some international surveys. For example, in the 1988 International Assessment of Educational Progress, the highest-achieving country, Korea, had the lowest percentage of students reporting they were good at mathematics. In contrast, the lowest-achieving country, the United States, had the highest percentage of students reporting that they were good at mathematics.[107]

[106] Margaret R. Meyer and Mary Schatz Koehler, *"Internal Influences on Gender Differences in Mathematics"* and Gender (New York, NY: Teachers College Press, 1990).

[107] Archie E. Lapointe, Nancy A. Mead, and Gary W. Phillips, *A World of Differences, An International Assessment of Mathematics and Science* (Princeton, NJ: Educational Testing Service, 1989).

Mathematics achievement results have shown persistent gender differences, particularly at higher performance levels, and research indicates that some of these differences stem om the lack of positive reinforcement provided to females.[108] Thus, eighth graders attending public schools were asked if they agreed or disagreed with the statement "Mathematics is more for boys than for girls." The results are presented in TABLE 16.5. Across the states, only about half the students registered strong disagreement with this statement, although 64 percent of the eighth graders in New Hampshire, 60 percent in Oregon, and 59 percent in Iowa and Wisconsin strongly disagreed. Slightly fewer than half the public-school eighth graders (47 to 49 percent) in a number of south-eastern states strongly disagreed with the statement, including those in Alabama, Florida, Kentucky, and Louisiana. This lower amount of strong disagreement also occurred in Guam, the Virgin Islands, and Hawaii (one of the few states where females tended to outperform males). At least 10 percent of the students in each state did not either strongly disagree or disagree with the statement.

PERCEPTIONS ABOUT THE UTILITY OF MATHEMATICS

Students' perceptions about the utility of mathematics were measured by asking about the degree of their agreement with two statements -- "Mathematics is useful for solving everyday problems" and "Almost all people use mathematics in their jobs." As shown in TABLES 16.6 and 16.7, eighth graders attending public schools responded similarly to the two questions, although there is some indication that they perceived mathematics to be more useful on the job than in everyday activities.

From 17 percent (Iowa) to 27 percent (Arizona) of the eighth graders did not agree at any level that mathematics is useful for solving everyday problems, whereas from 27 percent (Arizona and Rhode Island) to 47 percent (the Virgin Islands) strongly agreed. From 9 percent (the Virgin Islands) to 20 percent (Rhode Island) of the eighth grades did not indicate any amount of agreement with the idea that mathematics is used by almost all people in their jobs, while from 28 percent (New Jersey) to 50 percent (the Virgin Islands)

---

[108]Elizabeth Fennema, *"Justice, Equity, and Mathematics Education"* in Mathematics and Gender (New York, NY: Teacher College Press, 1990).

strongly agreed. In addition to New Jersey, other states reporting the lowest degree of strong agreement with this statement tended to be in the Northeast, with Connecticut, New York, and Rhode Island reporting 28 to 29 percent.

SUMMARY

In general, public school eighth graders across the states participating in NAEP's 1990 Trial State Assessment Program had positive perceptions toward mathematics. Within each state, a higher degree of positive agreement was associated with higher proficiency. This relationship did not, however, hold across states, because more students in some of the lower-performing states and fewer students in some of the higher-performing states reported positive attitudes.

Although only about one-fifth or fewer of the eighth graders strongly agreed that they liked mathematics or that they were good at it, an additional one-half or so agreed with these statements. Again, more eighth-grade students in some the lower-performing states tended to have strong confidence in their mathematics abilities, while fewer students in some higher-performing states reported strong confidence.

The gender gap in achievement favoring males appears to be reinforced by some sentiment that mathematics is more for boys than it is for girls. Across the states only about half the students strongly disagreed, and at least 10 percent in each state did not either strongly disagree or disagree with this idea.

When asked about the utility of mathematics, about one-third of the students across the states strongly agreed that it is useful for solving everyday problems and that almost all people use it in their jobs. However, more students showed lack of agreement with the utility of mathematics in everyday activities (from 16 to 27 percent) than they did with its frequent use in the workplace (from 9 to 20 percent).

TABLE 16.1 | **Summary of Students' Positive Perceptions and Attitudes Toward Mathematics**

GRADE 8 PUBLIC SCHOOLS	Strongly Agree		Agree		Undecided, Disagree, or Strongly Disagree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	27 (1.3)	271 (1.9)	49 (1.0)	262 (1.7)	24 (1.2)	251 (1.8)
Northeast	26 (4.9)	278 (5.0)	53 (3.0)	270 (4.5)	21 (3.0)	261 (5.8)
Southeast	30 (2.7)	265 (3.7)	45 (2.1)	251 (3.4)	25 (3.0)	244 (2.7)
Central	25 (1.6)	272 (3.5)	50 (1.8)	267 (3.1)	25 (2.2)	256 (2.3)
West	27 (1.9)	273 (3.9)	48 (1.5)	262 (2.4)	25 (2.1)	249 (2.9)
STATES						
Alabama	**30 (1.1)**	**259 (1.4)**	**48 (0.9)**	**251 (1.6)**	**22 (1.2)**	**246 (1.4)**
Arizona	**25 (1.0)**	**271 (1.5)**	**49 (0.9)**	**260 (1.3)**	**26 (1.1)**	**250 (1.4)**
Arkansas	**28 (1.0)**	**263 (1.4)**	**48 (1.2)**	**257 (1.2)**	**24 (0.9)**	**247 (1.2)**
California	**25 (1.1)**	**266 (1.7)**	**51 (0.6)**	**257 (1.4)**	**23 (0.9)**	**244 (2.0)**
Colorado	27 (1.0)	277 (1.2)	50 (1.0)	268 (1.1)	22 (0.8)	255 (1.5)
Connecticut	28 (1.0)	279 (1.4)	52 (1.1)	270 (1.3)	21 (1.0)	259 (1.6)
Delaware	28 (1.1)	270 (1.3)	49 (1.3)	261 (1.0)	23 (1.0)	249 (1.5)
District of Columbia	38 (0.8)	238 (1.0)	48 (0.9)	229 (1.0)	14 (0.7)	221 (2.0)
Florida	26 (0.9)	262 (1.7)	51 (1.0)	255 (1.6)	23 (0.9)	249 (1.6)
Georgia	**29 (0.9)**	**263 (1.6)**	**50 (0.9)**	**260 (1.6)**	**21 (0.9)**	**251 (1.9)**
Hawaii	**25 (0.9)**	**262 (1.6)**	**47 (1.0)**	**251 (1.0)**	**28 (1.0)**	**242 (1.3)**
Idaho	**29 (0.9)**	**281 (1.1)**	**49 (1.0)**	**271 (0.8)**	**22 (1.1)**	**260 (1.5)**
Illinois	**27 (1.2)**	**267 (2.4)**	**52 (0.8)**	**260 (1.7)**	**20 (1.1)**	**253 (2.2)**
Indiana	**31 (1.2)**	**276 (1.4)**	**48 (1.0)**	**267 (1.3)**	**21 (0.9)**	**255 (1.9)**
Iowa	32 (1.0)	286 (1.3)	49 (1.0)	278 (1.2)	18 (0.9)	265 (1.5)
Kentucky	28 (1.2)	264 (1.3)	50 (1.1)	257 (1.4)	22 (0.9)	247 (1.5)
Louisiana	29 (1.1)	253 (1.7)	50 (0.9)	245 (1.4)	21 (1.1)	238 (1.5)
Maryland	30 (1.0)	267 (1.7)	51 (0.9)	261 (1.6)	20 (0.9)	250 (2.0)
Michigan	29 (1.1)	273 (1.7)	51 (1.0)	264 (1.2)	20 (0.9)	254 (1.8)
Minnesota	**26 (1.3)**	**269 (1.3)**	**51 (1.3)**	**276 (1.1)**	**23 (1.2)**	**263 (1.3)**
Montana	**30 (1.4)**	**292 (1.2)**	**50 (1.4)**	**279 (1.0)**	**20 (1.1)**	**267 (1.8)**
Nebraska	**33 (1.3)**	**287 (1.2)**	**49 (1.2)**	**275 (1.2)**	**18 (0.9)**	**261 (1.6)**
New Hampshire	**29 (1.3)**	**283 (1.5)**	**52 (1.4)**	**273 (0.9)**	**19 (1.2)**	**260 (1.5)**
New Jersey	**27 (1.1)**	**280 (1.7)**	**52 (1.0)**	**269 (1.2)**	**20 (1.0)**	**260 (1.8)**
New Mexico	26 (1.3)	268 (1.6)	51 (1.3)	256 (1.1)	23 (0.9)	243 (1.2)
New York	27 (1.0)	269 (1.7)	51 (1.1)	262 (1.5)	22 (1.0)	252 (1.7)
North Carolina	32 (1.0)	256 (1.3)	48 (1.0)	250 (1.3)	20 (0.9)	241 (1.4)
North Dakota	29 (1.5)	293 (1.5)	50 (1.4)	280 (1.5)	20 (1.1)	268 (2.2)
Ohio	32 (1.0)	273 (1.3)	48 (1.0)	263 (1.1)	20 (1.0)	253 (1.6)
Oklahoma	**29 (0.9)**	**271 (1.8)**	**51 (0.9)**	**262 (1.3)**	**20 (1.0)**	**254 (1.9)**
Oregon	**26 (1.0)**	**282 (1.4)**	**51 (1.0)**	**272 (1.2)**	**23 (0.9)**	**260 (1.3)**
Pennsylvania	**27 (1.0)**	**275 (2.1)**	**50 (0.9)**	**267 (1.8)**	**23 (1.0)**	**255 (1.9)**
Rhode Island	**24 (0.8)**	**268 (1.6)**	**53 (1.1)**	**261 (1.0)**	**23 (1.0)**	**250 (1.5)**
Texas	**31 (1.0)**	**266 (1.7)**	**48 (1.0)**	**257 (1.4)**	**22 (1.1)**	**248 (1.9)**
Virginia	29 (0.8)	269 (1.7)	50 (1.0)	265 (1.9)	21 (0.9)	255 (1.8)
West Virginia	28 (1.2)	266 (1.2)	50 (1.0)	255 (1.0)	22 (0.9)	245 (1.4)
Wisconsin	32 (1.1)	283 (1.7)	51 (1.1)	274 (1.3)	17 (0.8)	261 (1.6)
Wyoming	30 (0.8)	281 (0.8)	48 (1.0)	272 (0.9)	22 (0.7)	260 (1.4)
TERRITORIES						
Guam	**19 (1.1)**	**249 (1.8)**	**51 (1.6)**	**232 (1.1)**	**30 (1.4)**	**225 (1.2)**
Virgin Islands	**37 (1.4)**	**226 (1.1)**	**47 (1.2)**	**215 (1.0)**	**16 (0.9)**	**207 (1.9)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. These results are averaged across student responses to the five statements presented in Tables 16.2, 16.3, and 16.5 through 16.7, immediately following. For the summary, the direction of the responses to "Mathematics Is More for Boys than for Girls" was reversed to agree with the direction of the other four questions.

TABLE 16.2 | Students' Responses to the Statement "I Like Mathematics"

GRADE 8 PUBLIC SCHOOLS	Strongly Agree		Agree		Undecided, Disagree, or Strongly Disagree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	18 (1.2)	271 (2.1)	39 (1.2)	265 (1.9)	43 (1.8)	256 (1.6)
Northeast	17 (4.5)	278 (6.6)!	39 (3.5)	271 (4.5)	43 (6.8)	266 (4.4)
Southeast	21 (2.2)	262 (3.8)	37 (1.7)	254 (3.4)	42 (3.2)	249 (3.0)
Central	16 (1.3)	274 (3.8)	43 (2.6)	267 (3.4)	40 (2.9)	260 (2.5)
West	18 (1.9)	273 (4.1)	37 (2.3)	267 (3.8)	45 (2.3)	253 (2.1)
STATES						
Alabama	**21 (1.0)**	**257 (1.4)**	**41 (1.2)**	**255 (1.5)**	**38 (1.6)**	**248 (1.4)**
Arizona	**16 (0.8)**	**268 (2.4)**	**39 (1.1)**	**263 (1.3)**	**45 (1.3)**	**255 (1.2)**
Arkansas	**19 (0.9)**	**262 (1.9)**	**40 (0.9)**	**258 (1.2)**	**41 (1.1)**	**251 (0.9)**
California	**15 (0.6)**	**268 (2.3)**	**41 (1.0)**	**260 (1.6)**	**44 (1.1)**	**250 (1.5)**
Colorado	16 (0.9)	275 (1.7)	40 (0.9)	271 (1.2)	44 (1.2)	261 (1.2)
Connecticut	18 (0.8)	274 (2.1)	44 (1.1)	272 (1.5)	39 (1.3)	266 (1.3)
Delaware	21 (1.1)	268 (2.1)	40 (1.4)	263 (1.2)	39 (1.0)	255 (1.1)
District of Columbia	32 (1.2)	238 (1.5)	43 (1.2)	228 (1.3)	25 (1.0)	229 (1.7)
Florida	17 (0.7)	260 (2.0)	41 (1.3)	258 (1.6)	43 (1.4)	252 (1.2)
Georgia	**19 (0.7)**	**262 (2.1)**	**45 (1.1)**	**260 (1.5)**	**36 (1.1)**	**255 (1.6)**
Hawaii	**18 (0.6)**	**259 (1.8)**	**36 (0.7)**	**253 (1.1)**	**45 (0.9)**	**247 (1.0)**
Idaho	**17 (0.7)**	**281 (1.8)**	**40 (1.1)**	**276 (0.9)**	**43 (1.2)**	**264 (1.0)**
Illinois	**19 (1.0)**	**268 (2.1)**	**43 (1.3)**	**261 (2.2)**	**39 (1.5)**	**256 (1.8)**
Indiana	**20 (1.1)**	**279 (1.5)**	**43 (1.1)**	**270 (1.2)**	**38 (1.2)**	**258 (1.5)**
Iowa	20 (1.0)	289 (1.6)	44 (1.1)	281 (1.2)	36 (1.4)	269 (1.4)
Kentucky	20 (0.9)	265 (2.0)	42 (1.1)	258 (1.2)	38 (1.2)	251 (1.5)
Louisiana	21 (1.0)	252 (2.1)	40 (1.0)	246 (1.5)	39 (1.2)	243 (1.3)
Maryland	22 (1.0)	268 (1.9)	38 (1.1)	261 (1.7)	39 (1.2)	258 (1.9)
Michigan	18 (0.8)	272 (2.2)	43 (1.1)	265 (1.3)	39 (1.3)	260 (1.3)
Minnesota	**16 (1.0)**	**290 (1.9)**	**40 (1.1)**	**279 (1.1)**	**44 (1.3)**	**268 (1.0)**
Montana	**17 (1.3)**	**296 (1.7)**	**42 (1.2)**	**282 (1.1)**	**41 (1.3)**	**272 (1.4)**
Nebraska	**19 (1.0)**	**289 (1.6)**	**43 (1.3)**	**280 (1.3)**	**38 (1.4)**	**266 (1.3)**
New Hampshire	**16 (1.0)**	**285 (1.7)**	**41 (1.3)**	**278 (1.2)**	**42 (1.2)**	**267 (1.1)**
New Jersey	**19 (1.0)**	**276 (2.2)**	**44 (1.4)**	**273 (1.3)**	**37 (1.5)**	**263 (1.3)**
New Mexico	18 (0.9)	267 (1.6)	41 (1.1)	258 (1.1)	41 (1.3)	251 (0.9)
New York	20 (0.9)	268 (2.4)	44 (1.0)	262 (1.7)	36 (1.2)	258 (1.4)
North Carolina	23 (0.9)	257 (1.5)	42 (0.9)	250 (1.2)	35 (1.1)	246 (1.4)
North Dakota	15 (1.0)	293 (2.3)	43 (1.7)	284 (1.8)	42 (1.4)	275 (1.2)
Ohio	22 (1.0)	271 (1.8)	42 (1.0)	266 (1.1)	36 (1.2)	257 (1.2)
Oklahoma	**19 (0.9)**	**271 (1.8)**	**44 (1.5)**	**265 (1.6)**	**37 (1.3)**	**257 (1.4)**
Oregon	**15 (0.9)**	**283 (2.1)**	**39 (1.0)**	**278 (1.2)**	**46 (1.3)**	**265 (1.1)**
Pennsylvania	**17 (0.9)**	**278 (2.4)**	**43 (1.2)**	**270 (1.8)**	**39 (1.5)**	**261 (1.5)**
Rhode Island	**17 (0.8)**	**264 (1.6)**	**40 (1.0)**	**262 (1.2)**	**43 (1.1)**	**257 (1.0)**
Texas	**20 (1.1)**	**266 (1.9)**	**41 (1.2)**	**259 (1.7)**	**39 (1.2)**	**253 (1.5)**
Virginia	19 (0.8)	270 (1.9)	39 (1.1)	266 (2.0)	41 (1.2)	260 (1.6)
West Virginia	19 (1.1)	267 (1.4)	41 (1.1)	257 (1.1)	40 (1.1)	250 (1.2)
Wisconsin	21 (1.1)	284 (2.2)	44 (1.2)	277 (1.3)	36 (1.3)	266 (1.6)
Wyoming	15 (0.7)	286 (1.5)	40 (1.0)	276 (0.8)	45 (0.9)	264 (0.9)
TERRITORIES						
Guam	**19 (1.1)**	**243 (2.1)**	**41 (1.2)**	**234 (1.2)**	**41 (1.2)**	**228 (1.3)**
Virgin Islands	**25 (1.3)**	**225 (1.4)**	**39 (1.6)**	**216 (0.9)**	**36 (1.5)**	**215 (1.5)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 16.3 | **Students' Responses to the Statement "I Am Good at Mathematics"**

GRADE 8 PUBLIC SCHOOLS	Strongly Agree		Agree		Undecided, Disagree, or Strongly Disagree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	18 (1.1)	274 (2.5)	44 (1.1)	270 (1.5)	38 (1.4)	249 (1.5)
Northeast	18 (3.3)	277 (5.8)	45 (2.7)	277 (4.3)	37 (3.6)	258 (4.9)
Southeast	19 (2.2)	262 (5.0)	43 (1.5)	262 (3.0)	38 (3.0)	242 (3.0)
Central	15 (1.7)	275 (4.6)	50 (3.3)	272 (2.6)	35 (3.2)	253 (2.6)
West	19 (2.1)	281 (4.3)	40 (1.3)	269 (2.9)	41 (1.9)	247 (1.6)
STATES						
Alabama	**17 (1.1)**	**263 (1.9)**	**48 (1.4)**	**258 (1.2)**	**35 (1.6)**	**241 (1.4)**
Arizona	**14 (0.8)**	**279 (2.1)**	**45 (1.2)**	**266 (1.2)**	**41 (1.4)**	**247 (1.3)**
Arkansas	**16 (0.7)**	**268 (1.9)**	**47 (1.0)**	**262 (1.1)**	**37 (1.1)**	**244 (1.1)**
California	**13 (0.8)**	**277 (2.1)**	**45 (0.9)**	**265 (1.4)**	**42 (1.0)**	**242 (1.5)**
Colorado	15 (0.8)	285 (1.5)	49 (1.0)	274 (1.1)	36 (1.2)	252 (1.3)
Connecticut	16 (0.9)	283 (2.1)	53 (1.0)	276 (1.2)	32 (1.2)	256 (1.4)
Delaware	20 (0.9)	271 (1.9)	46 (1.4)	265 (1.1)	34 (1.1)	249 (1.2)
District of Columbia	28 (1.1)	238 (2.0)	47 (1.3)	233 (1.1)	25 (0.8)	222 (1.5)
Florida	18 (0.8)	268 (2.1)	47 (1.1)	261 (1.5)	36 (1.2)	243 (1.4)
Georgia	**17 (0.8)**	**265 (2.3)**	**49 (1.0)**	**265 (1.6)**	**34 (1.1)**	**248 (1.5)**
Hawaii	**10 (0.7)**	**262 (2.9)**	**38 (0.9)**	**259 (1.1)**	**52 (1.0)**	**245 (0.8)**
Idaho	**12 (0.8)**	**289 (2.1)**	**50 (1.1)**	**279 (0.8)**	**38 (1.2)**	**257 (0.9)**
Illinois	**16 (1.1)**	**272 (2.5)**	**48 (1.2)**	**266 (2.0)**	**36 (1.2)**	**249 (1.7)**
Indiana	**15 (0.9)**	**263 (1.9)**	**48 (1.1)**	**273 (1.3)**	**37 (1.2)**	**254 (1.2)**
Iowa	16 (0.9)	296 (1.7)	48 (1.1)	283 (1.2)	36 (1.3)	265 (1.2)
Kentucky	14 (0.8)	269 (2.0)	50 (1.2)	262 (1.4)	36 (1.3)	246 (1.3)
Louisiana	16 (0.8)	258 (1.9)	45 (1.0)	250 (1.6)	40 (1.1)	237 (1.1)
Maryland	21 (0.9)	272 (1.9)	46 (0.9)	264 (1.6)	33 (1.2)	251 (1.7)
Michigan	17 (0.9)	277 (2.2)	50 (1.1)	269 (1.3)	33 (1.2)	251 (1.2)
Minnesota	**13 (0.9)**	**296 (1.9)**	**49 (0.9)**	**282 (0.9)**	**38 (1.2)**	**262 (1.1)**
Montana	**12 (0.6)**	**302 (1.9)**	**49 (1.4)**	**287 (0.9)**	**39 (1.4)**	**266 (1.4)**
Nebraska	**16 (0.8)**	**290 (1.9)**	**50 (1.1)**	**284 (0.9)**	**34 (1.1)**	**259 (1.5)**
New Hampshire	**15 (1.1)**	**293 (1.9)**	**50 (1.2)**	**277 (1.3)**	**35 (1.1)**	**261 (1.0)**
New Jersey	**17 (0.9)**	**281 (2.0)**	**51 (0.9)**	**275 (1.2)**	**32 (1.0)**	**256 (1.4)**
New Mexico	11 (0.6)	277 (2.2)	45 (1.4)	265 (1.2)	44 (1.2)	242 (0.8)
New York	19 (1.0)	272 (1.9)	47 (1.1)	267 (1.4)	34 (1.3)	248 (1.7)
North Carolina	19 (0.8)	257 (1.7)	48 (1.0)	255 (1.1)	32 (1.2)	240 (1.1)
North Dakota	11 (1.1)	306 (2.2)	50 (1.4)	287 (1.4)	39 (1.3)	268 (1.3)
Ohio	19 (1.0)	277 (2.0)	48 (1.1)	269 (1.2)	33 (1.2)	250 (1.1)
Oklahoma	**15 (0.9)**	**277 (2.7)**	**47 (0.9)**	**269 (1.4)**	**39 (0.9)**	**251 (1.3)**
Oregon	**14 (0.7)**	**289 (2.0)**	**51 (1.0)**	**278 (1.1)**	**35 (1.2)**	**257 (1.2)**
Pennsylvania	**17 (0.9)**	**278 (2.4)**	**48 (1.2)**	**272 (1.8)**	**35 (1.3)**	**255 (1.5)**
Rhode Island	**14 (0.7)**	**270 (2.2)**	**50 (1.1)**	**267 (0.8)**	**36 (1.1)**	**248 (0.9)**
Texas	**16 (0.9)**	**278 (2.4)**	**48 (1.1)**	**262 (1.4)**	**36 (0.9)**	**246 (1.5)**
Virginia	17 (0.7)	273 (2.4)	50 (1.1)	270 (1.6)	34 (1.1)	252 (1.6)
West Virginia	15 (0.8)	270 (1.5)	49 (1.1)	261 (1.0)	36 (1.3)	244 (1.1)
Wisconsin	17 (0.8)	289 (2.0)	50 (1.1)	280 (1.3)	33 (1.0)	259 (1.3)
Wyoming	12 (0.8)	291 (1.8)	49 (1.1)	278 (0.8)	39 (1.1)	258 (0.8)
TERRITORIES						
Guam	**6 (0.7)**	**252 (3.8)**	**30 (1.2)**	**249 (2.0)**	**64 (1.1)**	**226 (0.9)**
Virgin Islands	**24 (1.4)**	**229 (2.0)**	**42 (1.6)**	**221 (1.0)**	**34 (1.6)**	**206 (1.3)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 16.4 | **Students' Responses to the Statement "I Am Good at Mathematics" Organized by Percentage of Students Indicating Strong Agreement**

GRADE 8 PUBLIC SCHOOLS	Strongly Agree		Agree		Undecided, Disagree, or Strongly Disagree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
STATES/TERRITORIES						
District of Columbia	28 (1.1)	238 (2.0)	47 (1.3)	233 (1.1)	25 (0.8)	222 (1.5)
Virgin Islands	24 (1.4)	229 (2.0)	42 (1.6)	221 (1.0)	34 (1.6)	206 (1.3)
Maryland	21 (0.9)	272 (1.9)	46 (0.9)	264 (1.6)	33 (1.2)	251 (1.7)
Delaware	20 (0.9)	271 (1.9)	46 (1.4)	265 (1.1)	34 (1.1)	249 (1.2)
North Carolina	**19 (0.8)**	**257 (1.7)**	**48 (1.0)**	**255 (1.1)**	**32 (1.2)**	**240 (1.1)**
New York	**19 (1.0)**	**272 (1.9)**	**47 (1.1)**	**267 (1.4)**	**34 (1.3)**	**248 (1.7)**
Ohio	**19 (1.0)**	**277 (2.1)**	**48 (1.1)**	**269 (1.2)**	**33 (1.2)**	**250 (1.1)**
Florida	**18 (0.8)**	**269 (2.1)**	**47 (1.1)**	**261 (1.5)**	**36 (1.2)**	**243 (1.4)**
Alabama	**17 (1.1)**	**263 (1.9)**	**48 (1.4)**	**258 (1.2)**	**35 (1.8)**	**241 (1.4)**
New Jersey	17 (0.9)	281 (2.0)	51 (0.9)	275 (1.2)	32 (1.0)	256 (1.4)
Michigan	17 (0.9)	277 (2.2)	50 (1.1)	269 (1.3)	33 (1.2)	251 (1.2)
Pennsylvania	17 (0.9)	276 (2.4)	48 (1.2)	272 (1.8)	35 (1.3)	255 (1.5)
Virginia	17 (0.7)	273 (2.4)	50 (1.1)	270 (1.6)	34 (1.1)	252 (1.6)
Georgia	17 (0.8)	265 (2.3)	49 (1.0)	265 (1.6)	34 (1.1)	248 (1.5)
Wisconsin	**17 (0.8)**	**289 (2.0)**	**50 (1.1)**	**280 (1.3)**	**33 (1.0)**	**259 (1.3)**
Nebraska	**16 (0.8)**	**290 (1.9)**	**50 (1.1)**	**284 (0.9)**	**34 (1.1)**	**259 (1.5)**
Texas	**16 (0.9)**	**276 (2.4)**	**48 (1.1)**	**262 (1.4)**	**36 (0.9)**	**248 (1.5)**
Illinois	**16 (1.1)**	**272 (2.5)**	**48 (1.2)**	**266 (2.0)**	**36 (1.2)**	**249 (1.7)**
Arkansas	**16 (0.7)**	**266 (1.9)**	**47 (1.0)**	**262 (1.1)**	**37 (1.1)**	**244 (1.1)**
Iowa	16 (0.9)	296 (1.7)	48 (1.1)	283 (1.2)	36 (1.3)	265 (1.2)
Louisiana	16 (0.8)	258 (1.9)	45 (1.0)	250 (1.6)	40 (1.1)	237 (1.1)
Connecticut	16 (0.9)	283 (2.1)	53 (1.0)	276 (1.2)	32 (1.2)	256 (1.4)
West Virginia	15 (0.8)	270 (1.5)	49 (1.1)	261 (1.0)	36 (1.3)	244 (1.1)
Indiana	15 (0.9)	283 (1.9)	48 (1.1)	273 (1.3)	37 (1.2)	254 (1.2)
New Hampshire	**15 (1.1)**	**293 (1.9)**	**50 (1.2)**	**277 (1.3)**	**35 (1.1)**	**261 (1.0)**
Oklahoma	**15 (0.9)**	**277 (2.7)**	**47 (0.9)**	**269 (1.4)**	**39 (0.9)**	**251 (1.3)**
Colorado	**15 (0.8)**	**285 (1.5)**	**49 (1.0)**	**274 (1.1)**	**36 (1.2)**	**252 (1.3)**
Arizona	**14 (0.8)**	**279 (2.1)**	**45 (1.2)**	**266 (1.2)**	**41 (1.4)**	**247 (1.3)**
Kentucky	**14 (0.8)**	**269 (2.0)**	**50 (1.2)**	**262 (1.4)**	**36 (1.3)**	**245 (1.3)**
Rhode Island	14 (0.7)	270 (2.2)	50 (1.1)	267 (0.8)	36 (1.1)	248 (0.9)
Oregon	14 (0.7)	289 (2.0)	51 (1.0)	278 (1.1)	35 (1.2)	257 (1.2)
California	13 (0.8)	277 (2.1)	45 (0.9)	265 (1.4)	42 (1.0)	242 (1.5)
Minnesota	13 (0.9)	296 (1.9)	49 (0.9)	282 (0.9)	38 (1.2)	262 (1.1)
Wyoming	12 (0.8)	291 (1.8)	49 (1.1)	278 (0.8)	39 (1.1)	258 (0.8)
Idaho	**12 (0.6)**	**289 (2.1)**	**50 (1.1)**	**279 (0.8)**	**38 (1.2)**	**257 (0.9)**
Montana	**12 (0.6)**	**302 (1.9)**	**49 (1.4)**	**287 (0.9)**	**39 (1.4)**	**285 (1.4)**
New Mexico	**11 (0.8)**	**277 (2.2)**	**45 (1.4)**	**265 (1.2)**	**44 (1.2)**	**242 (0.8)**
North Dakota	**11 (1.1)**	**306 (2.2)**	**50 (1.4)**	**287 (1.4)**	**39 (1.3)**	**[illegible] (1.3)**
Hawaii	10 (0.7)	262 (2.9)	38 (0.9)	259 (1.1)	52 (1.0)	245 (0.8)
Guam	6 (0.7)	252 (3.8)	30 (1.2)	249 (2.0)	64 (1.1)	226 (0.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 16.5 | **Students' Responses to the Statement "Mathematics Is More for Boys than for Girls"**

GRADE 8 PUBLIC SCHOOLS	Strongly Disagree		Disagree		Undecided, Agree, or Strongly Agree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	51 (1.1)	267 (1.4)	33 (1.1)	261 (1.7)	16 (0.7)	253 (2.1)
Northeast	57 (2.4)	272 (2.5)	29 (2.7)	268 (6.3)	14 (1.4)	265 (5.4)
Southeast	45 (2.6)	262 (3.6)	36 (2.0)	250 (2.3)	19 (1.4)	246 (4.4)
Central	52 (1.9)	270 (3.0)	34 (1.5)	265 (2.5)	13 (1.6)	252 (2.5)
West	50 (1.9)	265 (2.7)	33 (2.3)	262 (3.5)	16 (1.5)	255 (4.1)
STATES						
Alabama	**47 (1.1)**	**257 (1.3)**	**37 (1.0)**	**249 (1.6)**	**16 (0.8)**	**249 (2.1)**
Arizona	**55 (1.1)**	**264 (1.2)**	**29 (0.9)**	**256 (1.7)**	**16 (0.8)**	**254 (1.9)**
Arkansas	**50 (1.3)**	**260 (1.0)**	**34 (1.1)**	**254 (1.4)**	**15 (0.7)**	**250 (2.1)**
California	**54 (1.2)**	**263 (1.3)**	**30 (1.0)**	**251 (1.8)**	**16 (0.8)**	**251 (2.3)**
Colorado	58 (1.1)	271 (1.1)	30 (1.1)	265 (1.3)	12 (0.7)	260 (1.9)
Connecticut	57 (1.2)	275 (1.2)	30 (1.1)	267 (1.4)	13 (0.7)	263 (1.9)
Delaware	54 (1.7)	265 (1.3)	31 (0.9)	259 (1.6)	16 (1.5)	251 (1.7)
District of Columbia	53 (1.0)	237 (0.9)	32 (1.0)	227 (1.4)	15 (0.8)	224 (2.1)
Florida	49 (1.0)	259 (1.4)	35 (1.0)	254 (1.5)	16 (0.8)	252 (2.1)
Georgia	**47 (1.0)**	**263 (1.4)**	**35 (0.9)**	**257 (1.8)**	**17 (0.8)**	**254 (2.4)**
Hawaii	**49 (1.1)**	**259 (0.9)**	**31 (0.9)**	**249 (1.2)**	**20 (0.8)**	**241 (1.8)**
Idaho	**58 (1.3)**	**274 (0.9)**	**30 (1.2)**	**270 (1.2)**	**13 (0.9)**	**267 (1.8)**
Illinois	**56 (1.1)**	**265 (1.7)**	**31 (0.9)**	**257 (2.0)**	**13 (0.7)**	**256 (2.5)**
Indiana	**56 (1.1)**	**270 (1.4)**	**31 (1.3)**	**266 (1.5)**	**13 (0.7)**	**259 (2.3)**
Iowa	59 (1.0)	281 (1.1)	30 (1.0)	276 (1.2)	12 (0.7)	273 (2.1)
Kentucky	49 (1.2)	261 (1.1)	35 (1.0)	254 (1.3)	16 (0.7)	253 (2.4)
Louisiana	49 (1.3)	250 (1.4)	34 (1.3)	241 (1.4)	17 (1.0)	245 (1.8)
Maryland	54 (1.2)	265 (1.5)	31 (0.9)	259 (1.6)	15 (0.8)	253 (2.5)
Michigan	58 (1.2)	269 (1.1)	29 (0.9)	259 (1.4)	14 (0.9)	258 (2.0)
Minnesota	**55 (1.2)**	**279 (1.0)**	**33 (1.0)**	**275 (1.2)**	**12 (0.7)**	**268 (2.0)**
Montana	**54 (1.5)**	**283 (0.9)**	**33 (1.4)**	**281 (1.4)**	**13 (0.9)**	**272 (2.0)**
Nebraska	**57 (1.4)**	**279 (1.0)**	**30 (1.3)**	**274 (1.5)**	**13 (0.9)**	**270 (2.2)**
New Hampshire	**64 (1.0)**	**277 (1.1)**	**27 (0.8)**	**269 (1.7)**	**10 (0.7)**	**268 (2.6)**
New Jersey	**57 (0.9)**	**273 (1.2)**	**30 (0.8)**	**266 (1.5)**	**14 (0.7)**	**270 (2.3)**
New Mexico	54 (1.5)	262 (1.1)	32 (1.3)	252 (1.1)	14 (0.8)	249 (2.3)
New York	55 (1.5)	265 (1.3)	30 (1.2)	259 (1.7)	15 (1.0)	256 (2.5)
North Carolina	51 (1.1)	256 (1.2)	33 (0.8)	243 (1.3)	16 (0.7)	245 (1.6)
North Dakota	57 (1.4)	285 (1.1)	30 (1.4)	280 (1.8)	12 (0.8)	271 (3.1)
Ohio	54 (1.2)	268 (1.1)	32 (1.0)	260 (1.6)	14 (0.8)	259 (1.7)
Oklahoma	**55 (1.0)**	**266 (1.3)**	**32 (1.1)**	**261 (1.6)**	**13 (0.7)**	**258 (2.0)**
Oregon	**60 (1.0)**	**275 (1.0)**	**28 (1.0)**	**270 (1.4)**	**12 (0.7)**	**265 (2.5)**
Pennsylvania	**55 (1.1)**	**271 (1.8)**	**32 (1.0)**	**262 (2.0)**	**13 (0.7)**	**262 (2.1)**
Rhode Island	**57 (1.2)**	**264 (0.8)**	**31 (1.1)**	**257 (1.3)**	**12 (0.7)**	**254 (2.0)**
Texas	**53 (1.1)**	**264 (1.3)**	**32 (1.0)**	**254 (1.8)**	**16 (0.9)**	**251 (2.3)**
Virginia	53 (1.0)	268 (1.5)	31 (0.9)	263 (2.0)	16 (0.8)	256 (2.3)
West Virginia	53 (1.2)	260 (0.9)	31 (1.1)	253 (1.3)	16 (0.7)	252 (1.8)
Wisconsin	59 (1.2)	277 (1.4)	30 (1.1)	273 (1.4)	11 (0.8)	269 (2.0)
Wyoming	57 (1.1)	274 (0.7)	30 (1.0)	272 (1.0)	14 (0.7)	267 (1.4)
TERRITORIES						
Guam	**43 (1.6)**	**244 (1.3)**	**32 (1.6)**	**229 (1.4)**	**25 (1.3)**	**226 (1.4)**
Virgin Islands	**49 (1.4)**	**223 (0.9)**	**31 (1.6)**	**218 (1.2)**	**20 (1.1)**	**212 (1.3)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 16.6 | **Students' Responses to the Statement "Mathematics Is Useful for Solving Everyday Problems"**

GRADE 8 PUBLIC SCHOOLS	Strongly Agree		Agree		Undecided, Disagree, or Strongly Disagree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	33 (1.0)	262 (1.7)	44 (1.1)	267 (1.7)	24 (1.1)	255 (2.0)
Northeast	32 (3.0)	270 (5.0)	47 (2.4)	273 (4.5)	21 (2.5)	261 (4.8)
Southeast	35 (2.1)	254 (3.5)	40 (2.2)	260 (3.2)	25 (2.9)	248 (2.5)
Central	28 (1.7)	264 (3.1)	47 (1.7)	270 (3.2)	25 (2.0)	261 (3.0)
West	34 (1.6)	263 (3.1)	42 (2.0)	267 (2.6)	24 (2.0)	253 (4.1)
STATES						
Alabama	**35 (1.2)**	**252 (1.8)**	**43 (1.1)**	**255 (1.5)**	**22 (0.8)**	**250 (1.5)**
Arizona	**27 (0.9)**	**261 (1.7)**	**48 (1.1)**	**262 (1.4)**	**27 (1.0)**	**258 (1.4)**
Arkansas	**31 (1.0)**	**256 (1.1)**	**46 (1.0)**	**259 (1.1)**	**23 (0.8)**	**250 (1.3)**
California	**31 (1.0)**	**258 (1.5)**	**47 (1.0)**	**260 (1.5)**	**22 (1.0)**	**252 (1.7)**
Colorado	29 (1.0)	270 (1.2)	47 (1.1)	270 (1.1)	24 (0.8)	260 (1.6)
Connecticut	30 (0.8)	271 (1.7)	49 (1.0)	273 (1.2)	22 (0.9)	265 (1.7)
Delaware	31 (1.2)	264 (1.2)	45 (1.7)	263 (1.4)	24 (1.0)	255 (1.4)
District of Columbia	38 (1.3)	234 (1.0)	40 (1.2)	233 (1.4)	23 (0.8)	226 (1.6)
Florida	30 (1.0)	254 (1.4)	46 (1.1)	260 (1.5)	24 (1.0)	252 (1.7)
Georgia	**34 (1.0)**	**258 (1.4)**	**43 (0.8)**	**264 (1.8)**	**22 (0.9)**	**252 (1.9)**
Hawaii	**33 (1.0)**	**254 (1.2)**	**41 (1.0)**	**254 (1.2)**	**26 (1.0)**	**248 (1.3)**
Idaho	**33 (0.9)**	**272 (1.2)**	**46 (1.2)**	**276 (0.9)**	**21 (1.0)**	**265 (1.5)**
Illinois	**32 (1.1)**	**260 (2.2)**	**46 (0.8)**	**264 (1.7)**	**22 (1.0)**	**258 (2.0)**
Indiana	**33 (1.1)**	**269 (1.4)**	**46 (0.9)**	**269 (1.3)**	**21 (0.8)**	**260 (2.2)**
Iowa	35 (1.1)	278 (1.5)	47 (1.3)	281 (1.1)	17 (1.0)	274 (1.8)
Kentucky	33 (1.4)	258 (1.5)	45 (1.4)	260 (1.4)	22 (0.9)	252 (1.6)
Louisiana	36 (1.1)	246 (1.4)	43 (1.1)	249 (1.5)	20 (0.8)	241 (1.8)
Maryland	33 (1.0)	261 (1.8)	44 (1.1)	264 (1.5)	23 (0.9)	256 (2.2)
Michigan	30 (1.0)	266 (1.4)	45 (1.0)	269 (1.3)	25 (1.1)	256 (1.7)
Minnesota	**29 (1.2)**	**279 (1.5)**	**51 (1.0)**	**278 (0.9)**	**20 (1.0)**	**267 (1.5)**
Montana	**33 (1.1)**	**284 (1.0)**	**50 (1.0)**	**282 (0.9)**	**18 (0.8)**	**271 (1.8)**
Nebraska	**35 (1.2)**	**278 (1.2)**	**47 (1.1)**	**278 (1.2)**	**18 (0.8)**	**268 (1.8)**
New Hampshire	**31 (1.3)**	**274 (1.7)**	**49 (1.4)**	**276 (1.0)**	**19 (1.1)**	**268 (1.8)**
New Jersey	**30 (1.0)**	**272 (1.7)**	**46 (0.9)**	**273 (1.4)**	**24 (0.9)**	**264 (1.3)**
New Mexico	30 (1.0)	259 (1.5)	48 (1.2)	259 (1.0)	22 (1.0)	250 (1.3)
New York	28 (1.0)	263 (1.8)	45 (1.1)	265 (1.4)	26 (1.0)	256 (1.6)
North Carolina	36 (0.9)	252 (1.3)	43 (1.1)	254 (1.2)	21 (0.9)	244 (1.9)
North Dakota	34 (1.6)	287 (1.7)	49 (1.3)	282 (1.1)	17 (1.3)	271 (2.5)
Ohio	34 (1.0)	266 (1.5)	46 (0.9)	265 (1.1)	20 (0.8)	259 (1.7)
Oklahoma	**34 (1.1)**	**263 (1.8)**	**45 (1.0)**	**265 (1.3)**	**21 (0.6)**	**259 (2.0)**
Oregon	**29 (0.9)**	**273 (1.8)**	**48 (0.9)**	**275 (1.3)**	**23 (0.9)**	**265 (1.2)**
Pennsylvania	**28 (0.9)**	**269 (2.0)**	**48 (1.1)**	**270 (1.6)**	**24 (1.1)**	**259 (2.2)**
Rhode Island	**27 (0.9)**	**262 (1.3)**	**47 (0.9)**	**264 (0.8)**	**26 (1.0)**	**253 (1.4)**
Texas	**34 (1.1)**	**262 (1.8)**	**45 (1.0)**	**260 (1.4)**	**21 (1.1)**	**252 (1.9)**
Virginia	33 (1.0)	264 (1.5)	47 (1.0)	267 (2.0)	21 (0.9)	260 (1.9)
West Virginia	33 (1.1)	258 (1.3)	44 (0.9)	259 (1.1)	24 (1.0)	248 (1.3)
Wisconsin	32 (1.1)	275 (1.2)	49 (1.2)	278 (1.4)	19 (0.9)	264 (2.0)
Wyoming	32 (0.8)	275 (0.9)	47 (1.0)	274 (0.6)	21 (0.7)	264 (1.4)
TERRITORIES						
Guam	**34 (1.2)**	**238 (1.8)**	**39 (1.4)**	**235 (1.1)**	**27 (1.4)**	**230 (1.4)**
Virgin Islands	**47 (1.3)**	**220 (1.0)**	**35 (1.1)**	**219 (1.3)**	**18 (1.2)**	**211 (2.1)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 16.7 | **Students' Responses to the Statement "Almost All People Use Mathematics in Their Jobs"**

GRADE 8 PUBLIC SCHOOLS	Strongly Agree		Agree		Undecided, Disagree, or Strongly Disagree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	32 (1.2)	262 (1.7)	49 (1.0)	264 (1.4)	18 (1.2)	258 (2.1)
Northeast	29 (3.2)	268 (4.3)	53 (3.3)	272 (3.7)	18 (2.1)	269 (4.4)
Southeast	34 (2.6)	255 (3.9)	49 (2.5)	256 (3.0)	18 (2.4)	248 (2.4)
Central	32 (2.1)	267 (3.5)	49 (1.3)	267 (2.6)	20 (2.8)	260 (4.0)
West	34 (1.7)	261 (3.2)	48 (1.6)	264 (2.3)	18 (2.1)	257 (5.1)
STATES						
Alabama	**36 (1.0)**	**250 (1.3)**	**49 (1.0)**	**255 (1.3)**	**15 (0.7)**	**249 (2.0)**
Arizona	**35 (1.0)**	**262 (1.4)**	**50 (1.0)**	**260 (1.4)**	**15 (0.8)**	**255 (1.8)**
Arkansas	**34 (1.3)**	**257 (1.2)**	**51 (1.2)**	**256 (1.1)**	**15 (0.9)**	**252 (1.8)**
California	**35 (1.2)**	**258 (1.4)**	**49 (1.2)**	**258 (1.5)**	**16 (0.8)**	**253 (2.1)**
Colorado	35 (0.9)	268 (1.1)	50 (0.8)	268 (1.2)	15 (0.7)	263 (1.9)
Connecticut	29 (0.8)	268 (1.6)	53 (0.8)	272 (1.2)	17 (0.8)	270 (1.6)
Delaware	32 (1.1)	260 (1.2)	50 (1.2)	263 (1.0)	17 (0.8)	256 (1.8)
District of Columbia	36 (1.0)	232 (1.2)	48 (1.1)	232 (1.0)	15 (0.7)	227 (1.6)
Florida	34 (1.4)	253 (1.5)	50 (1.3)	258 (1.4)	16 (0.7)	255 (2.3)
Georgia	**36 (1.0)**	**255 (1.4)**	**48 (1.0)**	**263 (1.7)**	**15 (0.8)**	**253 (2.2)**
Hawaii	**38 (1.2)**	**252 (1.4)**	**49 (1.1)**	**252 (1.1)**	**13 (0.6)**	**249 (2.2)**
Idaho	**40 (1.1)**	**273 (0.9)**	**48 (1.0)**	**272 (1.1)**	**12 (0.8)**	**266 (1.8)**
Illinois	**33 (1.3)**	**259 (2.1)**	**50 (1.1)**	**263 (1.8)**	**17 (0.9)**	**258 (2.6)**
Indiana	**37 (1.2)**	**266 (1.3)**	**48 (1.1)**	**269 (1.2)**	**15 (0.8)**	**265 (2.3)**
Iowa	34 (1.2)	278 (1.2)	53 (1.1)	279 (1.2)	13 (0.7)	274 (2.0)
Kentucky	34 (1.0)	257 (1.5)	51 (1.0)	257 (1.4)	15 (0.8)	254 (1.7)
Louisiana	37 (1.2)	246 (1.5)	48 (1.0)	247 (1.5)	14 (0.9)	243 (1.9)
Maryland	33 (0.8)	258 (1.8)	51 (0.8)	264 (1.7)	16 (0.7)	258 (2.1)
Michigan	33 (1.0)	263 (1.5)	52 (1.0)	266 (1.2)	16 (0.8)	265 (1.9)
Minnesota	**32 (1.4)**	**278 (1.3)**	**54 (1.1)**	**277 (0.9)**	**14 (0.8)**	**267 (2.1)**
Montana	**39 (1.1)**	**282 (1.1)**	**51 (1.1)**	**281 (1.0)**	**11 (0.8)**	**274 (2.2)**
Nebraska	**36 (1.3)**	**278 (1.2)**	**50 (1.1)**	**277 (1.2)**	**13 (0.8)**	**269 (2.4)**
New Hampshire	**33 (1.2)**	**276 (1.1)**	**51 (1.0)**	**275 (1.1)**	**16 (1.1)**	**266 (2.0)**
New Jersey	**28 (1.0)**	**272 (1.4)**	**54 (0.9)**	**270 (1.2)**	**17 (0.9)**	**268 (2.1)**
New Mexico	36 (1.2)	256 (1.3)	51 (1.4)	256 (1.0)	13 (0.7)	246 (1.8)
New York	28 (1.3)	258 (1.9)	53 (1.4)	263 (1.3)	19 (1.1)	263 (1.9)
North Carolina	36 (1.3)	251 (1.2)	48 (1.1)	251 (1.2)	16 (0.8)	248 (1.6)
North Dakota	36 (1.7)	282 (1.6)	53 (1.5)	282 (1.2)	12 (1.0)	274 (2.9)
Ohio	36 (1.3)	264 (1.2)	49 (1.2)	266 (1.4)	15 (0.8)	260 (1.8)
Oklahoma	**38 (1.2)**	**261 (1.6)**	**48 (1.0)**	**265 (1.4)**	**14 (0.8)**	**260 (2.3)**
Oregon	**31 (0.9)**	**273 (1.3)**	**52 (0.9)**	**273 (1.1)**	**17 (0.7)**	**267 (1.7)**
Pennsylvania	**30 (0.9)**	**267 (2.1)**	**53 (1.0)**	**266 (1.5)**	**17 (0.8)**	**262 (2.8)**
Rhode Island	**28 (0.9)**	**259 (1.3)**	**52 (1.1)**	**263 (0.9)**	**20 (0.8)**	**256 (1.4)**
Texas	**38 (1.1)**	**261 (1.8)**	**49 (0.9)**	**258 (1.4)**	**13 (0.9)**	**253 (2.1)**
Virginia	34 (1.2)	262 (1.7)	50 (1.2)	266 (1.6)	15 (0.7)	264 (2.7)
West Virginia	35 (1.0)	257 (1.4)	49 (1.0)	257 (1.0)	16 (0.8)	252 (1.6)
Wisconsin	35 (1.2)	274 (1.6)	51 (1.0)	276 (1.3)	14 (0.8)	268 (2.1)
Wyoming	40 (1.0)	272 (0.9)	49 (1.2)	274 (0.9)	11 (0.6)	264 (1.7)
TERRITORIES						
Guam	**41 (1.2)**	**232 (1.2)**	**46 (1.2)**	**237 (1.3)**	**13 (0.9)**	**228 (2.8)**
Virgin Islands	**50 (1.4)**	**219 (1.0)**	**42 (1.1)**	**217 (1.1)**	**9 (0.7)**	**214 (1.8)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

4?6

Chapter 17

Characteristics of Mathematics Teachers at Grade 8 in the States

INTRODUCTION

Teachers of eighth graders participating in the 1990 NAEP Trial State Assessment were asked a number of questions about their experience, education, and training. Consistent with procedures used throughout this report, however, the student was the unit of analysis. That is, the mathematics teachers' responses were linked to their students, and the data are reported for the percentages of students taught by teachers with particular characteristics.

TEACHING EXPERIENCE

Teachers were asked about their total years of teaching experience as well as about their years of experience teaching mathematics. The results are presented in TABLES 17.1 and 17.2. Eighth graders in all states were taught by relatively experienced teachers. Average years of teaching experience did not vary much in general from state to state -- 12 to 19 years, except in the Virgin Islands, with 9 years. West Virginia was at the low end of the continuum (12 years) and Connecticut at the high end (19 years). In several states, more than one-fifth of the public-school students at grade 8 were taught by teachers with 25 years or more experience, including California, Connecticut, the District of Columbia, Iowa, Michigan, Minnesota, North Dakota, Pennsylvania, and Wisconsin.

Teachers were somewhat less experienced in teaching mathematics, reporting 11 to 17 years experience, with 8 years for the Virgin Islands, on average. With only one exception -- Minnesota (26 percent) -- no state reported more than one-fifth of its eighth graders being taught by teachers with 25 years or more experience teaching in the discipline.

In general, the proficiency results indicate either little relationship between student achievement and teachers' experience or increases in achievement associated with increases in experience. The lack of consistent relationships between experience and proficiency may reflect a policy of assigning more experienced teachers to more difficult teaching situations, including remedial and advanced classes.

TEACHERS' GENDER AND RACE/ETHNICITY

In 22 states, including all those in the Southeast, the majority of eighth graders were taught by female teachers. In only Idaho, Iowa, Minnesota, Montana, North Dakota, Oregon, Pennsylvania, Wyoming, and the Virgin Islands were more than half of the students (58 percent or more) taught by male teachers (see TABLE 17.3).

In most participating states and territories, except the District of Columbia, the Virgin Islands, Guam, and Hawaii, the majority of eighth graders were taught by White teachers. However, in Alabama (21 percent), the District of Columbia (84 percent), Georgia (22 percent), Louisiana (25 percent), and the Virgin Islands (75 percent) sizable proportions of students were taught by Black teachers; in New Mexico (18 percent), Texas (14 percent), and the Virgin Islands (13 percent), more than 10 percent of the students were taught by Hispanic teachers. In Hawaii (75 percent) and Guam (77 percent), three-fourths of the students had Asian/Pacific Islander teachers; and in Oklahoma, 5 percent of the students were taught by American Indian teachers.

TEACHER CERTIFICATION

Because teacher certification practices vary from state to state, it is difficult to compare them across states.[109] However, teachers were asked about their certification, and the results are presented in TABLE 17.4. In a number of states, the majority of public-school students at grade 8 were taught by teachers who did not report the highest level of certification, including Alabama, Georgia, Iowa, Montana, Nebraska, Ohio, and Wyoming, and Guam. States and territories with at least 10 percent of their eighth graders taught by teachers who reported no regular certification included California, Connecticut, the District of Columbia, New York, Ohio, Texas, West Virginia, Guam, and the

[109]Rolf Blank, *State Education Policies on Science and Mathematics* (Washington, DC: Council of Chief State School Officers, 1987).

Virgin Islands. By and large, students' proficiency levels did not vary much by levels of teacher certification, although this did not hold true for every state.

In every state except Arizona (41 percent), the majority of public-school eighth graders were taught by teachers certified to teach mathematics at the middle school or secondary level (see TABLE 17.5). However, in some states, more than one-fourth of the eighth-grade students were taught mathematics by teachers with more general elementary- or middle-school education certification, including Arizona, Georgia, Illinois, Kentucky, Louisiana, New Jersey, New Mexico, Ohio, and Guam. For most states, public-school eighth graders taught by teachers certified in teaching mathematics had higher average proficiency.

TEACHERS' UNDERGRADUATE AND GRADUATE EDUCATION

Teachers were asked about their highest educational degree, and the results are presented in TABLE 17.6. In most states, the majority of public-school eighth graders were taught by teachers with bachelor's degrees. However, in Connecticut and Indiana, more than four-fifths of the students were taught by teachers with a master's or specialist's degree. In addition, in Delaware, the District of Columbia, Kentucky, Maryland, Michigan, New York, and Ohio, more than half the eighth graders attending public schools were taught by teachers with a master's or specialist's degree. In sixteen states, some eighth graders (6 percent or fewer) were taught by teachers with a doctorate or professional degree; in the remaining participating states, no students were taught by teachers holding these degrees. For those students whose teachers held bachelor's degrees or master's or specialist's degrees, generally there was no difference in mathematics proficiency, or the students whose teachers had master's or specialist's degrees had higher proficiency.

As presented in TABLE 17.7, there was considerable variation from state to state in the percentages of public-school eighth graders taught by undergraduate mathematics majors -- from 15 percent in Arizona to 88 percent in Minnesota. However, students of teachers who were mathematics majors tended to have higher mathematics proficiency than did students who were taught by education majors, although this pattern did not hold for some states. Performance for eighth-grade students whose teachers had some other type of major varied in relation to the performance of the two groups of students taught by mathematics or education majors. In most states, for teachers reporting graduate education, far more public-school eighth graders were taught by teachers who had done graduate-level work in education than were taught by those who had completed commensurate work in mathematics (see TABLE 17.8). Notable exceptions to this pattern were Arkansas, the District of Columbia, Minnesota, and Nebraska. Generally, there was no relationship between eighth graders' achievement and whether teachers' graduate work was in mathematics or education; however, if there was a difference, the advantage was usually in favor of the students taught by mathematics majors.

AMOUNT OF CONTENT AREA COURSE WORK

The results for teachers' reports of their course work across content areas are presented in TABLES 17.9 through 17.15. As might be expected, teachers reported quite different emphases in their course work. However, for some states, such as the District of Columbia, Minnesota, North Dakota, Wyoming, and several others, substantial percentages of eighth graders attending public schools were taught by teachers who had taken two or more courses in each of the content areas -- number systems and numeration, geometry, probability and statistics, abstract or linear algebra, calculus, computer science, and computer programming. On the other hand, for each of these content areas, sizable proportions of students, from 25 to 56 percent in some states, were taught mathematics by teachers who reported no course work. Across content areas and states, there were variations in the relationship between teachers' course taking and eighth graders' achievement, yet in many instances, teachers whose students performed better reported more course work.

Just as the results in TABLES 17.9 through 17.16 give an indication of the depth of teachers' course work in particular areas, the results were summarized across the content areas to provide a measure of the breadth of teachers' course work. The percentages of eighth graders whose teachers reported taking at least one course in each of the areas are presented for six to seven areas, four to five areas, and zero to three areas in TABLE 17.16 (alphabetically) and TABLE 17.17 (organized by the percentage of teachers reporting at least one course in six to seven of the areas). In Minnesota, the District of Columbia, North Dakota, Indiana, and Nebraska, more than two-thirds of the eighth graders attending public schools were taught by teachers with a high degree of breadth in their course taking. In contrast, in Oklahoma, Arizona, Guam, and Kentucky, one-third or fewer of the students had teachers with this breadth of course work. In several states, students' proficiency was higher if their teachers reported more areas of course work, and lower if they reported fewer areas of course work.

MATHEMATICS METHODS COURSE TAKING

Across the states, as shown in TABLES 17.18 and 17.19, sizable percentages of eighth-grade students attending public schools (from 13 to 54 percent) were taught by teachers who had not taken a single course in methods of teaching middle-school mathematics. In several states, however, substantial percentages of eighth-grade public-school students had teachers who had taken three or more methods courses. For example, the highest percentages of these students were in California, Minnesota, Montana, and North Carolina (all 31 percent), the District of Columbia (39 percent), and Oregon (41 percent). Several of the high-performing states had substantial percentages of eighth graders taught by teachers with three or more methods courses, including Minnesota, Montana, North Dakota, and Oregon. On the other hand, several of the lower-performing states also had high percentages of eighth graders taught by teachers reporting three or more methods courses (e.g., the District of Columbia and North Carolina). More often than not, students whose teachers had taken three or more methods courses performed no differently than did students whose teachers had taken no methods courses. When there was a difference, the patterns were not consistent from state to state.

IN-SERVICE EDUCATION

Teachers were asked about how many hours of mathematics in-service training they had received during the last year, and the results are summarized in TABLES 17.20 (alphabetically) and 17.21 (organized by the percentages of teachers reporting the most hours of in-service education). Again, there was tremendous variability across the states, with from 69 percent of the students in New Hampshire to 16 percent of the eighth-grade public-school students in Indiana being taught by teachers who reported at least 16 hours of in-service training during the last year. Besides New Hampshire, the District of

Columbia and North Carolina (more than 50 percent), were at the top of the range. In addition to Indiana, Illinois, New York, Arizona, Rhode Island, Ohio, West Virginia, New Mexico, and Kentucky (fewer than 25 percent) were at the bottom of this range. In Arizona, Hawaii, Indiana, Kentucky, New Mexico, Guam, and the Virgin Islands, one-fourth or more of the students were taught by teachers who reported no in-service mathematics training during the year. In the majority of states, eighth graders whose teachers had more in-service training performed better than those whose teachers reporting less training.

SUMMARY

There was tremendous variation in preparation and training across the states for those teachers providing mathematics instruction to eighth graders attending public schools. However, the teaching force in each state appeared to be relatively experienced, with about half the students being taught by teachers with at least 10 years experience.

The majority of eighth-grade students were taught by White teachers and by female teachers, although in some geographic areas significant proportions of eighth graders were taught by teachers of other racial/ethnic backgrounds. In nine states, the majority of students were taught by males.

In most states, the majority of students at grade 8 were taught by teachers with the highest level of certification, and four-fifths or more were taught by teachers certified in middle-school or secondary mathematics. The majority of eighth graders had teachers with bachelor's degrees in most states, but in some, the majority had teachers with a master's or specialist's degree. Across all the states, however, the percentage of teachers with a master's or specialist's degree varied considerably, from 19 to 74 percent. In most states, no students were taught by teachers with a doctorate or professional degree.

Considerable percentages of eighth graders were taught by mathematics majors, and by teachers who reported both depth and breadth in their mathematics course taking. On the other hand, there were also sizable proportions of eighth graders in each state being taught mathematics by education majors, and by teachers who reported no course work in specific content areas and limited breadth across courses.

There were also substantial differences in the amount of mathematics methods course taking. In some states, about one-third of the public-school eighth-grade students were taught by teachers reporting three or more methods courses, but in most states, sizable proportions were taught by teachers having taken no methods courses (from 13 to 54 percent).

The reports on in-service education did not deviate from the pattern of enormous variation across the states. From 16 to 69 percent of the eighth graders were taught by teachers who reported at least 16 hours of in-service mathematics training during the last year, and from 5 to 49 percent were taught by teachers who reported no such training.

For many of these variables, the relationship between proficiency and teacher background suggested no consistent pattern. However, there was a tendency for the better-performing students to have teachers with stronger course work and more in-service education in mathematics.

TABLE 17.1 | **Teachers' Reports on Number of Years Teaching Experience at the Elementary or Secondary Level**

GRADE 8 PUBLIC SCHOOLS	Average Years Teaching Experience	10 Years or Less Experience		More than 10 Years, but Less than 25 Years Experience		25 Years or More Experience	
		Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	17 (0.8)	29 (3.5)	261 (2.9)	51 (3.6)	265 (1.6)	19 (3.7)	264 (4.6)
Northeast	21 (3.1)	24 (8.7)	258 (3.3)!	42(10.9)	276 (2.3)!	35(15.2)	278 (6.7)!
Southeast	17 (1.4)	22 (6.3)	255 (4.9)!	63 (6.4)	258 (3.6)	14 (6.8)	247 (7.7)!
Central	18 (1.6)	20 (5.9)	260 (7.5)!	53 (7.0)	269 (2.8)	27 (7.1)	260 (4.5)!
West	13 (1.1)	45 (7.0)	265 (4.7)	46 (6.5)	261 (2.3)	9 (3.0)	269 (8.4)!
STATES							
Alabama	**13 (0.6)**	**41 (3.7)**	**254 (2.3)**	**53 (4.0)**	**254 (1.6)**	**7 (1.8)**	**237 (5.7)!**
Arizona	**14 (0.5)**	**38 (2.8)**	**259 (2.3)**	**52 (3.1)**	**261 (1.6)**	**10 (2.3)**	**260 (2.8)!**
Arkansas	**13 (0.8)**	**42 (4.0)**	**254 (1.7)**	**52 (4.2)**	**257 (1.3)**	**6 (2.2)**	**259 (5.3)!**
California	**15 (0.8)**	**36 (3.4)**	**253 (2.3)**	**43 (3.0)**	**262 (2.1)**	**21 (3.2)**	**253 (2.7)**
Colorado	14 (0.6)	43 (3.8)	263 (1.8)	46 (3.5)	269 (1.7)	11 (2.0)	271 (2.7)
Connecticut	19 (0.6)	16 (2.7)	271 (2.9)	58 (3.5)	271 (1.5)	25 (3.2)	266 (2.3)
Delaware	16 (0.2)	29 (0.9)	256 (1.2)	59 (1.1)	264 (0.9)	12 (0.8)	267 (2.0)
District of Columbia	17 (0.2)	22 (0.8)	237 (2.3)	57 (0.9)	228 (0.8)	20 (0.8)	232 (1.6)
Florida	14 (0.5)	39 (2.6)	255 (2.0)	53 (2.4)	257 (1.8)	8 (1.7)	254 (3.5)!
Georgia	**14 (0.6)**	**37 (3.5)**	**255 (2.3)**	**53 (3.7)**	**261 (1.9)**	**10 (2.2)**	**248 (3.4)!**
Hawaii	**14 (0.1)**	**40 (0.9)**	**248 (1.1)**	**45 (1.0)**	**253 (1.1)**	**16 (0.6)**	**258 (2.4)**
Idaho	**13 (0.3)**	**42 (1.9)**	**271 (1.2)**	**48 (1.9)**	**273 (1.1)**	**10 (0.8)**	**271 (1.7)**
Illinois	**16 (0.9)**	**30 (4.0)**	**259 (4.5)**	**52 (4.8)**	**261 (2.8)**	**18 (3.8)**	**264 (3.8)!**
Indiana	**15 (0.7)**	**30 (3.8)**	**267 (2.2)**	**59 (3.3)**	**267 (1.5)**	**11 (2.3)**	**270 (3.7)!**
Iowa	18 (0.8)	19 (3.7)	275 (2.3)	58 (4.8)	281 (1.8)	23 (4.0)	274 (2.2)
Kentucky	14 (0.7)	36 (3.9)	260 (1.6)	54 (4.3)	254 (1.7)	11 (2.9)	259 (3.5)!
Louisiana	14 (0.7)	34 (4.2)	245 (2.7)	49 (4.7)	246 (1.7)	16 (3.2)	242 (4.4)
Maryland	16 (0.5)	21 (2.5)	250 (2.9)	65 (3.0)	264 (1.7)	14 (2.3)	263 (4.8)
Michigan	18 (0.6)	18 (2.9)	264 (2.7)	62 (4.0)	265 (1.6)	20 (3.1)	261 (3.5)
Minnesota	**17 (0.6)**	**27 (3.2)**	**273 (1.8)**	**45 (3.6)**	**277 (1.7)**	**28 (3.4)**	**278 (1.8)**
Montana	**16 (0.5)**	**29 (3.1)**	**279 (1.2)**	**53 (3.1)**	**281 (1.0)**	**18 (2.1)**	**282 (2.8)**
Nebraska	**14 (0.4)**	**37 (2.8)**	**273 (1.7)**	**56 (2.8)**	**277 (1.1)**	**7 (1.3)**	**280 (2.8)**
New Hampshire	**13 (0.2)**	**40 (1.4)**	**267 (1.3)**	**55 (1.3)**	**276 (1.0)**	**5 (1.0)**	**276 (5.0)**
New Jersey	**17 (0.5)**	**21 (2.5)**	**265 (3.6)**	**63 (3.4)**	**270 (1.4)**	**17 (2.5)**	**272 (3.4)**
New Mexico	13 (0.2)	42 (1.3)	253 (1.3)	50 (1.4)	258 (1.2)	8 (0.6)	258 (2.4)
New York	16 (0.5)	28 (2.8)	247 (2.6)	54 (3.5)	263 (1.8)	18 (3.1)	270 (2.8)
North Carolina	13 (0.5)	42 (3.1)	252 (1.4)	49 (3.3)	250 (1.7)	9 (2.1)	246 (5.0)!
North Dakota	16 (0.4)	28 (2.4)	277 (2.9)	52 (2.8)	283 (1.5)	20 (1.3)	284 (1.5)
Ohio	17 (0.7)	25 (3.2)	263 (2.8)	58 (3.8)	266 (1.6)	17 (2.8)	261 (2.6)
Oklahoma	**14 (0.6)**	**42 (3.6)**	**262 (1.6)**	**46 (3.5)**	**265 (1.7)**	**12 (3.1)**	**265 (3.2)!**
Oregon	**14 (0.7)**	**35 (3.3)**	**269 (2.1)**	**52 (2.9)**	**273 (1.5)**	**13 (2.4)**	**272 (2.9)**
Pennsylvania	**17 (0.7)**	**23 (3.0)**	**258 (2.7)**	**55 (3.7)**	**269 (2.1)**	**23 (3.8)**	**270 (2.8)**
Rhode Island	**17 (0.2)**	**23 (0.8)**	**253 (1.0)**	**64 (0.7)**	**262 (0.8)**	**13 (0.8)**	**262 (2.3)**
Texas	**13 (0.7)**	**46 (3.2)**	**256 (1.8)**	**42 (3.4)**	**258 (1.9)**	**13 (3.0)**	**246 (5.1)!**
Virginia	15 (0.4)	29 (2.6)	260 (2.3)	61 (2.7)	265 (1.9)	10 (1.7)	261 (5.1)
West Virginia	12 (0.6)	46 (4.0)	253 (1.4)	47 (3.9)	257 (1.3)	7 (2.1)	270 (4.8)!
Wisconsin	18 (0.7)	25 (3.4)	271 (2.4)	52 (3.7)	278 (1.8)	23 (2.9)	276 (2.4)
Wyoming	14 (0.1)	33 (1.2)	272 (0.9)	57 (1.1)	273 (0.8)	11 (0.4)	271 (1.2)
TERRITORIES							
Guam	**14 (0.2)**	**43 (0.9)**	**224 (0.6)**	**40 (0.9)**	**238 (1.2)**	**17 (0.8)**	**232 (1.6)**
Virgin Islands	**9 (0.1)**	**77 (0.7)**	**215 (0.6)**	**20 (0.5)**	**232 (1.4)**	**4 (0.5)**	***** (***)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 17.2 | **Teachers' Reports on the Number of Years They Have Taught Mathematics**

GRADE 8 PUBLIC SCHOOLS	Average Years Teaching Mathematics	10 Years or Less Teaching Mathematics		More than 10 Years, but Less than 25 Years Teaching Mathematics		25 Years or More Teaching Mathematics	
		Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	14 (0.8)	40 (3.5)	262 (2.4)	46 (4.0)	264 (1.8)	14 (3.5)	265 (6.3)!
Northeast	20 (3.1)	31 (6.2)	265 (4.0)!	42 (6.3)	272 (2.2)	27(13.5)	282 (8.2)!
Southeast	14 (1.5)	36 (8.8)	262 (5.4)!	56 (8.7)	255 (4.4)	7 (4.7)	*** (***)
Central	15 (1.1)	35 (4.9)	257 (4.2)	44(10.0)	275 (2.8)!	20 (6.9)	257 (5.6)!
West	11 (1.0)	51 (6.5)	264 (4.3)	42 (6.3)	261 (2.9)	6 (2.5)	*** (***)
STATES							
Alabama	13 (0.6)	43 (3.7)	254 (2.1)	51 (4.0)	252 (1.9)	6 (2.0)	244 (5.2)!
Arizona	11 (0.5)	55 (2.3)	258 (1.8)	37 (2.3)	262 (1.9)	8 (2.0)	263 (3.9)!
Arkansas	11 (0.5)	53 (4.3)	254 (1.5)	45 (4.4)	259 (1.5)	2 (0.8)	*** (***)
California	12 (0.7)	50 (2.8)	253 (1.7)	39 (2.8)	261 (2.2)	11 (2.2)	258 (4.2)
Colorado	12 (0.5)	50 (3.6)	263 (1.6)	41 (3.1)	266 (1.7)	9 (1.7)	273 (2.8)
Connecticut	16 (0.6)	30 (3.6)	270 (2.3)	52 (3.7)	270 (1.8)	18 (2.4)	270 (2.6)
Delaware	13 (0.2)	43 (0.8)	258 (1.0)	49 (0.8)	264 (1.0)	8 (0.7)	265 (2.3)
District of Columbia	16 (0.2)	30 (1.0)	236 (1.9)	55 (1.0)	226 (0.8)	15 (0.7)	239 (1.8)
Florida	12 (0.5)	49 (2.9)	254 (1.7)	46 (2.6)	258 (2.1)	6 (1.5)	257 (3.5)!
Georgia	12 (0.5)	44 (3.1)	255 (1.9)	48 (3.3)	261 (2.1)	8 (1.9)	249 (4.5)!
Hawaii	13 (0.2)	49 (0.8)	246 (1.0)	38 (0.9)	255 (1.1)	13 (0.8)	262 (2.0)
Idaho	11 (0.3)	55 (2.0)	270 (0.9)	37 (1.9)	275 (1.3)	8 (0.7)	271 (1.8)
Illinois	15 (0.8)	36 (4.0)	258 (3.3)	46 (5.1)	264 (2.5)	18 (3.8)	264 (4.4)!
Indiana	14 (0.7)	33 (3.8)	268 (2.3)	58 (3.8)	266 (1.5)	9 (2.2)	271 (4.2)!
Iowa	17 (1.0)	27 (4.5)	272 (2.4)	55 (3.9)	282 (1.4)	18 (3.4)	274 (2.7)
Kentucky	12 (0.7)	45 (4.4)	258 (1.5)	47 (4.7)	256 (1.9)	7 (2.4)	255 (3.3)!
Louisiana	12 (0.7)	46 (4.5)	246 (2.0)	39 (4.3)	246 (2.1)	15 (3.1)	242 (4.7)!
Maryland	15 (0.5)	29 (2.5)	252 (2.8)	60 (2.6)	265 (1.8)	12 (2.0)	262 (4.8)
Michigan	15 (0.6)	36 (3.3)	263 (2.2)	49 (4.0)	265 (2.1)	15 (3.2)	263 (5.7)!
Minnesota	17 (0.7)	29 (3.4)	273 (1.6)	45 (3.6)	277 (1.7)	26 (3.3)	279 (2.0)
Montana	15 (0.5)	34 (3.3)	278 (1.4)	52 (3.1)	282 (1.0)	14 (2.0)	285 (2.7)
Nebraska	13 (0.4)	41 (2.7)	272 (1.6)	52 (2.6)	279 (1.5)	7 (1.3)	280 (2.8)
New Hampshire	12 (0.3)	49 (1.5)	269 (1.5)	50 (1.5)	277 (1.1)	1 (0.5)	*** (***)
New Jersey	15 (0.5)	30 (2.8)	265 (2.7)	56 (2.8)	271 (1.6)	14 (2.1)	274 (4.2)
New Mexico	11 (0.2)	53 (1.4)	253 (1.1)	41 (1.3)	260 (1.3)	6 (0.5)	256 (2.9)
New York	16 (0.6)	34 (3.1)	249 (2.6)	48 (3.6)	264 (1.9)	18 (3.0)	269 (2.8)
North Carolina	12 (0.4)	51 (2.6)	251 (1.2)	43 (2.9)	249 (1.7)	6 (1.6)	250 (6.0)!
North Dakota	15 (0.4)	33 (2.5)	277 (2.5)	53 (2.8)	283 (1.4)	15 (1.1)	287 (1.9)
Ohio	15 (0.7)	35 (3.8)	260 (2.5)	53 (3.8)	267 (1.8)	12 (2.4)	263 (2.4)
Oklahoma	12 (0.8)	50 (3.4)	261 (1.6)	39 (3.4)	266 (2.0)	11 (2.0)	265 (3.6)!
Oregon	13 (0.5)	43 (3.3)	270 (1.5)	48 (2.9)	273 (1.6)	9 (1.6)	270 (4.0)
Pennsylvania	16 (0.8)	29 (3.4)	255 (2.4)	54 (3.6)	270 (2.2)	17 (2.7)	275 (3.2)
Rhode Island	16 (0.1)	29 (0.7)	254 (1.0)	58 (0.7)	262 (0.8)	13 (0.8)	262 (2.3)
Texas	11 (0.6)	54 (3.2)	256 (1.7)	38 (3.2)	256 (1.8)	8 (2.6)	245 (7.5)!
Virginia	13 (0.5)	40 (2.8)	260 (2.0)	51 (2.6)	266 (2.2)	9 (1.8)	265 (5.2)
West Virginia	11 (0.6)	52 (4.1)	254 (1.3)	45 (3.9)	257 (1.5)	3 (1.6)	*** (***)
Wisconsin	17 (0.7)	27 (3.5)	271 (2.4)	54 (3.9)	277 (1.8)	19 (2.9)	278 (2.6)
Wyoming	13 (0.2)	40 (1.6)	272 (0.9)	52 (1.5)	273 (0.9)	8 (0.3)	270 (1.4)
TERRITORIES							
Guam	12 (0.1)	53 (0.9)	226 (1.0)	39 (0.8)	236 (0.9)	7 (0.4)	229 (2.2)
Virgin Islands	8 (0.1)	77 (0.7)	215 (0.6)	20 (0.5)	232 (1.4)	4 (0.5)	*** (***)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

4:5

TABLE 17.3 | Teachers' Reports on Their Gender and Race/Ethnicity

	Teachers' Gender		Teachers' Race/Ethnicity				
	Male	Female	White	Black	Hispanic	Asian / Pacific Islander	American Indian
GRADE 8 PUBLIC SCHOOLS	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students	Percent of Students
NATION	45 (4.3)	55 (4.3)	90 (2.2)	7 (2.0)	2 (0.7)	1 (0.5)	0 (0.0)
Northeast	51(14.4)	49(14.4)	97 (1.6)	1 (0.8)	0 (0.0)	1 (1.4)	0 (0.0)
Southeast	25 (7.3)	75 (7.3)	82 (5.7)	18 (5.6)	1 (0.6)	0 (0.0)	0 (0.0)
Central	55 (9.0)	45 (9.0)	93 (3.5)	6 (3.4)	1 (0.6)	0 (0.0)	0 (0.0)
West	49 (6.6)	51 (6.6)	90 (3.8)	3 (2.6)	5 (2.1)	2 (1.2)	0 (0.0)
STATES							
Alabama	**31 (4.2)**	**69 (4.2)**	**78 (3.5)**	**21 (3.3)**	**1 (0.8)**	**0 (0.4)**	**0 (0.0)**
Arizona	**52 (3.3)**	**48 (3.3)**	**86 (2.3)**	**2 (0.7)**	**8 (1.9)**	**1 (0.3)**	**3 (0.9)**
Arkansas	**26 (4.0)**	**74 (4.0)**	**87 (2.0)**	**11 (1.7)**	**0 (0.0)**	**1 (0.7)**	**1 (0.9)**
California	**53 (3.3)**	**47 (3.3)**	**83 (2.0)**	**6 (1.4)**	**4 (1.1)**	**6 (1.4)**	**0 (0.0)**
Colorado	41 (2.8)	59 (2.8)	93 (2.1)	1 (0.3)	3 (1.3)	3 (1.5)	0 (0.0)
Connecticut	52 (2.6)	48 (2.6)	97 (0.7)	1 (0.5)	1 (0.4)	0 (0.1)	0 (0.0)
Delaware	44 (0.8)	56 (0.8)	90 (0.7)	7 (0.6)	1 (0.1)	0 (0.0)	2 (0.2)
District of Columbia	35 (0.8)	65 (0.8)	8 (0.8)	84 (1.0)	4 (0.3)	5 (0.6)	0 (0.0)
Florida	35 (3.0)	65 (3.0)	76 (2.8)	18 (2.3)	5 (1.5)	0 (0.3)	0 (0.2)
Georgia	**19 (2.6)**	**81 (2.6)**	**77 (2.4)**	**22 (2.4)**	**1 (0.5)**	**0 (0.0)**	**0 (0.4)**
Hawaii	**41 (0.7)**	**59 (0.7)**	**20 (0.8)**	**1 (0.1)**	**3 (0.1)**	**75 (0.8)**	**0 (0.1)**
Idaho	**58 (1.9)**	**42 (1.9)**	**96 (0.4)**	**0 (0.0)**	**1 (0.2)**	**3 (0.2)**	**0 (0.2)**
Illinois	**44 (4.5)**	**56 (4.5)**	**89 (3.2)**	**9 (3.1)**	**1 (0.7)**	**0 (0.3)**	**0 (0.5)**
Indiana	**50 (3.9)**	**50 (3.9)**	**98 (0.8)**	**1 (0.6)**	**0 (0.3)**	**0 (0.0)**	**0 (0.0)**
Iowa	62 (5.0)	38 (5.0)	99 (0.8)	1 (0.5)	1 (0.7)	0 (0.0)	0 (0.0)
Kentucky	34 (4.4)	66 (4.4)	98 (0.9)	2 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)
Louisiana	32 (3.4)	68 (3.4)	75 (3.9)	25 (3.9)	0 (0.1)	0 (0.0)	0 (0.0)
Maryland	38 (3.3)	62 (3.3)	80 (2.4)	17 (2.6)	1 (1.0)	1 (0.6)	1 (0.6)
Michigan	55 (3.8)	45 (3.8)	90 (2.0)	9 (1.9)	0 (0.5)	0 (0.2)	1 (0.8)
Minnesota	**72 (3.2)**	**28 (3.2)**	**99 (0.7)**	**0 (0.0)**	**0 (0.3)**	**1 (0.6)**	**0 (0.0)**
Montana	**66 (2.6)**	**34 (2.6)**	**100 (0.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**
Nebraska	**50 (2.6)**	**50 (2.6)**	**98 (0.3)**	**1 (0.1)**	**1 (0.3)**	**0 (0.1)**	**0 (0.0)**
New Hampshire	**29 (1.2)**	**71 (1.2)**	**100 (0.2)**	**0 (0.0)**	**0 (0.2)**	**0 (0.0)**	**0 (0.0)**
New Jersey	**34 (3.6)**	**66 (3.6)**	**90 (2.0)**	**8 (1.9)**	**2 (0.9)**	**1 (0.5)**	**0 (0.0)**
New Mexico	55 (1.2)	45 (1.2)	78 (1.2)	2 (0.4)	18 (1.2)	0 (0.0)	2 (0.3)
New York	55 (3.5)	45 (3.5)	89 (2.2)	8 (1.8)	2 (0.9)	1 (0.5)	0 (0.4)
North Carolina	20 (2.6)	80 (2.6)	84 (2.6)	13 (2.1)	0 (0.0)	1 (0.5)	2 (1.1)
North Dakota	72 (3.0)	28 (3.0)	99 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.3)
Ohio	56 (3.5)	44 (3.5)	93 (2.0)	6 (1.7)	0 (0.0)	1 (0.6)	1 (0.9)
Oklahoma	**32 (3.8)**	**68 (3.8)**	**92 (2.1)**	**3 (1.4)**	**0 (0.0)**	**0 (0.2)**	**5 (1.7)**
Oregon	**58 (3.5)**	**42 (3.5)**	**95 (1.4)**	**0 (0.0)**	**1 (0.4)**	**2 (1.1)**	**1 (0.7)**
Pennsylvania	**58 (3.8)**	**42 (3.8)**	**92 (2.4)**	**7 (2.3)**	**0 (0.0)**	**0 (0.3)**	**0 (0.0)**
Rhode Island	**48 (0.8)**	**52 (0.8)**	**98 (0.2)**	**2 (0.2)**	**0 (0.0)**	**0 (0.0)**	**0 (0.0)**
Texas	**30 (3.0)**	**70 (3.0)**	**73 (2.8)**	**11 (2.2)**	**14 (2.0)**	**1 (0.8)**	**1 (0.9)**
Virginia	24 (2.7)	76 (2.7)	82 (2.1)	18 (2.1)	0 (0.0)	0 (0.2)	0 (0.0)
West Virginia	37 (3.8)	63 (3.8)	97 (0.9)	2 (0.8)	0 (0.3)	0 (0.2)	0 (0.2)
Wisconsin	54 (4.2)	46 (4.2)	100 (0.1)	0 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
Wyoming	58 (0.8)	42 (0.8)	98 (0.2)	0 (0.0)	2 (0.2)	0 (0.0)	0 (0.0)
TERRITORIES							
Guam	**48 (0.7)**	**52 (0.7)**	**23 (0.7)**	**0 (0.0)**	**0 (0.0)**	**77 (0.7)**	**0 (0.0)**
Virgin Islands	**71 (0.7)**	**29 (0.7)**	**8 (0.5)**	**79 (0.8)**	**13 (0.6)**	**0 (0.0)**	**0 (0.0)**

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 17.4 | Teachers' Reports on Their Level of Teaching Certification

GRADE 8 PUBLIC SCHOOLS	None, Temporary, Probational, Provisional, or Emergency		Regular Certification, But Not Highest Level		Highest Certification (Permanent or Long-Term)	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	4 (1.2)	258 (7.7)!	29 (4.3)	258 (3.0)	66 (4.3)	268 (1.9)
Northeast	0 (0.0)	0 (0.0)	19(11.5)	*** (***)	81(11.5)	273 (4.8)
Southeast	5 (2.3)	*** (***)	53(10.4)	252 (3.2)!	42(10.7)	263 (4.4)!
Central	4 (2.7)	*** (***)	25 (7.3)	264 (6.5)!	71 (7.3)	265 (3.3)
West	6 (2.4)	*** (***)	20 (3.3)	257 (6.2)	74 (3.3)	265 (2.8)
STATES						
Alabama	1 (0.6)	*** (***)	70 (3.9)	251 (1.4)	29 (3.8)	257 (2.2)
Arizona	4 (1.0)	257 (6.4)!	23 (2.8)	255 (2.9)	73 (2.7)	261 (1.3)
Arkansas	2 (1.4)	*** (***)	40 (4.2)	255 (1.7)	57 (4.3)	259 (1.4)
California	11 (2.0)	242 (3.[illegible]	13 (2.3)	248 (4.1)	76 (2.5)	260 (1.5)
Colorado	6 (1.7)	266 (2.9)!	41 (2.9)	266 (1.7)	53 (3.4)	267 (1.4)
Connecticut	11 (2.2)	273 (2.7)	4 (1.3)	273 (4.8)!	85 (2.5)	269 (1.2)
Delaware	2 (0.2)	*** (***)	15 (0.8)	254 (1.8)	83 (0.8)	263 (0.7)
District of Columbia	23 (0.7)	236 (2.4)	6 (0.3)	233 (2.6)	71 (0.7)	229 (0.7)
Florida	9 (1.9)	251 (4.1)	36 (3.1)	254 (2.2)	55 (3.0)	259 (1.7)
Georgia	5 (1.6)	242 (8.3)!	78 (2.8)	258 (1.4)	16 (2.3)	259 (3.1)
Hawaii	9 (0.6)	231 (1.8)	29 (0.8)	255 (1.5)	62 (0.9)	252 (0.9)
Idaho	3 (0.4)	260 (5.4)	34 (1.5)	269 (1.0)	63 (1.5)	274 (1.0)
Illinois	6 (2.8)	293 (7.1)!	29 (4.0)	263 (2.7)	65 (4.5)	262 (2.4)
Indiana	2 (0.9)	*** (***)	15 (2.9)	266 (2.1)	83 (2.9)	268 (1.4)
Iowa	1 (1.2)	*** (***)	56 (4.2)	279 (1.5)	42 (4.2)	278 (1.5)
Kentucky	0 (0.0)	0 (0.0)	38 (3.7)	258 (1.9)	62 (3.7)	255 (1.4)
Louisiana	5 (1.5)	231 (5.0)!	25 (3.6)	246 (1.9)	70 (3.8)	246 (1.6)
Maryland	3 (1.2)	262 (6.3)!	17 (2.7)	256 (4.0)	79 (3.0)	262 (1.8)
Michigan	9 (2.2)	266 (3.1)!	5 (1.4)	256 (5.0)!	87 (2.7)	264 (1.3)
Minnesota	2 (1.0)	*** (***)	22 (3.5)	273 (2.6)	76 (3.5)	277 (1.2)
Montana	1 (0.1)	*** (***)	52 (2.6)	278 (1.1)	47 (2.8)	284 (1.2)
Nebraska	4 (1.0)	260 (5.3)!	61 (3.3)	276 (1.3)	35 (3.0)	278 (1.1)
New Hampshire	4 (0.5)	264 (5.0)	36 (1.4)	271 (1.5)	60 (1.4)	275 (0.9)
New Jersey	1 (0.5)	*** (***)	5 (1.5)	251 (7.0)!	94 (1.6)	270 (1.1)
New Mexico	2 (0.4)	*** (***)	45 (1.1)	257 (1.2)	53 (1.2)	255 (1.1)
New York	13 (2.0)	240 (4.1)	3 (1.1)	*** (***)	84 (2.3)	264 (1.4)
North Carolina	5 (1.5)	249 (4.5)!	45 (3.3)	249 (1.7)	50 (3.3)	252 (1.7)
North Dakota	1 (0.2)	*** (***)	30 (4.1)	281 (2.4)	69 (4.1)	281 (1.4)
Ohio	17 (3.2)	261 (2.4)	34 (4.0)	264 (2.8)	49 (4.5)	266 (1.9)
Oklahoma	1 (0.4)	*** (***)	31 (3.2)	262 (1.6)	69 (3.2)	264 (1.5)
Oregon	1 (0.9)	*** (***)	33 (3.1)	269 (1.6)	65 (3.2)	272 (1.2)
Pennsylvania	7 (2.2)	254 (9.0)!	14 (2.7)	256 (5.2)	80 (3.2)	269 (1.6)
Rhode Island	3 (0.2)	258 (2.4)	7 (0.9)	255 (2.1)	90 (0.9)	260 (0.6)
Texas	13 (2.6)	250 (3.6)	14 (2.4)	254 (4.1)	73 (3.4)	257 (1.6)
Virginia	8 (1.5)	250 (4.5)	24 (3.0)	261 (3.1)	68 (3.4)	266 (1.8)
West Virginia	15 (2.8)	252 (2.1)	31 (3.4)	254 (1.8)	54 (3.7)	258 (1.3)
Wisconsin	1 (0.9)	*** (***)	10 (2.4)	274 (3.2)!	88 (2.6)	276 (1.4)
Wyoming	1 (0.4)	*** (***)	53 (1.3)	273 (0.9)	46 (1.3)	272 (0.7)
TERRITORIES						
Guam	10 (0.4)	218 (1.9)	55 (0.9)	234 (1.1)	35 (0.9)	231 (1.4)
Virgin Islands	41 (1.0)	216 (0.9)	8 (0.6)	224 (2.7)	51 (0.7)	219 (0.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 17.5 | Teachers' Reports on the Type of Their Teaching Certification

GRADE 8 PUBLIC SCHOOLS	Mathematics (Middle School or Secondary)		Education (Elementary or Middle School)		Other	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	84 (2.2)	264 (1.6)	12 (2.6)	258 (3.9)!	4 (1.5)	271 (6.0)!
Northeast	89 (3.7)	271 (3.0)	8 (3.8)	*** (***)	4 (3.7)	*** (***)
Southeast	84 (5.1)	256 (3.3)	14 (4.6)	253 (8.5)!	2 (1.5)	*** (***)
Central	77 (4.5)	266 (2.6)	17 (7.5)	254 (8.7)!	7 (4.8)	*** (***)
West	88 (3.0)	264 (3.0)	9 (2.8)	257 (5.1)!	2 (1.3)	*** (***)
STATES						
Alabama	92 (2.2)	254 (1.3)	7 (2.1)	238 (5.5)!	1 (0.4)	*** (***)
Arizona	41 (2.8)	263 (1.6)	52 (3.0)	258 (1.7)	8 (1.9)	254 (4.9)!
Arkansas	94 (2.0)	257 (1.0)	2 (1.1)	*** (***)	4 (1.7)	246 (5.2)!
California	72 (3.4)	259 (1.6)	24 (3.3)	253 (2.5)	4 (0.8)	241 (5.4)!
Colorado	79 (2.5)	268 (1.3)	17 (1.9)	261 (2.5)	4 (1.6)	265 (3.7)!
Connecticut	75 (2.5)	273 (1.2)	21 (2.6)	258 (1.9)	3 (1.4)	264 (5.4)!
Delaware	88 (0.7)	264 (0.7)	11 (0.6)	250 (2.1)	1 (0.3)	*** (***)
District of Columbia	92 (0.7)	231 (0.8)	6 (0.7)	229 (1.9)	1 (0.2)	*** (***)
Florida	93 (1.2)	257 (1.3)	5 (1.0)	236 (4.3)!	3 (0.8)	*** (***)
Georgia	55 (3.3)	258 (1.6)	44 (3.3)	258 (1.9)	1 (0.3)	*** (***)
Hawaii	78 (0.7)	255 (0.8)	13 (0.6)	235 (1.8)	9 (0.4)	234 (2.4)
Idaho	80 (1.0)	274 (0.9)	17 (0.9)	264 (1.4)	2 (0.3)	249 (5.6)
Illinois	73 (3.6)	267 (1.9)	26 (3.4)	250 (4.0)	1 (0.6)	*** (***)
Indiana	96 (1.2)	268 (1.2)	3 (1.1)	262 (7.0)!	1 (0.3)	*** (***)
Iowa	85 (3.3)	279 (1.2)	12 (3.0)	268 (3.0)!	3 (1.5)	276 (3.3)!
Kentucky	62 (3.8)	259 (1.3)	36 (3.8)	252 (1.7)	3 (1.2)	253 (5.9)!
Louisiana	59 (4.0)	246 (1.7)	37 (4.1)	246 (2.0)	5 (1.5)	227 (4.6)!
Maryland	87 (2.1)	263 (1.6)	10 (1.9)	252 (3.1)	3 (0.7)	241(10.9)!
Michigan	81 (2.4)	266 (1.3)	17 (2.3)	258 (2.1)	1 (0.9)	*** (***)
Minnesota	98 (0.9)	276 (0.9)	1 (0.4)	*** (***)	2 (0.8)	*** (***)
Montana	77 (3.0)	282 (0.9)	23 (3.0)	278 (1.4)	0 (0.1)	*** (***)
Nebraska	94 (1.0)	277 (0.9)	5 (1.0)	267 (6.0)	1 (0.1)	*** (***)
New Hampshire	80 (1.5)	273 (1.0)	16 (1.4)	272 (1.8)	3 (0.5)	268 (4.2)
New Jersey	63 (3.4)	278 (1.6)	36 (3.4)	255 (2.4)	1 (0.5)	*** (***)
New Mexico	71 (1.3)	258 (0.9)	28 (1.3)	251 (1.2)	1 (0.1)	*** (***)
New York	85 (2.3)	264 (1.7)	10 (1.7)	238 (3.9)	5 (1.7)	228 (6.4)!
North Carolina	89 (1.7)	252 (1.0)	8 (1.6)	237 (4.4)	3 (0.6)	235 (6.9)!
North Dakota	91 (1.6)	282 (1.3)	5 (1.4)	274 (3.7)!	3 (0.6)	280 (4.6)
Ohio	75 (3.5)	266 (1.5)	25 (3.6)	260 (2.6)	1 (0.3)	*** (***)
Oklahoma	80 (3.6)	265 (1.4)	19 (3.4)	259 (2.7)	1 (0.7)	*** (***)
Oregon	75 (3.1)	273 (1.3)	20 (3.0)	263 (2.4)	5 (1.5)	270 (5.3)!
Pennsylvania	89 (2.8)	270 (1.5)	9 (2.7)	238 (5.3)!	2 (0.8)	*** (***)
Rhode Island	96 (0.3)	260 (0.6)	3 (0.2)	251 (2.8)	1 (0.2)	*** (***)
Texas	86 (2.4)	256 (1.4)	10 (2.0)	261 (3.3)	4 (1.4)	246 (8.8)!
Virginia	94 (1.5)	265 (1.5)	4 (1.4)	247 (4.1)!	2 (0.7)	*** (***)
West Virginia	95 (1.5)	256 (0.9)	2 (0.8)	*** (***)	3 (1.2)	247 (8.2)!
Wisconsin	74 (3.7)	277 (1.3)	23 (3.5)	271 (3.2)	2 (1.3)	*** (***)
Wyoming	91 (0.7)	273 (0.7)	9 (0.6)	266 (2.2)	1 (0.3)	*** (***)
TERRITORIES						
Guam	64 (0.5)	231 (0.8)	36 (0.5)	231 (0.7)	0 (0.0)	0 (0.0)
Virgin Islands	52 (0.7)	220 (0.8)	23 (0.4)	218 (1.3)	25 (0.7)	218 (1.1)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 17.6 | Teachers' Reports on the Highest Academic Degree They Earned

GRADE 8 PUBLIC SCHOOLS	Bachelor's Degree		Master's or Specialist's Degree		Doctorate or Professional Degree	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	58 (4.2)	263 (2.2)	42 (4.2)	264 (2.6)	2 (1.4)	*** (***)
Northeast	46(15.0)	268 (3.0)!	54(15.0)	276 (5.3)!	0 (0.0)	0 (0.0)
Southeast	56 (8.2)	259 (4.7)	39 (8.4)	255 (4.7)!	5 (5.1)	*** (***)
Central	48 (9.1)	267 (3.6)	48 (8.8)	262 (4.6)	4 (2.7)	*** (***)
West	68 (5.2)	263 (4.1)	32 (5.2)	264 (2.7)	0 (0.0)	0 (0.0)
STATES						
Alabama	52 (4.7)	253 (1.9)	48 (4.8)	252 (1.7)	0 (0.4)	** (***)
Arizona	55 (2.8)	259 (1.8)	44 (2.8)	260 (1.5)	1 (0.4)	*** (***)
Arkansas	66 (3.9)	255 (1.1) •	34 (3.9)	258 (2.0)	0 (0.1)	*** (***)
California	64 (3.3)	257 (1.6)	35 (3.2)	256 (2.6)	1 (0.6)	*** (***)
Colorado	50 (3.3)	266 (1.7)	49 (3.4)	267 (1.6)	1 (0.7)	*** (***)
Connecticut	17 (2.7)	272 (2.4)	82 (2.7)	269 (1.2)	1 (0.7)	*** (***)
Delaware	47 (1.1)	259 (1.1)	52 (1.1)	265 (1.1)	2 (0.0)	*** (***)
District of Columbia	40 (1.0)	230 (1.4)	54 (1.1)	230 (1.0)	6 (0.4)	232 (3.1)
Florida	55 (3.1)	254 (1.8)	45 (3.2)	259 (1.5)	0 (0.3)	*** (***)
Georgia	54 (3.6)	254 (1.7)	46 (3.6)	261 (1.8)	0 (0.0)	0 (0.0)
Hawaii	67 (0.8)	254 (0.6)	31 (0.7)	246 (1.4)	2 (0.4)	*** (***)
Idaho	73 (1.9)	271 (0.9)	27 (1.9)	272 (1.6)	0 (0.0)	0 (0.0)
Illinois	55 (4.7)	261 (3.0)	45 (4.7)	26* (2.4)	0 (0.5)	*** (***)
Indian.	18 (3.1)	265 (2.5)	61 (3.1)	266 (1.3)	0 (0.4)	*** (***)
Iowa	64 (3.9)	278 (1.4)	36 (3.9)	278 (1.7)	0 (0.0)	0 (0.0)
Kentucky	25 (3.5)	257 (1.9)	74 (3.6)	257 (1.5)	1 (0.6)	*** (***)
Louisiana	61 (4.5)	246 (1.6)	35 (3.9)	244 (2.6)	4 (1.9)	247 (6.7)!
Maryland	41 (3.6)	257 (2.0)	59 (3.6)	263 (2.1)	0 (0.1)	*** (***)
Michigan	36 (3.4)	266 (1.9)	64 (3.4)	263 (1.7)	0 (0.0)	*** (***)
Minnesota	56 (3.4)	274 (1.2)	44 (3.4)	279 (1.5)	0 (0.0)	0 (0.0)
Montana	62 (2.5)	278 (1.1)	36 (2.5)	286 (1.2)	1 (0.0)	*** (***)
Nebraska	67 (2.6)	276 (1.3)	33 (2.6)	276 (1.4)	0 (0.0)	0 (0.0)
New Hampshire	65 (1.4)	271 (1.0)	34 (1.4)	277 (1.6)	1 (0.1)	*** (***)
New Jersey	61 (3.9)	266 (1.8)	37 (4.2)	275 (2.2)	1 (0.8)	*** (***)
New Mexico	54 (1.2)	258 (1.1)	46 (1.2)	254 (0.9)	0 (0.0)	0 (0.0)
New York	31 (3.3)	256 (2.9)	68 (3.3)	261 (1.7)	2 (0.8)	*** (***)
North Carolina	65 (2.8)	250 (1.2)	35 (2.9)	252 (2.1)	0 (0.0)	0 (0.0)
North Dakota	81 (1.9)	281 (1.4)	19 (1.9)	284 (1.6)	0 (0.0)	0 (0.0)
Ohio	49 (4.2)	262 (1.8)	51 (4.2)	266 (1.7)	0 (0.0)	0 (0.0)
Oklahoma	60 (3.8)	262 (1.4)	40 (3.7)	266 (2.2)	1 (0.7)	*** (***)
Oregon	56 (3.2)	271 (1.5)	43 (3.2)	272 (1.5)	1 (0.4)	*** (***)
Pennsylvania	53 (3.6)	264 (2.4)	45 (3.5)	269 (2.1)	1 (0.7)	*** (***)
Rhode Island	52 (1.1)	259 (0.7)	48 (1.1)	261 (0.9)	0 (0.0)	0 (0.0)
Texas	62 (3.3)	254 (1.6)	38 (3.3)	258 (2.2)	0 (0.0)	0 (0.0)
Virginia	68 (2.5)	262 (1.8)	31 (2.6)	267 (2.6)	0 (0.2)	*** (***)
West Virginia	57 (3.5)	255 (1.0)	43 (3.5)	257 (1.4)	0 (0.0)	0 (0.0)
Wisconsin	56 (4.3)	272 (1.5)	44 (4.4)	280 (1.9)	0 (0.3)	*** (***)
Wyoming	70 (0.9)	274 (0.7)	30 (0.9)	268 (1.0)	0 (0.0)	0 (0.0)
TERRITORIES						
Guam	80 (0.6)	231 (0.7)	20 (0.6)	233 (1.5)	0 (0.0)	0 (0.0)
Virgin Islands	63 (0.9)	215 (0.7)	37 (0.9)	224 (1.0)	0 (0.0)	0 (0.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 17.7 | Teachers' Reports on Their Undergraduate Major

GRADE 8 PUBLIC SCHOOLS	Undergraduate Major in Mathematics		Undergraduate Major in Education		Other Undergraduate Major	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	43 (3.9)	268 (1.9)	35 (3.8)	258 (2.4)	22 (3.3)	263 (3.8)
Northeast	44 (9.2)	275 (2.2)!	34 (8.0)	268 (4.3)!	22 (6.1)	277(11.6)!
Southeast	44 (9.0)	257 ('1.7)!	43 (9.0)	257 (4.7)!	14 (6.5)	252 (5.9)!
Central	57 (7.1)	271 ,3.5)	29 (6.4)	254 (4.3)!	14 (5.4)	266 (6.9)!
West	31 (5.9)	270 (3.6)!	34 (6.6)	259 (4.2)!	35 (6.6)	261 (4.9)
STATES						
Alabama	66 (4.2)	255 (1.5)	24 (3.6)	245 (3.1)	10 (2.8)	256 (3.6)!
Arizona	15 (2.2)	267 (3.5)	63 (3.5)	258 (1.5)	22 (2.7)	260 (2.9)
Arkansas	51 (4.7)	259 (1.7)	35 (4.2)	256 (1.6)	14 (3.1)	248 (2.5)!
California	22 (2.0)	258 (2.7)	27 (2.7)	253 (2.9)	51 (2.6)	258 (1.7)
Colorado	57 (2.9)	268 (1.3)	27 (2.4)	262 (1.9)	16 (2.4)	267 (2.6)
Connecticut	33 (3.3)	277 (1.8)	46 (3.5)	267 (1.7)	21 (2.6)	265 (2.7)
Delaware	39 (1.1)	267 (1.2)	47 (0.9)	263 (1.1)	15 (0.8)	247 (1.8)
District of Columbia	64 (1.0)	228 (0.7)	20 (0.6)	231 (1.6)	17 (0.9)	241 (3.3)
Florida	32 (2.9)	261 (2.0)	41 (3.5)	255 (2.0)	27 (2.5)	252 (2.3)
Georgia	34 (2.9)	259 (1.9)	58 (3.0)	258 (1.8)	9 (1.9)	250 (4.7)!
Hawaii	53 (0.9)	255 (0.8)	37 (1.0)	249 (1.3)	10 (0.6)	239 (2.3)
Idaho	34 (1.9)	275 (1.2)	47 (2.0)	269 (1.1)	19 (1.2)	272 (1.5)
Illinois	30 (3.6)	273 (2.7)	49 (4.7)	258 (2.3)	21 (4.2)	254 (5.3)!
Indiana	64 (3.6)	268 (1.5)	27 (3.6)	264 (2.5)	9 (2.6)	274 (4.2)!
Iowa	51 (4.8)	281 (1.7)	39 (4.9)	275 (1.9)	11 (2.8)	273 (2.9)!
Kentucky	31 (3.9)	262 (2.0)	54 (4.7)	255 (1.3)	15 (4.1)	250 (3.2)!
Louisiana	26 (3.6)	247 (2.6)	67 (4.1)	245 (1.8)	7 (1.8)	234 (4.8)!
Maryland	47 (3.4)	263 (2.3)	39 (3.4)	257 (1.9)	14 (1.9)	264 (4.8)
Michigan	47 (4.0)	269 (2.4)	28 (3.2)	256 (2.5)	26 (3.3)	262 (2.9)
Minnesota	88 (2.0)	277 (1.0)	9 (1.6)	273 (2.2)	4 (1.6)	270 (5.3)!
Montana	50 (2.6)	262 (0.8)	38 (2.9)	278 (1.3)	12 (2.3)	280 (1.6)
Nebraska	71 (2.7)	278 (1.0)	24 (2.5)	270 (2.0)	5 (1.2)	274 (2.9)!
New Hampshire	44 (1.1)	272 (1.2)	42 (1.2)	272 (1.2)	15 (0.8)	277 (1.9)
New Jersey	41 (3.2)	261 (2.2)	49 (3.3)	262 (1.9)	10 (1.7)	263 (4.5)
New Mexico	34 (1.4)	262 (1.4)	46 (1.3)	252 (1.0)	20 (0.8)	254 (1.6)
New York	48 (3.6)	267 (1.9)	24 (2.8)	260 (3.0)	28 (3.1)	247 (2.5)
North Carolina	34 (3.2)	254 (1.7)	60 (3.5)	248 (1.5)	7 (1.6)	250 (3.8)!
North Dakota	61 (3.0)	281 (1.5)	28 (2.8)	281 (2.3)	11 (1.1)	285 (2.5)
Ohio	39 (4.2)	267 (2.3)	48 (4.1)	261 (1.9)	13 (2.6)	268 (4.5)
Oklahoma	35 (3.4)	268 (2.4)	59 (3.4)	260 (1.4)	6 (1.4)	271 (3.0)!
Oregon	34 (3.6)	274 (2.2)	45 (3.4)	270 (1.7)	22 (2.7)	269 (2.2)
Pennsylvania	69 (3.5)	272 (1.2)	24 (2.9)	252 (3.1)	8 (2.2)	254 (6.1)!
Rhode Island	55 (0.9)	264 (0.8)	31 (0.9)	255 (1.3)	14 (0.9)	254 (1.9)
Texas	36 (3.2)	251 (2.4)	43 (3.4)	258 (1.9)	21 (3.2)	257 (2.9)
Virginia	48 (3.3)	265 (2.0)	34 (2.8)	262 (2.3)	18 (2.1)	263 (3.1)
West Virginia	46 (4.2)	258 (1.4)	42 (3.9)	254 (1.3)	12 (3.6)	254 (4.2)!
Wisconsin	51 (4.3)	279 (1.6)	43 (4.1)	272 (2.0)	6 (2.1)	273 (3.0)!
Wyoming	61 (0.9)	273 (0.8)	29 (0.7)	271 (1.1)	11 (0.7)	274 (2.0)
TERRITORIES						
Guam	37 (0.6)	234 (1.2)	38 (0.8)	231 (1.1)	25 (0.8)	226 (1.1)
Virgin Islands	56 (0.7)	222 (0.8)	15 (0.4)	221 (1.5)	30 (0.7)	209 (1.1)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 17.8 | **Teachers' Reports on Their Graduate Major**

GRADE 8 PUBLIC SCHOOLS	Graduate Major in Mathematics		Graduate Major in Education		Other Graduate Major or No Graduate Study	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	22 (3.4)	261 (3.3)	38 (3.5)	262 (2.1)	40 (3.4)	266 (2.8)
Northeast	22 (9.7)	270 (5.1)!	42 (8.2)	274 (4.1)!	37 (4.5)	272 (9.3)!
Southeast	15 (5.4)	241 (5.7)!	43 (9.8)	255 (4.6)!	41 (8.1)	263 (5.5)!
Central	34 (9.1)	260 (7.0)!	34 (6.2)	268 (3.8)	32 (6.6)	267 (4.5)
West	19 (4.7)	269 (4.1)!	36 (4.5)	259 (3.4)	45 (5.4)	264 (4.6)
STATES						
Alabama	25 (3.3)	254 (2.2)	32 (4.0)	250 (2.4)	42 (4.1)	254 (2.2)
Arizona	6 (1.1)	269 (3.5)	58 (3.1)	258 (1.4)	35 (3.0)	261 (2.1)
Arkansas	27 (3.5)	258 (2.2)	24 (3.5)	257 (2.1)	49 (4.1)	255 (1.5)
California	12 (2.2)	260 (3.3)	49 (3.1)	256 (2.2)	39 (3.0)	256 (2.5)
Colorado	20 (3.0)	266 (2.0)	35 (3.4)	267 (2.1)	45 (3.1)	267 (1.7)
Connecticut	19 (2.7)	279 (2.6)	64 (3.3)	267 (1.6)	16 (2.9)	271 (2.4)
Delaware	24 (1.3)	269 (1.6)	41 (1.1)	264 (1.1)	35 (1.1)	256 (1.2)
District of Columbia	36 (1.2)	228 (1.1)	35 (1.3)	234 (1.0)	29 (0.9)	232 (2.0)
Florida	14 (2.1)	262 (3.0)	35 (3.2)	255 (2.3)	51 (3.1)	256 (1.6)
Georgia	16 (2.8)	258 (3.0)	51 (3.7)	260 (1.8)	33 (3.1)	258 (2.3)
Hawaii	28 (0.9)	251 (1.4)	33 (1.0)	247 (1.0)	39 (0.9)	255 (1.4)
Idaho	10 (1.6)	278 (2.2)	45 (1.9)	272 (0.9)	45 (1.4)	269 (1.3)
Illinois	15 (3.3)	268 (4.4)!	39 (4.4)	259 (2.5)	46 (4.8)	263 (2.8)
Indiana	34 (3.8)	270 (2.4)	50 (4.0)	267 (1.5)	16 (2.6)	266 (3.0)
Iowa	18 (3.5)	280 (2.5)	34 (4.1)	276 (2.3)	48 (4.4)	279 (1.9)
Kentucky	11 (2.3)	261 (3.9)!	69 (4.1)	256 (1.4)	21 (3.3)	256 (2.5)
Louisiana	9 (2.2)	247 (4.0)!	53 (4.6)	245 (2.1)	39 (4.1)	245 (2.1)
Maryland	19 (2.5)	263 (4.2)	52 (3.3)	263 (1.7)	29 (2.8)	255 (2.9)
Michigan	23 (3.6)	260 (3.4)	45 (4.0)	262 (2.1)	32 (3.7)	268 (2.2)
Minnesota	40 (3.6)	277 (1.6)	23 (3.0)	278 (2.0)	37 (3.1)	276 (1.8)
Montana	19 (1.7)	282 (1.6)	43 (2.8)	280 (1.2)	38 (3.0)	280 (1.1)
Nebraska	30 (2.6)	281 (1.5)	29 (2.6)	272 (1.3)	40 (3.1)	275 (1.6)
New Hampshire	20 (1.3)	274 (1.7)	31 (1.5)	279 (2.2)	49 (1.3)	268 (1.0)
New Jersey	17 (2.7)	282 (4.2)	28 (3.0)	273 (2.5)	56 (3.7)	266 (2.0)
New Mexico	15 (0.9)	261 (2.0)	37 (1.4)	252 (1.3)	47 (1.3)	258 (1.1)
New York	30 (3.0)	266 (2.9)	51 (3.5)	263 (1.9)	19 (2.8)	244 (3.6)
North Carolina	14 (2.1)	251 (4.0)	36 (3.6)	252 (2.1)	51 (3.6)	249 (1.5)
North Dakota	15 (1.5)	283 (2.5)	28 (2.9)	284 (2.3)	57 (3.3)	28[illegible] (1.3)
Ohio	12 (2.7)	260 (4.6)!	49 (4.1)	264 (1.8)	40 (4.2)	26[illegible] (2.2)
Oklahoma	16 (2.9)	268 (2.9)	40 (4.3)	262 (1.9)	45 (4.3)	264 (1.5)
Oregon	27 (3.3)	275 (2.3)	45 (3.6)	269 (1.4)	28 (3.3)	270 (2.3)
Pennsylvania	33 (3.1)	269 (2.6)	44 (4.0)	267 (2.3)	23 (2.6)	265 (2.8)
Rhode Island	32 (0.9)	269 (1.1)	37 (0.9)	252 (1.2)	32 (0.7)	259 (1.1)
Texas	15 (2.3)	253 (3.6)	39 (3.9)	257 (2.1)	46 (3.6)	256 (2.0)
Virginia	14 (2.2)	265 (4.0)	32 (3.2)	265 (2.3)	53 (3.2)	262 (2.0)
West Virginia	11 (2.5)	257 (3.3)!	43 (4.6)	258 (1.7)	46 (4.5)	253 (1.4)
Wisconsin	14 (3.1)	282 (2.0)!	45 (4.3)	276 (2.0)	40 (4.2)	273 (2.0)
Wyoming	20 (0.9)	272 (1.3)	28 (1.3)	272 (1.3)	52 (1.3)	272 (0.8)
TERRITORIES						
Guam	1 (0.3)	*** (***)	49 (0.7)	229 (0.8)	50 (0.6)	231 (1.4)
Virgin Islands	19 (0.3)	210 (1.3)	28 (0.7)	222 (1.2)	54 (0.6)	220 (0.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

4^1

TABLE 17.9 | **Teachers' Reports on Their Undergraduate and Graduate Course Taking in Number Systems and Numeration**

GRADE 8 PUBLIC SCHOOLS	Two or More Courses		One Course		No Courses	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	34 (4.8)	268 (3.4)	47 (4.7)	263 (1.8)	19 (3.0)	260 (2.9)
Northeast	37(14.0)	280 (7.8)!	56(10.3)	269 (3.6)	8 (4.8)	*** (***)
Southeast	35 (8.7)	255 (5.6)!	48(10.2)	257 (2.5)!	17 (6.8)	262 (8.6)!
Central	27(10.0)	265 (5.5)!	51 (9.8)	264 (3.6)!	22 (6.9)	267 (4.6)!
West	37 (8.4)	268 (5.3)!	40 (6.0)	265 (3.7)	23 (4.5)	253 (4.0)
STATES						
Alabama	48 (4.0)	250 (2.2)	33 (3.8)	258 (2.0)	20 (3.5)	253 (2.4)
Arizona	27 (2.8)	284 (2.1)	47 (3.1)	260 (1.9)	26 (3.1)	257 (2.8)
Arkansas	30 (3.1)	251 (2.1)	54 (3.9)	260 (1.4)	17 (3.4)	254 (2.2)!
California	36 (3.4)	258 (2.1)	48 (2.9)	259 (2.1)	16 (2.5)	250 (4.1)
Colorado	47 (3.6)	268 (1.5)	38 (3.5)	268 (1.8)	15 (2.4)	256 (3.1)
Connecticut	35 (3.0)	273 (2.0)	46 (3.1)	268 (1.9)	20 (2.6)	267 (3.1)
Delaware	48 (1.0)	264 (1.1)	34 (0.8)	264 (1.0)	18 (0.7)	250 (1.1)
District of Columbia	58 (0.9)	230 (0.9)	34 (1.0)	229 (0.9)	9 (0.7)	242 (5.3)
Florida	35 (2.8)	259 (2.1)	43 (3.0)	255 (1.9)	22 (2.7)	254 (2.9)
Georgia	38 (3.4)	259 (2.3)	42 (3.5)	258 (2.2)	19 (2.6)	253 (2.6)
Hawaii	37 (0.8)	252 (1.3)	38 (0.9)	254 (1.3)	25 (0.7)	244 (1.2)
Idaho	34 (1.3)	274 (1.3)	48 (1.6)	272 (1.2)	18 (1.0)	266 (1.3)
Illinois	20 (3.4)	266 (3.2)	50 (4.3)	259 (3.1)	29 (4.3)	260 (3.9)
Indiana	43 (3.7)	268 (2.1)	47 (3.9)	267 (1.6)	10 (2.0)	265 (3.1)!
Iowa	34 (3.7)	281 (2.4)	46 (4.0)	277 (1.6)	20 (4.0)	275 (2.2)!
Kentucky	24 (3.4)	257 (1.8)	45 (3.8)	260 (1.7)	31 (3.7)	254 (2.0)
Louisiana	33 (3.6)	243 (2.1)	39 (3.9)	244 (2.3)	28 (4.0)	248 (2.6)
Maryland	39 (3.4)	261 (2.8)	45 (3.6)	262 (1.9)	15 (2.4)	261 (4.2)
Michigan	32 (3.8)	265 (2.9)	45 (3.8)	267 (2.3)	23 (3.2)	260 (3.3)
Minnesota	54 (3.5)	278 (1.2)	40 (3.6)	274 (1.4)	7 (1.7)	276 (3.8)!
Montana	51 (3.2)	284 (0.9)	32 (2.2)	279 (1.7)	17 (3.5)	276 (1.3)!
Nebraska	45 (3.2)	279 (1.2)	40 (3.0)	275 (1.7)	14 (2.6)	271 (2.3)
New Hampshire	39 (1.3)	274 (1.4)	36 (1.1)	271 (1.2)	24 (1.3)	273 (1.6)
New Jersey	33 (3.3)	275 (3.0)	45 (3.8)	271 (2.0)	22 (2.8)	258 (3.4)
New Mexico	35 (1.2)	260 (1.4)	47 (1.2)	255 (1.1)	17 (0.9)	252 (1.9)
New York	49 (4.2)	266 (2.0)	36 (3.5)	257 (2.8)	15 (2.5)	251 (4.3)
North Carolina	36 (3.2)	252 (1.9)	43 (3.6)	252 (1.7)	20 (2.9)	245 (2.2)
North Dakota	46 (3.2)	284 (1.6)	38 (2.8)	281 (1.9)	16 (1.5)	279 (2.1)
Ohio	32 (3.6)	263 (2.8)	49 (4.4)	266 (2.1)	19 (3.0)	260 (3.1)
Oklahoma	31 (3.4)	263 (2.0)	45 (4.1)	265 (1.6)	24 (3.2)	260 (2.7)
Oregon	44 (3.3)	272 (1.9)	36 (3.2)	271 (1.9)	16 (2.1)	268 (2.2)
Pennsylvania	43 (3.1)	268 (2.2)	39 (3.8)	268 (2.2)	18 (3.2)	259 (5.0)
Rhode Island	48 (0.9)	264 (1.0)	41 (0.9)	258 (1.0)	12 (1.0)	255 (2.0)
Texas	35 (3.5)	254 (2.4)	47 (3.6)	257 (2.1)	18 (2.6)	255 (3.1)
Virginia	36 (3.5)	264 (2.2)	43 (3.5)	263 (2.4)	21 (2.4)	264 (2.7)
West Virginia	38 (3.4)	258 (1.8)	49 (3.7)	255 (1.3)	13 (3.0)	252 (2.8)!
Wisconsin	31 (3.9)	277 (2.0)	53 (4.0)	275 (1.8)	17 (3.3)	275 (3.2)
Wyoming	49 (1.1)	273 (0.9)	35 (1.2)	272 (1.4)	16 (0.6)	271 (1.3)
TERRITORIES						
Guam	31 (0.8)	234 (1.3)	47 (0.7)	230 (1.1)	22 (0.7)	230 (1.2)
Virgin Islands	31 (0.5)	222 (1.4)	60 (0.6)	218 (0.7)	9 (0.4)	204 (1.2)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 17.10 | **Teachers' Reports on Their Undergraduate and Graduate Course Taking in Geometry**

GRADE 8 PUBLIC SCHOOLS	Two or More Courses		One Course		No Courses	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	44 (4.2)	265 (2.3)	38 (3.9)	265 (2.7)	17 (3.1)	255 (3.2)
Northeast	56 (8.9)	278 (3.5)	33 (7.8)	265 (3.6)!	11 (7.0)	*** (***)
Southeast	49 (9.7)	254 (5.0)!	23 (7.6)	255 (5.5)!	29 (7.8)	258 (5.2)!
Central	41 (9.0)	264 (5.1)!	49 (8.5)	267 (4.5)	10 (6.6)	*** (***)
West	38 (6.1)	266 (2.2)	43 (7.1)	268 (4.6)	18 (3.2)	248 (4.5)
STATES						
Alabama	43 (3.6)	253 (1.9)	42 (3.4)	254 (1.8)	16 (3.0)	247 (3.8)
Arizona	20 (2.1)	269 (2.2)	43 (3.0)	259 (1.9)	38 (3.2)	254 (2.0)
Arkansas	35 (3.5)	256 (2.2)	53 (3.2)	256 (1.3)	12 (2.2)	257 (2.3)
California	28 (2.6)	259 (2.5)	50 (3.0)	259 (1.9)	22 (3.0)	250 (3.6)
Colorado	50 (3.7)	270 (1.5)	35 (3.3)	265 (1.8)	15 (2.2)	258 (2.5)
Connecticut	33 (3.0)	277 (1.9)	39 (3.0)	270 (1.9)	26 (3.1)	262 (2.0)
Delaware	40 (1.1)	265 (1.3)	44 (0.9)	260 (1.2)	16 (0.5)	254 (1.4)
District of Columbia	64 (1.1)	231 (0.7)	25 (1.1)	231 (1.6)	11 (0.7)	235 (4.9)
Florida	33 (3.0)	260 (2.0)	37 (3.3)	255 (2.0)	30 (3.0)	255 (2.1)
Georgia	38 (3.4)	260 (2.4)	35 (3.3)	258 (2.0)	27 (2.9)	253 (2.2)
Hawaii	39 (0.8)	253 (1.2)	49 (0.9)	255 (1.0)	12 (0.5)	239 (2.2)
Idaho	32 (1.1)	275 (1.4)	42 (1.1)	271 (1.1)	27 (1.1)	268 (1.4)
Illinois	32 (4.3)	265 (2.9)	45 (4.4)	260 (3.3)	23 (3.5)	257 (4.0)
Indiana	58 (4.1)	270 (1.5)	35 (4.0)	266 (2.2)	9 (2.4)	260 (4.1)!
Iowa	34 (3.9)	281 (2.3)	49 (4.5)	279 (1.8)	17 (3.7)	273 (2.2)!
Kentucky	22 (3.0)	259 (2.2)	40 (3.8)	262 (1.8)	39 (4.3)	253 (1.5)
Louisiana	31 (3.8)	243 (2.4)	45 (4.3)	246 (2.5)	24 (3.7)	245 (2.7)
Maryland	45 (3.9)	264 (2.7)	39 (3.9)	260 (2.3)	16 (2.4)	256 (3.3)
Michigan	38 (4.0)	268 (2.1)	35 (4.2)	266 (2.0)	27 (3.2)	258 (2.9)
Minnesota	60 (3.2)	276 (1.3)	37 (3.3)	276 (1.7)	3 (0.7)	260 (7.0)!
Montana	44 (3.2)	284 (1.0)	37 (2.9)	279 (1.4)	19 (2.6)	279 (1.7)
Nebraska	43 (2.9)	281 (1.2)	45 (2.9)	273 (1.4)	12 (2.1)	270 (3.0)
New Hampshire	41 (1.1)	274 (1.1)	36 (1.2)	274 (1.5)	23 (1.0)	271 (1.8)
New Jersey	29 (3.0)	278 (3.3)	47 (3.6)	272 (2.0)	24 (3.2)	256 (2.9)
New Mexico	30 (1.3)	260 (1.5)	48 (1.3)	256 (0.9)	22 (1.2)	250 (1.5)
New York	55 (3.3)	265 (2.0)	29 (2.6)	262 (2.5)	15 (2.6)	243 (4.0)
North Carolina	36 (3.9)	252 (2.2)	39 (3.5)	254 (2.0)	25 (2.8)	243 (1.9)
North Dakota	57 (2.5)	283 (1.5)	36 (3.1)	281 (2.4)	7 (1.5)	273 (3.5)
Ohio	34 (3.6)	269 (2.1)	40 (4.0)	264 (2.2)	26 (3.4)	258 (2.3)
Oklahoma	26 (3.5)	267 (2.8)	51 (3.5)	264 (1.3)	23 (3.3)	258 (2.3)
Oregon	46 (3.2)	274 (1.8)	34 (3.2)	271 (1.7)	20 (2.6)	264 (2.0)
Pennsylvania	49 (3.6)	271 (1.9)	38 (4.2)	268 (2.2)	13 (3.3)	244 (5.1)!
Rhode Island	47 (0.9)	269 (1.0)	38 (0.9)	255 (1.0)	15 (0.5)	247 (1.5)
Texas	37 (3.0)	250 (3.0)	49 (2.9)	260 (1.5)	14 (2.1)	253 (3.4)
Virginia	41 (2.8)	267 (2.4)	44 (2.7)	262 (2.2)	15 (2.3)	259 (2.2)
West Virginia	37 (4.0)	258 (1.8)	49 (4.4)	256 (1.4)	15 (3.1)	249 (2.9)!
Wisconsin	39 (4.4)	280 (2.0)	43 (4.1)	273 (1.7)	18 (3.2)	271 (3.0)
Wyoming	39 (1.1)	274 (0.9)	48 (1.0)	274 (0.9)	13 (0.8)	264 (2.0)
TERRITORIES						
Guam	31 (0.7)	235 (1.3)	32 (0.9)	229 (1.7)	37 (0.7)	230 (1.0)
Virgin Islands	2 (0.1)	*** (***)	72 (1.0)	219 (0.7)	26 (1.0)	216 (1.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

4^3

TABLE 17.11 | **Teachers' Reports on Their Undergraduate and Graduate Course Taking in Probability and Statistics**

GRADE 8 PUBLIC SCHOOLS	Two or More Courses		One Course		No Courses	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	33 (3.8)	266 (2.8)	51 (4.0)	264 (2.2)	16 (2.8)	258 (2.4)
Northeast	44(10.9)	273 (4.7)!	54(10.9)	272 (2.3)!	1 (1.4)	*** (***)
Southeast	28 (8.0)	258 (6.3)!	51 (8.7)	256 (3.4)!	21 (5.9)	252 (3.1)!
Central	20 (6.8)	265 (6.4)!	59 (7.9)	264 (4.0)	21 (7.4)	268 (3.9)!
West	42 (6.8)	266 (3.7)	42 (6.6)	265 (5.2)	16 (3.5)	254 (5.1)!
STATES						
Alabama	36 (3.5)	252 (2.4)	50 (4.2)	253 (1.8)	14 ([illegible].1)	250 (3.7)!
Arizona	23 (2.3)	260 (2.4)	47 (3.2)	263 (1.5)	30 (3.2)	258 (2.7)
Arkansas	27 (3.8)	250 (2.6)	51 (4.0)	260 (1.6)	22 (3.2)	257 (2.3)
California	35 (3.2)	255 (2.3)	46 (2.7)	259 (1.9)	20 (2.8)	255 (4.0)
Colorado	44 (3.1)	269 (1.2)	39 (2.8)	267 (1.7)	16 (2.7)	260 (2.4)
Connecticut	36 (3.5)	273 (2.3)	44 (3.8)	269 (1.6)	21 (2.2)	266 (2.8)
Delaware	36 (0.9)	261 (1.2)	53 (0.9)	263 (1.0)	11 (0.9)	254 (1.6)
District of Columbia	56 (1.0)	231 (0.8)	34 (1.0)	228 (0.9)	10 (0.9)	244 (4.5)
Florida	30 (2.7)	257 (2.1)	49 (3.2)	258 (1.8)	21 (2.6)	250 (2.4)
Georgia	26 (2.9)	258 (2.5)	47 (3.5)	259 (1.9)	26 (3.2)	254 (2.7)
Hawaii	43 (0.8)	252 (1.0)	44 (0.9)	255 (1.0)	13 (0.8)	239 (1.6)
Idaho	31 (2.0)	276 (1.3)	47 (2.0)	272 (1.2)	23 (1.3)	266 (1.7)
Illinois	31 (4.0)	266 (3.0)	44 (4.1)	261 (2.3)	25 (4.0)	253 (4.9)
Indiana	46 (4.1)	269 (2.0)	46 (3.8)	266 (1.5)	8 (2.1)	269 (4.9)!
Iowa	30 (3.6)	279 (1.8)	52 (4.5)	280 (1.5)	19 (3.7)	273 (2.4)!
Kentucky	17 (2.8)	259 (3.0)	51 (3.7)	258 (1.4)	32 (3.7)	254 (1.8)
Louisiana	23 (3.8)	241 (2.8)	48 (4.2)	247 (1.9)	29 (4.0)	247 (2.7)
Maryland	38 (3.0)	263 (3.0)	52 (3.4)	261 (1.7)	10 (2.0)	254 (5.0)
Michigan	25 (3.1)	258 (3.3)	49 (3.5)	268 (1.9)	26 (3.5)	263 (2.4)
Minnesota	44 (4.1)	278 (1.5)	53 (4.1)	274 (1.2)	2 (0.8)	*** (***)
Montana	35 (2.8)	284 (1.0)	50 (2.7)	281 (1.1)	15 (1.4)	277 (2.7)
Nebraska	37 (3.3)	276 (1.1)	47 (3.6)	276 (1.4)	16 (2.8)	277 (3.1)
New Hampshire	30 (1.5)	272 (1.3)	51 (1.4)	273 (1.6)	19 (1.2)	273 (1.6)
New Jersey	25 (2.6)	279 (2.7)	55 (3.1)	271 (1.7)	21 (2.9)	254 (3.3)
New Mexico	31 (1.1)	257 (1.6)	47 (1.4)	255 (1.1)	21 (1.1)	254 (1.5)
New York	51 (3.9)	263 (2.2)	38 (3.4)	259 (2.5)	11 (2.5)	248 (4.9)!
North Carolina	33 (3.2)	254 (2.2)	48 (3.4)	251 (1.4)	19 (2.6)	243 (2.1)
North Dakota	40 (2.9)	282 (2.0)	49 (3.1)	282 (1.9)	11 (1.8)	276 (2.6)
Ohio	38 (3.7)	263 (2.0)	41 (4.0)	267 (2.0)	21 (2.9)	261 (2.8)
Oklahoma	25 (3.6)	266 (2.7)	50 (3.5)	264 (1.8)	25 (3.6)	260 (1.8)
Oregon	35 (3.9)	271 (1.8)	47 (3.6)	273 (1.6)	16 (2.4)	268 (2.4)
Pennsylvania	35 (3.5)	270 (2.9)	51 (3.8)	268 (1.9)	14 (2.8)	251 (5.1)
Rhode Island	45 (1.3)	265 (1.1)	48 (1.2)	259 (0.8)	8 (0.4)	242 (1.8)
Texas	30 (3.3)	250 (2.6)	51 (3.8)	258 (1.7)	20 (2.6)	257 (2.9)
Virginia	39 (3.3)	262 (2.5)	50 (3.3)	266 (1.8)	11 (2.2)	260 (3.5)
West Virginia	24 ([illegible].0)	260 (2.2)	52 (3.9)	255 (1.2)	24 (3.5)	255 (1.8)
Wisconsin	32 (3.8)	280 (2.4)	46 (3.6)	275 (1.8)	22 (3.9)	272 (3.0)
Wyoming	35 (1.1)	273 (1.0)	47 (1.5)	273 (0.9)	17 (0.8)	269 (1.5)
TERRITORIES						
Guam	59 (0.8)	231 (0.9)	26 (0.5)	234 (2.0)	16 (0.7)	228 (1.2)
Virgin Islands	39 (0.8)	229 (1.1)	57 (0.7)	210 (0.8)	4 (0.5)	*** (***)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 17.12 | **Teachers' Reports on Their Undergraduate and Graduate Course Taking in Abstract or Linear Algebra**

GRADE 8 PUBLIC SCHOOLS	Two or More Courses		One Course		No Courses	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	40 (4.6)	266 (2.8)	34 (4.2)	264 (2.3)	27 (3.1)	259 (2.8)
Northeast	59(15.4)	276 (5.0)!	21 (8.2)	275 (6.4)!	20 (8.3)	*** (***)
Southeast	37 (7.8)	253 (6.5)!	36 (7.7)	261 (3.1)!	27 (6.1)	258 (6.0)!
Central	35 (9.1)	267 (3.6)!	39 (9.3)	264 (4.8)	25 (6.0)	262 (4.6)!
West	38 (7.7)	269 (4.3)!	32 (7.1)	265 (4.3)!	30 (5.0)	256 (5.2)
STATES						
Alabama	40 (4.1)	254 (2.2)	45 (4.3)	255 (1.6)	16 (3.2)	242 (4.1)
Arizona	19 (2.3)	272 (2.2)	29 (2.6)	263 (2.5)	51 (3.4)	254 (1.7)
Arkansas	36 (4.1)	258 (2.2)	36 (4.5)	257 (2.1)	29 (4.2)	252 (1.5)
California	30 (2.6)	257 (2.3)	31 (3.1)	259 (2.3)	39 (3.4)	254 (2.4)
Colorado	48 (3.6)	270 (1.5)	31 (3.6)	269 (2.1)	21 (2.4)	257 (1.7)
Connecticut	30 (3.3)	279 (2.3)	34 (3.4)	274 (1.6)	36 (2.9)	261 (2.0)
Delaware	43 (1.4)	269 (1.1)	37 (0.9)	262 (1.3)	20 (1.2)	245 (1.6)
District of Columbia	55 (1.4)	230 (0.7)	32 (1.0)	235 (1.7)	13 (1.0)	229 (2.3)
Florida	29 (3.1)	261 (2.5)	35 (3.2)	257 (2.1)	36 (3.0)	253 (1.9)
Georgia	31 (3.5)	256 (2.6)	28 (3.2)	259 (2.6)	41 (3.4)	258 (2.3)
Hawaii	27 (0.7)	255 (1.3)	52 (0.8)	253 (0.9)	20 (0.7)	246 (1.9)
Idaho	32 (1.9)	275 (1.3)	30 (1.9)	277 (1.5)	37 (1.5)	265 (1.1)
Illinois	24 (4.4)	271 (2.7)	42 (4.2)	259 (3.3)	33 (3.6)	256 (3.5)
Indiana	51 (3.6)	272 (1.6)	37 (3.6)	263 (1.8)	12 (2.2)	262 (3.4)
Iowa	29 (3.9)	283 (2.2)	47 (4.2)	278 (1.4)	24 (4.3)	272 (2.4)
Kentucky	22 (3.3)	260 (2.5)	30 (3.4)	261 (2.3)	48 (4.2)	253 (1.5)
Louisiana	24 (3.9)	244 (2.8)	30 (3.3)	245 (2.7)	45 (4.3)	247 (2.0)
Maryland	30 (3.2)	268 (3.1)	50 (3.6)	258 (2.2)	20 (2.7)	258 (2.9)
Michigan	27 (3.0)	265 (2.6)	43 (3.4)	270 (1.9)	30 (3.4)	257 (2.4)
Minnesota	59 (4.1)	277 (1.2)	38 (4.0)	278 (1.4)	4 (1.2)	265 (3.8)!
Montana	35 (2.5)	283 (1.1)	43 (3.0)	282 (1.0)	22 (2.3)	276 (1.9)
Nebraska	50 (3.5)	278 (1.1)	37 (3.0)	275 (1.7)	13 (2.7)	272 (2.9)!
New Hampshire	44 (1.3)	272 (1.1)	29 (1.1)	275 (1.3)	26 (1.1)	272 (1.5)
New Jersey	29 (3.1)	279 (3.2)	39 (3.2)	275 (2.0)	32 (3.3)	254 (2.5)
New Mexico	32 (1.3)	260 (1.4)	39 (1.4)	256 (1.4)	29 (1.3)	251 (1.1)
New York	45 (3.4)	266 (2.0)	40 (3.4)	261 (2.7)	15 (2.2)	242 (3.1)
North Carolina	33 (3.3)	253 (2.4)	29 (3.4)	252 (2.1)	38 (3.6)	246 (1.6)
North Dakota	44 (3.1)	282 (2.1)	33 (2.1)	281 (1.2)	23 (2.5)	280 (2.7)
Ohio	32 (3.4)	265 (2.2)	35 (3.4)	270 (2.3)	33 (3.4)	257 (2.0)
Oklahoma	22 (3.4)	272 (2.9)	37 (4.2)	264 (2.0)	41 (4.1)	259 (1.7)
Oregon	41 (3.3)	274 (2.0)	25 (3.0)	271 (2.0)	34 (3.3)	267 (1.7)
Pennsylvania	49 (3.1)	270 (1.6)	37 (3.5)	269 (2.4)	14 (3.1)	245 (4.5)!
Rhode Island	58 (0.9)	266 (0.8)	34 (0.8)	255 (1.0)	8 (0.4)	249 (3.2)
Texas	28 (3.4)	252 (2.4)	45 (3.5)	256 (2.2)	27 (3.2)	254 (2.6)
Virginia	38 (3.3)	264 (2.2)	39 (3.4)	265 (2.9)	24 (3.3)	262 (2.6)
West Virginia	34 (3.6)	256 (1.9)	50 (3.5)	257 (1.4)	16 (2.7)	252 (2.2)
Wisconsin	39 (4.0)	279 (1.4)	30 (3.8)	277 (2.2)	30 (4.0)	272 (2.4)
Wyoming	39 (1.2)	270 (0.7)	42 (1.1)	276 (1.1)	19 (0.7)	270 (1.5)
TERRITORIES						
Guam	23 (0.7)	236 (1.5)	39 (0.8)	230 (1.1)	38 (0.9)	228 (1.2)
Virgin Islands	42 (0.6)	227 (1.0)	29 (0.8)	211 (1.3)	29 (0.6)	212 (0.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 17.13 | **Teachers' Reports on Their Undergraduate and Graduate Course Taking in Calculus**

GRADE 8 PUBLIC SCHOOLS	Two or More Courses		One Course		No Courses	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	67 (3.3)	266 (1.8)	13 (2.9)	262 (4.1)!	20 (3.0)	256 (2.5)
Northeast	67 (9.0)	276 (3.7)	24 (8.5)	265 (3.6)!	8 (3.4)	*** (***)
Southeast	57 (9.0)	256 (4.3)!	14 (6.6)	254 (7.4)!	29 (5.6)	257 (4.9)!
Central	75 (4.7)	268 (2.6)	9 (6.1)	263(11.6)!	16 (6.3)	253 (8.4)!
West	68 (4.9)	266 (3.0)	11 (3.9)	265 (7.5)!	21 (6.1)	254 (3.5)!
STATES						
Alabama	82 (3.1)	255 (1.2)	8 (2.4)	250 (3.9)!	10 (2.7)	234 (4.8)!
Arizona	30 (2.7)	267 (2.4)	19 (2.3)	263 (2.1)	51 (3.2)	256 (1.8)
Arkansas	70 (4.2)	258 (1.3)	15 (3.3)	251 (3.3)!	15 (3.0)	251 (2.5)
California	48 (3.6)	258 (1.8)	22 (2.4)	266 (2.8)	30 (3.3)	250 (2.8)
Colorado	70 (3.2)	268 (1.2)	13 (2.4)	271 (2.5)	16 (2.2)	258 (2.5)
Connecticut	48 (3.4)	278 (1.6)	26 (3.1)	268 (2.6)	27 (3.1)	258 (1.9)
Delaware	69 (1.2)	265 (0.9)	21 (0.6)	259 (1.4)	10 (0.9)	243 (2.2)
District of Columbia	78 (1.1)	229 (0.6)	16 (0.9)	239 (3.2)	6 (0.7)	233 (3.9)
Florida	50 (2.6)	261 (1.9)	23 (2.7)	255 (2.1)	27 (2.8)	248 (2.5)
Georgia	47 (2.9)	258 (2.0)	14 (2.5)	260 (3.7)	40 (3.1)	255 (2.1)
Hawaii	72 (0.8)	257 (0.8)	13 (0.7)	248 (1.8)	15 (0.6)	233 (1.6)
Idaho	56 (2.0)	274 (1.1)	21 (1.6)	274 (1.5)	23 (1.1)	263 (1.2)
Illinois	45 (4.2)	270 (2.4)	18 (3.6)	258 (4.3)	37 (4.2)	251 (3.4)
Indiana	78 (3.6)	269 (1.4)	16 (3.3)	265 (2.7)!	6 (1.7)	259 (6.8)!
Iowa	63 (4.7)	280 (1.3)	22 (4.2)	276 (2.5)!	15 (3.2)	272 (2.8)!
Kentucky	45 (4.1)	262 (1.6)	14 (2.9)	257 (4.1)!	42 (4.2)	253 (1.3)
Louisiana	41 (4.5)	249 (2.1)	13 (2.1)	242 (4.1)	46 (4.4)	245 (2.0)
Maryland	59 (3.8)	264 (2.1)	24 (3.4)	257 (3.1)	17 (2.6)	258 (2.6)
Michigan	59 (3.6)	270 (1.5)	15 (2.8)	264 (4.5)	26 (3.2)	252 (2.6)
Minnesota	93 (1.4)	276 (1.0)	3 (1.2)	278 (4.3)!	3 (0.9)	269 (5.0)!
Montana	63 (3.1)	283 (0.9)	17 (1.9)	279 (1.8)	21 (2.1)	277 (1.5)
Nebraska	80 (2.9)	277 (1.0)	13 (2.4)	273 (2.4)	7 (1.9)	266 (4.7)!
New Hampshire	58 (1.5)	273 (1.0)	23 (1.3)	274 (1.8)	19 (1.2)	271 (1.9)
New Jersey	53 (3.3)	280 (2.0)	15 (2.6)	269 (3.0)	32 (3.3)	252 (2.7)
New Mexico	59 (1.2)	259 (1.2)	18 (1.0)	253 (1.7)	23 (1.2)	249 (1.4)
New York	76 (2.9)	264 (1.9)	13 (2.4)	254 (5.2)	11 (2.0)	246 (5.0)
North Carolina	46 (3.2)	255 (1.6)	18 (2.8)	248 (2.3)	36 (2.9)	246 (2.1)
North Dakota	68 (2.3)	281 (1.4)	17 (3.3)	292 (2.4)!	15 (2.1)	272 (1.9)
Ohio	57 (3.8)	268 (1.2)	12 (2.2)	263 (4.0)	31 (3.7)	259 (2.0)
Oklahoma	45 (3.8)	268 (2.1)	13 (2.5)	262 (3.2)	42 (3.9)	260 (1.3)
Oregon	60 (3.1)	273 (1.6)	18 (2.6)	272 (2.6)	22 (3.0)	265 (2.1)
Pennsylvania	80 (3.0)	271 (1.4)	7 (1.6)	260 (4.5)!	13 (3.2)	239 (4.5)!
Rhode Island	80 (0.6)	263 (0.6)	14 (0.5)	256 (1.8)	7 (0.4)	251 (2.2)
Texas	62 (3.3)	254 (1.8)	21 (2.7)	262 (2.8)	17 (2.4)	250 (3.4)
Virginia	66 (3.3)	265 (2.0)	21 (2.6)	266 (2.7)	13 (2.4)	253 (2.6)
West Virginia	55 (4.2)	257 (1.4)	20 (3.1)	256 (1.9)	25 (3.0)	255 (1.7)
Wisconsin	53 (4.5)	279 (1.5)	16 (2.9)	275 (3.6)	31 (4.2)	271 (2.3)
Wyoming	74 (0.7)	273 (0.7)	17 (0.5)	275 (1.3)	10 (0.4)	263 (1.6)
TERRITORIES						
Guam	64 (0.6)	232 (0.8)	13 (0.5)	233 (3.0)	23 (0.8)	228 (1.4)
Virgin Islands	62 (0.7)	222 (0.9)	14 (0.6)	218 (1.4)	24 (1.0)	213 (0.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 17.14 | **Teachers' Reports on Their Undergraduate and Graduate Course Taking in Computer Science**

GRADE 8 PUBLIC SCHOOLS	Two or More Courses		One Course		No Courses	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	21 (2.8)	265 (3.2)	41 (3.9)	265 (2.4)	39 (3.5)	261 (2.5)
Northeast	16 (4.3)	280 (7.3)!	40 (9.1)	269 (3.5)!	43 (7.5)	270 (2.6)!
Southeast	19 (6.0)	257 (8.8)!	50 (9.5)	256 (4.8)!	31 (6.2)	259 (6.6)!
Central	20 (3.5)	272 (4.0)	34 (6.9)	272 (4.5)	46 (7.6)	256 (4.6)
West	24 (6.2)	260 (3.6)!	40 (6.0)	267 (4.4)	36 (4.5)	262 (5.2)
STATES						
Alabama	**15 (3.3)**	**245 (5.0)!**	**32 (3.6)**	**254 (2.1)**	**53 (3.9)**	**253 (1.8)**
Arizona	**23 (2.1)**	**263 (2.0)**	**41 (2.9)**	**260 (2.2)**	**36 (3.4)**	**257 (2.0)**
Arkansas	**15 (2.7)**	**254 (3.1)**	**33 (3.5)**	**259 (1.9)**	**53 (3.8)**	**255 (1.3)**
California	**28 (3.3)**	**254 (3.0)**	**35 (2.6)**	**257 (2.2)**	**37 (3.4)**	**258 (2.3)**
Colorado	46 (3.6)	269 (1.7)	36 (3.3)	265 (1.8)	18 (2.8)	263 (2.3)
Connecticut	16 (2.9)	275 (3.3)	38 (3.6)	271 (1.6)	46 (3.4)	267 (2.0)
Delaware	23 (1.1)	256 (1.5)	37 (1.1)	258 (1.3)	40 (0.9)	268 (1.0)
District of Columbia	48 (1.1)	229 (0.9)	43 (1.0)	230 (1.0)	9 (0.6)	251 (4.7)
Florida	23 (2.8)	257 (2.3)	42 (3.3)	257 (2.1)	35 (2.5)	255 (2.1)
Georgia	**17 (2.8)**	**258 (4.1)**	**44 (3.2)**	**259 (1.7)**	**39 (3.5)**	**255 (1.7)**
Hawaii	**22 (0.6)**	**248 (1.7)**	**41 (0.6)**	**254 (1.1)**	**38 (0.9)**	**250 (1.1)**
Idaho	**24 (1.3)**	**273 (1.2)**	**46 (1.3)**	**273 (1.4)**	**30 (1.3)**	**268 (1.0)**
Illinois	**20 (3.1)**	**264 (3.3)**	**30 (4.0)**	**260 (2.9)**	**50 (4.5)**	**259 (3.4)**
Indiana	**16 (3.0)**	**266 (2.9)**	**47 (3.6)**	**266 (1.7)**	**37 (3.6)**	**270 (2.3)**
Iowa	21 (3.9)	280 (1.8)	42 (4.5)	277 (1.5)	37 (4.1)	278 (2.2)
Kentucky	11 (2.4)	261 (4.2)!	25 (3.6)	258 (2.1)	64 (4.1)	256 (1.4)
Louisiana	21 (3.8)	243 (3.1)	38 (3.4)	245 (2.1)	41 (3.9)	247 (1.9)
Maryland	18 (2.6)	263 (3.6)	49 (3.5)	263 (2.4)	33 (3.3)	258 (2.5)
Michigan	21 (3.4)	267 (2.5)	35 (3.9)	266 (2.3)	43 (3.5)	263 (2.6)
Minnesota	**35 (3.2)**	**278 (1.6)**	**42 (3.4)**	**275 (1.4)**	**23 (2.6)**	**274 (2.9)**
Montana	**28 (2.0)**	**283 (1.1)**	**49 (2.8)**	**281 (1.3)**	**23 (1.9)**	**279 (1.9)**
Nebraska	**27 (3.2)**	**278 (2.1)**	**46 (3.6)**	**274 (1.3)**	**26 (3.1)**	**278 (1.9)**
New Hampshire	**25 (1.4)**	**276 (1.8)**	**40 (1.4)**	**271 (1.5)**	**35 (1.3)**	**273 (1.7)**
New Jersey	**16 (2.3)**	**283 (2.9)**	**33 (2.7)**	**273 (2.3)**	**51 (3.3)**	**263 (1.9)**
New Mexico	32 (1.1)	258 (1.5)	36 (1.3)	257 (1.1)	31 (1.3)	253 (1.4)
New York	21 (2.9)	264 (3.1)	37 (3.2)	261 (2.7)	41 (3.3)	258 (2.2)
North Carolina	28 (3.4)	253 (1.9)	40 (3.2)	250 (2.0)	32 (3.3)	249 (1.9)
North Dakota	45 (3.3)	282 (2.2)	34 (2.7)	282 (1.7)	21 (2.4)	280 (2.1)
Ohio	19 (3.2)	267 (2.8)	36 (4.3)	263 (2.1)	44 (4.3)	263 (2.0)
Oklahoma	**20 (3.5)**	**266 (2.4)**	**39 (4.3)**	**260 (2.0)**	**40 (3.7)**	**264 (1.7)**
Oregon	**35 (2.9)**	**270 (2.5)**	**35 (3.2)**	**272 (1.7)**	**30 (3.2)**	**272 (2.1)**
Pennsylvania	**22 (2.7)**	**266 (4.0)**	**40 (3.4)**	**266 (2.5)**	**38 (3.7)**	**267 (2.1)**
Rhode Island	**24 (0.7)**	**262 (1.4)**	**46 (0.9)**	**259 (0.9)**	**30 (0.8)**	**261 (1.0)**
Texas	**15 (2.3)**	**251 (4.0)**	**42 (3.3)**	**256 (2.3)**	**43 (3.7)**	**255 (1.8)**
Virginia	31 (3.0)	265 (2.7)	41 (2.7)	262 (2.5)	27 (3.0)	263 (2.8)
West Virginia	14 (3.0)	252 (3.1)	42 (4.1)	258 (1.6)	43 (4.1)	255 (1.3)
Wisconsin	24 (3.2)	275 (2.0)	37 (4.1)	275 (2.4)	38 (4.0)	277 (2.1)
Wyoming	47 (1.4)	272 (0.8)	37 (1.1)	273 (0.9)	16 (0.9)	273 (2.0)
TERRITORIES						
Guam	**26 (0.8)**	**230 (1.4)**	**20 (0.3)**	**235 (1.3)**	**54 (0.9)**	**233 (0.9)**
Virgin Islands	**21 (0.4)**	**213 (1.4)**	**60 (0.6)**	**222 (0.8)**	**19 (0.7)**	**212 (1.2)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 17.15	Teachers' Reports on Their Undergraduate and Graduate Course Taking in Computer Programming

GRADE 8 PUBLIC SCHOOLS	Two or More Courses		One Course		No Courses	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	33 (3.7)	267 (2.4)	32 (3.7)	261 (2.7)	35 (3.6)	262 (2.2)
Northeast	34 (7.6)	275 (3.8)!	37(10.3)	276 (5.1)!	30 (7.6)	266 (3.0)!
Southeast	34(10.0)	253 (6.3)!	31 (8.2)	250 (3.4)!	35 (9.2)	265 (4.4)!
Central	36 (4.8)	275 (2.4)	24 (6.5)	256 (3.2)!	39 (6.9)	260 (4.8)
West	29 (5.9)	266 (3.1)!	37 (5.7)	263 (5.0)	34 (4.9)	261 (4.3)
STATES						
Alabama	17 (3.2)	250 (4.4)	31 (3.8)	252 (2.4)	52 (4.1)	254 (1.4)
Arizona	23 (2.2)	262 (2.2)	40 (2.9)	260 (2.3)	37 (3.3)	258 (2.0)
Arkansas	18 (3.1)	255 (3.2)	35 (4.2)	258 (1.9)	47 (4.3)	255 (1.3)
California	24 (2.7)	262 (2.3)	32 (3.1)	257 (2.8)	44 (3.6)	254 (2.1)
Colorado	48 (3.7)	268 (1.6)	29 (2.6)	265 (1.7)	23 (3.3)	265 (2.2)
Connecticut	21 (2.8)	279 (2.9)	30 (2.4)	273 (1.7)	49 (3,3)	265 (1.8)
Delaware	28 (1.1)	261 (1.4)	37 (1.1)	259 (1.2)	36 (1.2)	263 (1.2)
District of Columbia	42 (1.0)	228 (1.0)	37 (0.9)	241 (1.4)	22 (0.9)	222 (1.3)
Florida	27 (3.0)	259 (2.6)	27 (2.7)	259 (2.2)	46 (2.7)	254 (1.8)
Georgia	19 (3.0)	261 (2.6)	33 (3.2)	259 (2.3)	48 (3.9)	255 (1.7)
Hawaii	28 (0.9)	251 (1.6)	31 (0.8)	252 (1.4)	41 (0.9)	250 (1.0)
Idaho	37 (2.1)	274 (1.3)	35 (2.0)	271 (1.6)	28 (1.0)	270 (1.3)
Illinois	27 (4.2)	260 (2.7)	28 (3.4)	263 (2.8)	46 (4.3)	255 (3.4)
Indiana	34 (3.9)	270 (1.6)	44 (4.2)	264 (2.3)	22 (3.6)	271 (2.5)
Iowa	29 (3.9)	279 (2.3)	35 (4.3)	280 (2.0)	37 (4.3)	276 (2.4)
Kentucky	13 (2.4)	258 (3.9)	25 (3.2)	261 (1.6)	62 (3.7)	255 (1.4)
Louisiana	16 (3.4)	245 (3.2)!	29 (3.8)	245 (3.5)	56 (4.5)	246 (1.6)
Maryland	27 (2.9)	262 (3.2)	40 (3.1)	261 (2.2)	33 (2.8)	261 (2.4)
Michigan	21 (3.0)	273 (3.0)	36 (3.4)	264 (2.3)	43 (3.3)	261 (2.3)
Minnesota	55 (3.1)	277 (1.2)	32 (3.1)	274 (1.8)	13 (1.9)	279 (3.1)
Montana	32 (2.1)	283 (1.0)	42 (3.1)	280 (1.1)	26 (2.2)	277 (1.8)
Nebraska	39 (3.1)	277 (1.4)	37 (3.1)	274 (1.5)	24 (2.6)	278 (1.2)
New Hampshire	32 (1.1)	275 (1.2)	29 (1.2)	272 (1.4)	39 (1.3)	272 (1.7)
New Jersey	22 (2.8)	282 (3.3)	26 (3.0)	270 (2.7)	51 (3.7)	284 (1.7)
New Mexico	32 (1.0)	253 (1.3)	33 (1.2)	260 (1.5)	35 (1.1)	254 (1.1)
New York	34 (3.4)	266 (2.3)	28 (3.3)	260 (3.2)	38 (3.4)	255 (2.4)
North Carolina	28 (2.9)	256 (1.9)	36 (3.4)	252 (2.0)	35 (3.0)	246 (2.0)
North Dakota	42 (3.1)	281 (1.9)	33 (3.5)	282 (2.3)	25 (2.4)	282 (2.0)
Ohio	27 (3.2)	267 (2.9)	32 (4.0)	265 (2.9)	42 (3.6)	262 (1.8)
Oklahoma	19 (2.8)	264 (2.8)	31 (3.4)	266 (2.0)	50 (3.6)	261 (1.6)
Oregon	37 (3.4)	273 (2.3)	34 (3.5)	272 (1.9)	30 (3.3)	269 (1.8)
Pennsylvania	36 (3.7)	270 (2.1)	34 (3.7)	267 (2.1)	32 (4.2)	262 (3.5)
Rhode Island	33 (1.0)	261 (1.4)	33 (1.5)	263 (1.1)	34 (1.0)	257 (1.1)
Texas	18 (2.8)	262 (3.7)	29 (2.7)	258 (2.0)	53 (3.6)	255 (1.6)
Virginia	31 (3.1)	265 (2.7)	39 (3.0)	262 (2.5)	29 (2.9)	264 (2.7)
West Virginia	23 (3.3)	258 (2.8)	36 (3.9)	255 (1.3)	39 (4.1)	256 (1.3)
Wisconsin	34 (4.3)	280 (2.5)	25 (3.7)	273 (2.2)	40 (4.6)	273 (2.3)
Wyoming	48 (1.0)	272 (1.0)	31 (1.3)	275 (0.9)	21 (0.8)	270 (1.2)
TERRITORIES						
Guam	7 (0.5)	243 (4.0)	28 (0.7)	224 (1.1)	65 (0.7)	234 (0.8)
Virgin Islands	26 (0.5)	222 (1.3)	40 (1.1)	220 (1.2)	34 (1.1)	215 (0.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

428

TABLE 17.16 | Teachers' Reports on Mathematics Courses Taken Across Seven Areas

GRADE 8 PUBLIC SCHOOLS	Courses in Six to Seven Areas		Courses in Four to Five Areas		Courses in Zero to Three Areas	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	52 (3.2)	268 (2.2)	29 (3.4)	260 (2.5)	19 (2.5)	256 (2.7)
Northeast	65 (6.4)	276 (3.8)	22 (8.0)	270 (4.4)!	13 (5.3)	*** (***)
Southeast	40 (8.3)	255 (5.9)!	36 (9.3)	256 (3.6)!	24 (5.5)	258 (6.5)!
Central	54 (6.9)	271 (2.3)	34 (6.3)	258 (5.1)!	11 (6.4)	256(14.5)!
West	54 (3.8)	268 (3.8)	22 (3.4)	262 (4.0)	24 (3.2)	254 (3.3)
STATES						
Alabama	46 (3.7)	253 (1.7)	40 (4.1)	254 (2.3)	14 (2.4)	247 (3.4)
Arizona	30 (2.9)	267 (2.4)	27 (2.7)	263 (1.9)	43 (3.6)	253 (1.9)
Arkansas	41 (3.6)	257 (1.9)	41 (3.3)	257 (1.5)	18 (3.5)	251 (2.0)
California	41 (3.6)	258 (2.1)	29 (2.9)	262 (2.3)	30 (3.3)	250 (2.4)
Colorado	66 (3.4)	269 (1.3)	22 (3.3)	266 (1.9)	12 (2.4)	253 (2.3)!
Connecticut	35 (3.3)	277 (1.9)	38 (3.6)	271 (1.8)	28 (3.0)	259 (2.3)
Delaware	52 (0.8)	262 (1.0)	35 (1.0)	268 (1.4)	14 (1.1)	244 (1.8)
District of Columbia	79 (1.1)	230 (0.7)	13 (1.0)	231 (2.1)	8 (0.6)	243 (6.0)
Florida	40 (3.3)	259 (2.0)	31 (2.9)	258 (2.1)	29 (3.2)	250 (2.2)
Georgia	38 (3.3)	260 (2.3)	29 (2.6)	257 (2.0)	33 (2.8)	255 (2.1)
Hawaii	52 (0.9)	255 (0.9)	31 (0.9)	251 (1.2)	17 (0.7)	238 (1.4)
Idaho	51 (1.4)	275 (1.1)	27 (1.3)	270 (1.3)	21 (1.2)	264 (1.4)
Illinois	36 (3.7)	267 (2.3)	33 (3.8)	263 (2.9)	31 (4.1)	252 (4.3)
Indiana	71 (3.1)	268 (1.4)	23 (3.0)	268 (3.2)	7 (1.6)	260 (3.6)!
Iowa	54 (4.2)	281 (1.5)	28 (4.0)	277 (1.7)	18 (3.8)	271 (3.1)!
Kentucky	25 (3.3)	260 (1.8)	30 (3.4)	261 (2.1)	45 (4.4)	252 (1.6)
Louisiana	36 (4.5)	244 (2.6)	28 (3.6)	247 (2.2)	36 (4.1)	245 (2.3)
Maryland	56 (3.6)	263 (2.1)	30 (3.2)	261 (2.8)	14 (2.3)	254 (3.1)
Michigan	39 (3.5)	269 (1.6)	34 (3.8)	266 (2.6)	26 (3.3)	255 (2.6)
Minnesota	85 (2.2)	276 (1.0)	13 (2.1)	277 (2.8)	2 (0.3)	*** (***)
Montana	59 (3.1)	283 (1.0)	24 (2.8)	278 (1.1)	17 (1.7)	276 (2.6)
Nebraska	69 (3.0)	277 (1.0)	19 (2.6)	277 (2.2)	12 (1.7)	270 (2.8)
New Hampshire	55 (1.3)	273 (1.2)	24 (1.3)	273 (1.9)	21 (1.3)	272 (1.8)
New Jersey	42 (3.5)	279 (2.3)	26 (2.9)	272 (2.6)	33 (3.2)	256 (2.5)
New Mexico	44 (1.2)	259 (1.2)	35 (1.2)	256 (1.1)	21 (1.0)	251 (1.5)
New York	57 (3.2)	265 (2.0)	28 (3.1)	259 (2.8)	14 (2.7)	239 (3.7)
North Carolina	43 (3.5)	255 (1.9)	28 (3.3)	250 (2.3)	29 (2.9)	244 (1.5)
North Dakota	74 (2.7)	283 (1.6)	15 (1.3)	276 (2.4)	12 (1.9)	276 (2.5)
Ohio	46 (3.7)	269 (2.0)	26 (3.1)	264 (2.9)	29 (3.7)	257 (1.8)
Oklahoma	30 (3.6)	269 (2.1)	41 (3.6)	263 (2.0)	29 (3.3)	259 (1.8)
Oregon	51 (3.5)	274 (1.5)	29 (3.1)	270 (1.5)	20 (2.5)	266 (2.1)
Pennsylvania	60 (3.9)	269 (2.0)	27 (3.6)	272 (2.2)	13 (3.2)	243 (4.5)!
Rhode Island	63 (1.1)	262 (0.8)	29 (1.3)	259 (1.0)	8 (0.4)	243 (2.5)
Texas	39 (3.4)	255 (2.3)	42 (3.4)	257 (1.7)	19 (2.7)	253 (3.2)
Virginia	56 (3.2)	265 (2.2)	31 (2.8)	264 (2.3)	13 (2.1)	254 (2.8)
West Virginia	45 (3.7)	258 (1.6)	36 (3.5)	256 (1.6)	19 (3.4)	251 (2.2)
Wisconsin	50 (4.1)	277 (1.6)	24 (3.1)	279 (2.4)	26 (3.4)	270 (3.0)
Wyoming	65 (0.8)	274 (0.8)	24 (0.6)	271 (1.3)	11 (0.5)	267 (1.5)
TERRITORIES						
Guam	26 (0.7)	226 (1.6)	42 (0.8)	234 (1.0)	32 (0.7)	232 (1.0)
Virgin Islands	52 (0.7)	220 (0.6)	29 (0.6)	218 (1.1)	19 (0.9)	214 (1.2)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. These results are summarized across Tables 17.9 to 17.15, with course taking defined as at least one course in an area. The seven course areas included Number Systems, Geometry, Probability/Statistics, Abstract/Linear Algebra, Calculus, Computer Science, and Computer Programming. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 17.17 | **Teachers' Reports on Mathematics Courses Taken Organized by Percentage of Students Whose Teachers Had Taken Courses in Six to Seven Areas**

GRADE 8 PUBLIC SCHOOLS	Courses in Six to Seven Areas		Courses in Four to Five Areas		Courses in Zero to Three Areas	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
STATES/TERRITORIES						
Minnesota	85 (2.2)	276 (1.0)	13 (2.1)	277 (2.8)	2 (0.3)	*** (***)
District of Columbia	79 (1.1)	230 (0.7)	13 (1.0)	231 (2.1)	8 (0.6)	243 (6.0)
North Dakota	74 (2.7)	283 (1.6)	15 (1.3)	276 (2.4)	12 (1.9)	276 (2.5)
Indiana	71 (3.1)	268 (1.4)	23 (3.0)	268 (3.2)	7 (1.6)	260 (3.6)!
Nebraska	**69 (3.0)**	**277 (1.0)**	**19 (2.6)**	**277 (2.2)**	**12 (1.7)**	**270 (2.8)**
Colorado	**68 (3.4)**	**269 (1.3)**	**22 (3.3)**	**268 (1.9)**	**12 (2.4)**	**253 (2.3)!**
Wyoming	**65 (0.6)**	**274 (0.8)**	**24 (0.8)**	**271 (1.3)**	**11 (0.5)**	**267 (1.5)**
Rhode Island	**63 (1.1)**	**262 (0.8)**	**29 (1.3)**	**259 (1.0)**	**8 (0.4)**	**243 (2.5)**
Pennsylvania	**60 (3.9)**	**269 (2.0)**	**27 (3.6)**	**272 (2.2)**	**13 (3.2)**	**243 (4.5)!**
Montana	59 (3.1)	283 (1.0)	24 (2.8)	278 (1.1)	17 (1.7)	276 (2.6)
New York	57 (3.2)	265 (2.0)	28 (3.1)	259 (2.8)	14 (2.7)	239 (3.7)
Virginia	56 (3.2)	265 (2.2)	31 (2.6)	264 (2.3)	13 (2.1)	254 (2.8)
Maryland	56 (3.6)	263 (2.1)	30 (3.2)	261 (2.8)	14 (2.3)	254 (3.1)
New Hampshire	55 (1.3)	273 (1.2)	24 (1.3)	273 (1.9)	21 (1.3)	272 (1.8)
Iowa	**54 (4.2)**	**261 (1.5)**	**28 (4.0)**	**277 (1.7)**	**18 (3.6)**	**271 (3.1)!**
Virgin Islands	**52 (0.7)**	**220 (0.8)**	**29 (0.6)**	**218 (1.1)**	**19 (0.9)**	**214 (1.2)**
Hawaii	**52 (0.9)**	**255 (0.9)**	**31 (0.9)**	**251 (1.2)**	**17 (0.7)**	**238 (1.4)**
Delaware	**52 (0.6)**	**262 (1.0)**	**35 (1.0)**	**268 (1.4)**	**14 (1.1)**	**244 (1.6)**
Idaho	**51 (1.4)**	**275 (1.1)**	**27 (1.3)**	**270 (1.3)**	**21 (1.2)**	**264 (1.4)**
Oregon	51 (3.5)	274 (1.8)	29 (3.1)	270 (1.8)	20 (2.5)	266 (2.1)
Wisconsin	50 (4.1)	277 (1.6)	24 (3.1)	279 (2.4)	26 (3.4)	270 (3.0)
Alabama	46 (3.7)	253 (1.7)	40 (4.1)	254 (2.3)	14 (2.4)	247 (3.4)
Ohio	46 (3.7)	269 (2.0)	26 (3.1)	264 (2.9)	29 (3.7)	257 (1.8)
West Virginia	45 (3.7)	258 (1.6)	36 (3.5)	256 (1.6)	19 (3.4)	251 (2.2)
New Mexico	**44 (1.2)**	**259 (1.2)**	**35 (1.2)**	**256 (1.1)**	**21 (1.0)**	**251 (1.5)**
North Carolina	**43 (3.5)**	**255 (1.9)**	**28 (3.3)**	**250 (2.3)**	**29 (2.9)**	**244 (1.5)**
New Jersey	**42 (3.5)**	**279 (2.3)**	**26 (2.9)**	**272 (2.8)**	**33 (3.2)**	**258 (2.5)**
California	**41 (3.6)**	**258 (2.1)**	**29 (2.9)**	**262 (2.3)**	**30 (3.3)**	**250 (2.4)**
Arkansas	**41 (3.6)**	**257 (1.9)**	**41 (3.3)**	**257 (1.5)**	**18 (3.5)**	**251 (2.0)**
Florida	40 (3.3)	259 (2.0)	31 (2.9)	258 (2.1)	29 (3.2)	250 (2.2)
Michigan	39 (3.5)	269 (1.6)	34 (3.8)	266 (2.6)	26 (3.3)	255 (2.6)
Texas	39 (3.4)	255 (2.3)	42 (3.4)	257 (1.7)	19 (2.7)	253 (3.2)
Georgia	38 (3.3)	260 (2.3)	29 (2.6)	257 (2.0)	33 (2.8)	255 (2.1)
Louisiana	36 (4.5)	244 (2.6)	28 (3.6)	247 (2.2)	36 (4.1)	245 (2.3)
Illinois	**36 (3.7)**	**267 (2.3)**	**33 (3.6)**	**263 (2.9)**	**31 (4.1)**	**252 (4.3)**
Connecticut	**35 (3.3)**	**277 (1.9)**	**38 (3.6)**	**271 (1.8)**	**28 (3.0)**	**259 (2.3)**
Oklahoma	**30 (3.6)**	**269 (2.1)**	**41 (3.6)**	**253 (2.0)**	**29 (3.3)**	**259 (1.8)**
Arizona	**30 (2.9)**	**267 (2.4)**	**27 (2.7)**	**263 (1.9)**	**43 (3.6)**	**253 (1.9)**
Guam	26 (0.7)	226 (1.6)	42 (0.8)	234 (1.0)	32 (0.7)	232 (1.0)
Kentucky	25 (3.3)	260 (1.8)	30 (3.4)	261 (2.1)	45 (4.4)	252 (1.6)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. These results are summarized across Tables 17.9 to 17.15, with course taking defined as at least one course in an area. The seven course areas included Number Systems, Geometry, Probability/Statistics, Abstract/Linear Algebra, Calculus, Computer Science, and Computer Programming. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

430

TABLE 17.18 | **Teachers' Reports on Their Undergraduate and Graduate Course Taking in Methods of Teaching Middle-School Mathematics**

GRADE 8 PUBLIC SCHOOLS	Three or More Courses		Two Courses		One Course		None	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	27 (3.1)	267 (2.9)	16 (2.7)	265 (5.9)	29 (4.2)	262 (2.8)	28 (3.4)	260 (2.7)
Northeast	36 (8.8)	277 (7.9)!	6 (3.5)	*** (***)	21 (9.2)	264 (3.4)!	37 (8.4)	270 (3.0)
Southeast	22 (7.4)	262 (6.7)!	24 (6.5)	255 (7.2)!	32 (9.0)	255 (3.2)!	21 (8.2)	251 (5.8)!
Central	22 (5.9)	265 (6.0)!	17 (5.5)	260(10.0)!	37 (9.2)	267 (5.4)!	25 (6.1)	265 (6.9)!
West	30 (4.5)	265 (2.7)	14 (6.1)	278 (8.0)!	23 (6.4)	263 (5.4)!	32 (5.6)	256 (3.3)
STATES								
Alabama	21 (3.6)	252 (3.0)	18 (2.8)	250 (2.7)	33 (4.6)	254 (2.5)	28 (3.5)	253 (2.9)
Arizona	19 (2.4)	265 (2.6)	14 (1.9)	260 (2.4)	27 (2.8)	260 (2.8)	40 (3.3)	257 (2.0)
Arkansas	17 (3.1)	253 (2.6)	18 (3.0)	253 (2.6)	34 (3.1)	258 (2.1)	31 (4.2)	257 (1.5)
California	31 (3.7)	259 (2.7)	20 (2.7)	255 (2.7)	21 (2.6)	258 (2.9)	28 (3.1)	253 (2.6)
Colorado	27 (3.2)	268 (2.4)	18 (2.8)	270 (2.4)	34 (3.4)	265 (1.6)	22 (3.2)	265 (2.7)
Connecticut	25 (2.9)	271 (2.4)	19 (2.2)	270 (2.7)	29 (3.1)	270 (2.3)	27 (2.9)	269 (3.0)
Delaware	19 (0.7)	260 (1.7)	23 (1.3)	265 (1.9)	32 (1.0)	260 (1.4)	27 (0.9)	263 (1.1)
District of Columbia	39 (0.8)	228 (1.2)	21 (0.6)	231 (1.5)	28 (0.9)	225 (0.8)	13 (0.8)	250 (3.9)
Florida	21 (2.4)	259 (3.0)	14 (2.1)	255 (3.3)	43 (2.8)	256 (2.0)	22 (2.6)	253 (2.5)
Georgia	21 (2.6)	262 (2.6)	28 (3.2)	257 (2.5)	37 (3.4)	258 (2.1)	14 (2.2)	254 (2.9)
Hawaii	21 (0.7)	250 (1.3)	12 (0.6)	258 (1.7)	32 (0.9)	251 (1.4)	36 (0.9)	251 (1.3)
Idaho	19 (1.7)	260 (1.9)	22 (1.2)	270 (1.3)	36 (2.3)	271 (1.2)	23 (1.4)	269 (1.6)
Illinois	18 (3.3)	263 (4.4)!	23 (4.0)	262 (3.5)	31 (4.0)	260 (2.6)	30 (4.1)	259 (4.9)
Indiana	9 (2.2)	268 (4.0)!	27 (3.9)	267 (2.7)	36 (3.9)	266 (2.0)	28 (3.6)	267 (2.2)
Iowa	16 (3.2)	280 (3.1)!	20 (3.7)	282 (2.9)	34 (4.5)	276 (1.8)	30 (3.7)	277 (2.1)
Kentucky	12 (2.4)	255 (2.8)!	12 (2.8)	260 (3.6)!	24 (3.5)	259 (1.8)	51 (4.5)	256 (1.8)
Louisiana	16 (3.1)	242 (3.9)	21 (3.5)	245 (2.7)	31 (3.5)	247 (2.4)	31 (4.0)	245 (2.4)
Maryland	22 (2.8)	260 (3.9)	21 (2.7)	260 (2.9)	40 (3.9)	261 (2.3)	17 (2.9)	263 (3.7)
Michigan	22 (3.9)	263 (3.3)	17 (2.8)	263 (3.7)	30 (3.2)	264 (2.2)	31 (3.2)	265 (2.2)
Minnesota	31 (3.6)	276 (2.0)	18 (2.8)	277 (2.5)	29 (2.9)	279 (1.8)	22 (2.7)	272 (2.0)
Montana	31 (2.2)	282 (1.8)	19 (2.3)	280 (2.0)	31 (2.8)	280 (1.8)	18 (2.7)	281 (1.1)
Nebraska	9 (2.1)	280 (2.0)!	15 (1.4)	274 (1.8)	45 (3.6)	276 (1.8)	31 (2.9)	276 (1.7)
New Hampshire	19 (1.4)	276 (1.9)	20 (1.2)	274 (1.7)	32 (1.2)	274 (1.4)	29 (1.4)	269 (1.5)
New Jersey	17 (2.3)	274 (4.3)	18 (2.3)	267 (3.1)	36 (3.0)	271 (2.7)	31 (3.4)	267 (2.7)
New Mexico	18 (0.9)	260 (1.5)	24 (1.0)	255 (1.6)	29 (1.1)	256 (1.7)	28 (1.2)	257 (1.5)
New York	21 (2.9)	261 (2.9)	24 (2.9)	266 (2.9)	31 (3.3)	261 (3.3)	24 (3.0)	252 (3.3)
North Carolina	31 (2.9)	252 (2.2)	23 (2.9)	254 (2.6)	28 (2.9)	248 (1.9)	18 (2.7)	249 (2.9)
North Dakota	26 (2.7)	285 (1.9)	12 (1.2)	284 (2.2)	38 (3.3)	282 (2.0)	25 (2.8)	278 (1.6)
Ohio	21 (3.1)	262 (3.3)	20 (3.7)	264 (2.8)	31 (4.2)	263 (2.3)	28 (3.8)	269 (2.6)
Oklahoma	17 (3.6)	263 (3.1)	18 (3.4)	266 (2.6)	34 (3.7)	263 (2.1)	31 (3.7)	262 (2.3)
Oregon	41 (3.4)	272 (2.0)	24 (3.2)	271 (2.3)	22 (2.6)	271 (2.5)	13 (1.9)	267 (2.9)
Pennsylvania	21 (2.6)	266 (3.9)	15 (2.8)	270 (3.7)	34 (3.3)	266 (2.3)	30 (3.6)	266 (3.4)
Rhode Island	17 (0.5)	274 (2.0)	14 (0.5)	258 (1.3)	33 (1.3)	251 (1.0)	36 (0.9)	263 (1.0)
Texas	24 (3.0)	255 (2.9)	19 (2.5)	254 (2.8)	26 (3.6)	254 (2.2)	31 (3.6)	258 (2.7)
Virginia	18 (2.7)	265 (3.1)	17 (2.4)	264 (3.5)	29 (2.8)	265 (2.9)	37 (3.4)	261 (2.1)
West Virginia	19 (3.2)	253 (2.4)	25 (3.3)	255 (1.5)	40 (3.6)	258 (1.6)	16 (2.9)	257 (3.0)
Wisconsin	23 (4.0)	273 (1.9)	20 (3.6)	277 (2.8)	37 (4.3)	274 (2.1)	20 (3.2)	278 (2.3)
Wyoming	17 (0.8)	276 (1.4)	15 (0.7)	276 (1.5)	39 (1.6)	273 (1.1)	29 (1.2)	268 (0.8)
TERRITORIES								
Guam	0 (0.0)	0 (0.0)	21 (0.6)	230 (1.8)	37 (0.5)	231 (1.1)	42 (0.7)	231 (0.8)
Virgin Islands	14 (0.5)	210 (1.8)	14 (0.9)	218 (1.8)	18 (0.6)	216 (1.6)	54 (0.9)	220 (0.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

431

TABLE 17.19

Teachers' Reports on Their Undergraduate and Graduate Course Taking in Methods of Teaching Middle-School Mathematics Organized by Percentage of Students Whose Teachers Had Taken Three or More Courses

GRADE 8 PUBLIC SCHOOLS	Three or More Courses		Two Courses		One Course		None	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
STATES/TERRITORIES								
Oregon	41 (3.4)	272 (2.0)	24 (3.2)	271 (2.3)	22 (2.8)	271 (2.5)	13 (1.9)	267 (2.9)
District of Columbia	39 (0.8)	228 (1.2)	21 (0.6)	231 (1.5)	28 (0.9)	225 (0.8)	13 (0.8)	250 (3.9)
North Carolina	31 (2.9)	252 (2.2)	23 (2.9)	254 (2.6)	28 (2.9)	248 (1.9)	18 (2.7)	249 (2.9)
California	31 (3.7)	259 (2.7)	20 (2.7)	255 (2.7)	21 (2.6)	258 (2.9)	28 (3.1)	253 (2.6)
Montana	31 (2.2)	282 (1.8)	19 (2.3)	280 (2.0)	31 (2.6)	280 (1.8)	18 (2.7)	281 (1.1)
Minnesota	31 (3.6)	276 (2.0)	18 (2.6)	277 (2.5)	29 (2.9)	279 (1.6)	22 (2.7)	272 (2.0)
Colorado	27 (3.2)	268 (2.4)	18 (2.8)	270 (2.4)	34 (3.4)	265 (1.8)	22 (3.2)	265 (2.7)
North Dakota	26 (2.7)	285 (1.9)	12 (1.2)	284 (2.2)	38 (3.3)	282 (2.0)	25 (2.6)	278 (1.6)
Connecticut	25 (2.9)	271 (2.4)	19 (2.2)	270 (2.7)	29 (3.1)	270 (2.3)	27 (2.9)	269 (3.0)
Texas	24 (3.0)	255 (2.9)	19 (2.5)	254 (2.8)	26 (3.6)	254 (2.2)	31 (3.6)	258 (2.7)
Wisconsin	23 (4.0)	273 (1.9)	20 (3.6)	277 (2.8)	37 (4.3)	274 (2.1)	20 (3.2)	278 (2.3)
Maryland	22 (2.6)	260 (3.9)	21 (2.7)	260 (2.9)	40 (3.9)	261 (2.3)	17 (2.9)	263 (3.7)
Michigan	22 (3.9)	263 (3.3)	17 (2.8)	263 (3.7)	30 (3.2)	264 (2.2)	31 (3.2)	265 (2.2)
Hawaii	21 (0.7)	250 (1.3)	12 (0.8)	258 (1.7)	32 (0.9)	251 (1.4)	36 (0.9)	251 (1.3)
Florida	21 (2.4)	259 (3.0)	14 (2.1)	255 (3.3)	43 (2.8)	256 (2.0)	22 (2.6)	253 (2.5)
New York	21 (2.9)	261 (2.9)	24 (2.9)	266 (2.9)	31 (3.3)	261 (3.3)	24 (3.0)	252 (3.3)
Georgia	21 (2.6)	262 (2.6)	28 (3.2)	257 (2.5)	37 (3.4)	258 (2.1)	14 (2.2)	254 (2.9)
Alabama	21 (3.6)	252 (3.0)	18 (2.8)	250 (2.7)	33 (4.6)	254 (2.5)	28 (3.5)	253 (2.9)
Ohio	21 (3.1)	262 (3.3)	20 (3.7)	264 (2.8)	31 (4.2)	263 (2.3)	28 (3.6)	269 (2.6)
Pennsylvania	21 (2.6)	266 (3.9)	15 (2.8)	270 (3.7)	34 (3.3)	266 (2.3)	30 (3.8)	266 (3.4)
Idaho	19 (1.7)	280 (1.9)	22 (1.2)	270 (1.3)	36 (2.3)	271 (1.2)	23 (1.4)	269 (1.6)
Arizona	19 (2.4)	265 (2.6)	14 (1.9)	260 (2.4)	27 (2.8)	260 (2.6)	40 (3.3)	257 (2.0)
West Virginia	19 (3.2)	253 (2.4)	25 (3.3)	255 (1.5)	40 (3.6)	258 (1.6)	16 (2.9)	257 (3.0)
New Hampshire	19 (1.4)	276 (1.9)	20 (1.2)	274 (1.7)	32 (1.2)	274 (1.4)	29 (1.4)	269 (1.5)
Delaware	19 (0.7)	260 (1.7)	23 (1.3)	265 (1.9)	32 (1.0)	260 (1.4)	27 (0.9)	263 (1.1)
New Mexico	18 (0.9)	260 (1.5)	24 (1.0)	255 (1.8)	29 (1.1)	256 (1.7)	28 (1.2)	257 (1.5)
Virginia	18 (2.7)	265 (3.1)	17 (2.4)	264 (3.5)	29 (2.8)	265 (2.9)	37 (3.4)	261 (2.1)
Wyoming	17 (0.8)	276 (1.4)	15 (0.7)	276 (1.5)	39 (1.6)	273 (1.1)	29 (1.2)	268 (0.8)
Oklahoma	17 (3.6)	263 (3.1)	18 (3.4)	266 (2.6)	34 (3.7)	263 (2.1)	31 (3.7)	262 (2.3)
Rhode Island	17 (0.5)	274 (2.0)	14 (0.5)	256 (1.3)	33 (1.3)	251 (1.0)	36 (0.9)	263 (1.0)
Arkansas	17 (3.1)	253 (2.6)	18 (3.0)	253 (2.6)	34 (3.1)	258 (2.1)	31 (4.2)	257 (1.5)
New Jersey	17 (2.3)	274 (4.3)	16 (2.3)	267 (3.1)	36 (3.0)	271 (2.7)	3[illegible] (3.4)	267 (2.7)
Louisiana	16 (3.1)	242 (3.9)	21 (3.5)	245 (2.7)	31 (3.5)	247 (2.4)	31 (4.0)	245 (2.4)
Illinois	16 (3.3)	263 (4.4)!	23 (4.0)	262 (3.5)	31 (4.0)	260 (2.6)	30 (4.1)	259 (4.9)
Iowa	16 (3.2)	280 (3.1)!	20 (3.7)	282 (2.9)	34 (4.5)	276 (1.6)	30 (3.7)	277 (2.1)
Virgin Islands	14 (0.5)	210 (1.8)	14 (0.3)	218 (1.6)	18 (0.6)	216 (1.6)	54 (0.9)	220 (0.8)
Kentucky	12 (2.4)	255 (2.8)!	12 (2.6)	260 (3.6)!	24 (3.5)	259 (1.8)	51 (4.5)	256 (1.8)
Nebraska	9 (2.1)	260 (2.0)!	15 (1.4)	274 (1.8)	45 (3.8)	276 (1.6)	31 (2.9)	276 (1.7)
Indiana	9 (2.2)	268 (4.0)!	27 (3.9)	267 (2.7)	36 (3.9)	268 (2.0)	28 (3.8)	267 (2.2)
Guam	0 (0.0)	0 (0.0)	21 (0.6)	230 (1.8)	37 (0.5)	231 (1.1)	42 (0.7)	231 (0.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

TABLE 17.20 | **Teachers' Reports on the Amount of Time Spent on In-Service Education in Mathematics or the Teaching of Mathematics During the Last Year**

GRADE 8 PUBLIC SCHOOLS	16 Hours or More		One to 15 Hours		None	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	39 (3.8)	268 (2.0)	51 (4.1)	260 (1.7)	11 (2.1)	254 (4.6)
Northeast	38 (8.4)	273 (3.7)!	37 (4.1)	270 (3.5)	25 (7.0)	275 (5.1)!
Southeast	43(10.1)	267 (4.5)!	46(12.0)	247 (3.0)!	11 (6.0)	*** (***)
Central	28 (5.0)	274 (2.4)	71 (5.4)	261 (2.9)	1 (1.3)	*** (***)
West	44 (6.9)	264 (3.8)	45 (7.0)	263 (3.3)	11 (3.0)	262 (5.6)!
STATES						
Alabama	**27 (3.8)**	**253 (2.5)**	**57 (3.9)**	**254 (1.6)**	**15 (2.9)**	**247 (4.4)**
Arizona	**23 (1.9)**	**262 (1.9)**	**50 (3.1)**	**261 (1.3)**	**27 (2.7)**	**258 (2.9)**
Arkansas	**46 (3.9)**	**258 (1.5)**	**45 (4.1)**	**255 (1.6)**	**8 (2.5)**	**254 (3.7)!**
California	**43 (2.9)**	**259 (2.2)**	**47 (2.9)**	**256 (1.9)**	**10 (1.9)**	**250 (4.7)**
Colorado	37 (3.3)	265 (1.9)	49 (3.3)	269 (1.5)	14 (2.1)	262 (2.5)
Connecticut	39 (3.4)	275 (1.7)	52 (3.8)	267 (1.9)	8 (2.0)	262 (4.0)!
Delaware	42 (0.9)	265 (1.4)	45 (1.0)	261 (0.9)	13 (1.0)	255 (2.2)
District of Columbia	53 (0.9)	234 (1.3)	41 (1.0)	226 (0.9)	5 (0.4)	223 (2.8)
Florida	44 (3.5)	260 (1.8)	42 (3.7)	254 (1.9)	14 (2.5)	250 (4.5)
Georgia	**35 (4.1)**	**257 (2.1)**	**48 (4.3)**	**258 (1.8)**	**17 (2.8)**	**257 (2.7)**
Hawaii	**28 (0.9)**	**255 (1.3)**	**45 (0.9)**	**250 (1.0)**	**27 (0.8)**	**249 (1.3)**
Idaho	**36 (2.0)**	**276 (1.1)**	**45 (2.0)**	**272 (1.1)**	**19 (1.0)**	**263 (1.5)**
Illinois	**24 (3.3)**	**268 (3.3)**	**58 (4.0)**	**261 (2.0)**	**18 (3.5)**	**250 (5.2)!**
Indiana	**16 (2.9)**	**271 (2.8)**	**57 (3.9)**	**266 (1.6)**	**26 (3.3)**	**268 (2.1)**
Iowa	26 (3.8)	280 (2.2)	58 (4.3)	278 (1.5)	16 (3.6)	277 (2.8)!
Kentucky	18 (3.3)	259 (2.7)	53 (3.6)	256 (1.3)	29 (4.0)	256 (2.1)
Louisiana	37 (4.3)	245 (2.1)	49 (4.3)	245 (2.1)	14 (3.0)	244 (3.5)!
Maryland	47 (3.0)	264 (2.0)	47 (3.2)	258 (2.5)	6 (1.5)	254 (6.6)!
Michigan	26 (3.6)	272 (2.3)	50 (3.7)	261 (1.6)	24 (3.1)	261 (3.2)
Minnesota	**34 (3.4)**	**276 (2.0)**	**55 (3.5)**	**276 (1.5)**	**11 (2.5)**	**277 (3.4)!**
Montana	**38 (2.8)**	**282 (1.3)**	**58 (3.0)**	**280 (1.0)**	**5 (1.0)**	**273 (2.1)!**
Nebraska	**37 (2.9)**	**277 (1.6)**	**48 (3.1)**	**276 (1.2)**	**15 (2.4)**	**274 (2.6)**
New Hampshire	**69 (1.4)**	**275 (1.0)**	**28 (1.5)**	**268 (1.6)**	**3 (0.3)**	**263 (3.1)**
New Jersey	**29 (3.1)**	**272 (3.3)**	**56 (3.5)**	**270 (1.5)**	**14 (3.0)**	**262 (3.5)!**
New Mexico	19 (1.1)	258 (1.6)	45 (1.2)	257 (1.3)	36 (1.2)	253 (1.3)
New York	23 (2.5)	259 (3.6)	59 (3.4)	262 (1.9)	18 (2.8)	254 (3.2)
North Carolina	51 (3.5)	254 (1.6)	39 (3.6)	247 (1.8)	10 (2.3)	244 (3.5)!
North Dakota	25 (2.0)	280 (2.7)	55 (3.6)	283 (1.6)	20 (2.4)	280 (2.4)
Ohio	22 (3.5)	265 (3.2)	63 (3.8)	263 (1.6)	16 (2.7)	264 (2.9)
Oklahoma	**26 (3.4)**	**263 (2.4)**	**56 (3.4)**	**265 (1.5)**	**18 (2.7)**	**259 (2.9)**
Oregon	**48 (2.9)**	**273 (1.5)**	**42 (3.0)**	**270 (1.6)**	**10 (1.3)**	**269 (2.5)**
Pennsylvania	**27 (3.4)**	**268 (3.1)**	**54 (3.9)**	**268 (2.2)**	**19 (3.3)**	**262 (2.6)**
Rhode Island	**22 (0.7)**	**260 (1.4)**	**54 (1.1)**	**264 (0.9)**	**24 (0.8)**	**249 (1.4)**
Texas	**38 (3.9)**	**258 (2.5)**	**49 (3.9)**	**254 (2.0)**	**13 (2.8)**	**255 (4.1)**
Virginia	31 (2.8)	269 (2.4)	56 (3.4)	262 (1.8)	13 (2.7)	255 (4.6)!
West Virginia	22 (3.2)	260 (2.0)	57 (3.9)	255 (1.3)	21 (3.5)	253 (2.3)
Wisconsin	32 (4.0)	279 (2.2)	55 (4.1)	274 (1.6)	13 (2.3)	273 (4.8)
Wyoming	36 (1.3)	275 (0.8)	45 (1.4)	273 (1.0)	20 (1.1)	267 (1.5)
TERRITORIES						
Guam	**27 (0.4)**	**241 (1.2)**	**25 (0.9)**	**234 (1.5)**	**49 (0.9)**	**224 (1.0)**
Virgin Islands	**26 (0.7)**	**220 (1.6)**	**49 (0.9)**	**218 (0.7)**	**25 (0.8)**	**216 (1.4)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

433

TABLE 17.21 | **Teachers' Reports on the Amount of Time Spent on In-Service Education in Mathematics or the Teaching of Mathematics During the Last Year Organized by Percentage of Students Whose Teachers Reported 16 Hours or More**

GRADE 8 PUBLIC SCHOOLS	16 Hours or More		One to 15 Hours		None	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
STATES/TERRITORIES						
New Hampshire	69 (1.4)	275 (1.0)	28 (1.5)	268 (1.6)	3 (0.3)	263 (3.1)
District of Columbia	53 (0.9)	234 (1.3)	41 (1.0)	226 (0.9)	5 (0.4)	223 (2.8)
North Carolina	51 (3.5)	254 (1.6)	39 (3.6)	247 (1.8)	10 (2.3)	244 (3.5)!
Oregon	48 (2.9)	273 (1.5)	42 (3.0)	270 (1.6)	10 (1.3)	269 (2.5)
Maryland	47 (3.0)	264 (2.0)	47 (3.2)	258 (2.5)	6 (1.5)	254 (6.6)!
Arkansas	46 (3.9)	258 (1.5)	45 (4.1)	255 (1.6)	8 (2.5)	254 (3.7)!
Florida	44 (3.5)	260 (1.8)	42 (3.7)	254 (1.9)	14 (2.5)	250 (4.5)
California	43 (2.9)	259 (2.2)	47 (2.9)	256 (1.9)	10 (1.9)	250 (4.7)
Delaware	42 (0.9)	265 (1.4)	45 (1.0)	261 (0.9)	13 (1.0)	255 (2.2)
Connecticut	39 (3.4)	275 (1.7)	52 (3.8)	267 (1.9)	8 (2.0)	262 (4.0)!
Texas	38 (3.9)	258 (2.5)	49 (3.9)	254 (2.0)	13 (2.6)	255 (4.1)
Montana	38 (2.8)	282 (1.3)	58 (3.0)	280 (1.0)	5 (1.0)	273 (2.1)!
Colorado	37 (3.3)	265 (1.9)	49 (3.3)	269 (1.5)	14 (2.1)	262 (2.5)
Nebraska	37 (2.9)	277 (1.6)	48 (3.1)	276 (1.2)	15 (2.4)	274 (2.6)
Louisiana	37 (4.3)	245 (2.1)	49 (4.3)	245 (2.1)	14 (3.0)	244 (3.5)!
Idaho	36 (2.0)	276 (1.1)	45 (2.0)	272 (1.1)	19 (1.0)	263 (1.5)
Wyoming	36 (1.3)	275 (0.8)	45 (1.4)	273 (1.0)	20 (1.1)	267 (1.5)
Georgia	35 (4.1)	257 (2.1)	48 (4.3)	256 (1.8)	17 (2.6)	257 (2.7)
Minnesota	34 (3.4)	276 (2.0)	55 (3.5)	276 (1.5)	11 (2.5)	277 (3.4)!
Wisconsin	32 (4.0)	279 (2.2)	55 (4.1)	274 (1.6)	13 (2.3)	273 (4.8)
Virginia	31 (2.8)	269 (2.4)	56 (3.4)	262 (1.8)	13 (2.7)	255 (4.6)!
New Jersey	29 (3.1)	272 (3.3)	56 (3.5)	270 (1.5)	14 (3.0)	262 (3.5)!
Hawaii	28 (0.9)	255 (1.3)	45 (0.9)	250 (1.0)	27 (0.8)	249 (1.3)
Alabama	27 (3.6)	253 (2.5)	57 (3.9)	254 (1.6)	15 (2.9)	247 (4.4)
Pennsylvania	27 (3.4)	266 (3.1)	54 (3.9)	268 (2.2)	19 (3.3)	262 (2.6)
Guam	27 (0.4)	241 (1.2)	25 (0.9)	234 (1.5)	49 (0.9)	224 (1.0)
Iowa	26 (3.6)	280 (2.2)	58 (4.3)	278 (1.5)	16 (3.6)	277 (2.8)!
Michigan	26 (3.6)	272 (2.3)	50 (3.7)	261 (1.6)	24 (3.1)	261 (3.2)
Oklahoma	26 (3.4)	263 (2.4)	56 (3.4)	265 (1.5)	18 (2.7)	259 (2.9)
Virgin Islands	26 (0.7)	220 (1.6)	49 (0.9)	218 (0.7)	25 (0.6)	218 (1.4)
North Dakota	25 (2.0)	280 (2.7)	55 (3.6)	283 (1.6)	20 (2.4)	280 (2.4)
Illinois	24 (3.3)	268 (3.3)	58 (4.0)	261 (2.0)	18 (3.5)	250 (5.2)!
New York	23 (2.5)	259 (3.6)	59 (3.4)	262 (1.9)	18 (2.8)	254 (3.2)
Arizona	23 (1.9)	262 (1.9)	50 (3.1)	261 (1.3)	27 (2.7)	256 (2.9)
Rhode Island	22 (0.7)	260 (1.4)	54 (1.1)	264 (0.9)	24 (0.6)	249 (1.4)
Ohio	22 (3.5)	265 (3.2)	63 (3.8)	263 (1.6)	16 (2.7)	264 (2.9)
West Virginia	22 (3.2)	260 (2.0)	57 (3.9)	256 (1.3)	21 (3.5)	253 (2.3)
New Mexico	19 (1.1)	256 (1.8)	45 (1.2)	257 (1.3)	36 (1.2)	253 (1.3)
Kentucky	18 (3.3)	259 (2.7)	53 (3.6)	256 (1.3)	29 (4.0)	256 (2.1)
Indiana	16 (2.9)	271 (2.6)	57 (3.9)	266 (1.6)	26 (3.3)	268 (2.1)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

434

Chapter 18

Proficiency Results by Academic Emphasis in the Home at Grade 8 in the States

INTRODUCTION

The support and encouragement students receive from their parents, the academic and non-academic influences of the home, and the amount of effort students expend on their studies outside the classroom all have an effect on student proficiency. Because of the potential magnitude of these influences, information about home contexts for mathematics learning can help to extend our understanding of the effectiveness of school mathematics and eighth graders participating in NAEP's 1990 Trial State Assessment Program were asked about some of these background factors.

READING MATERIALS IN THE HOME

Across the states, eighth-grade public-school students were asked to indicate whether their family subscribed to a newspaper, had an encyclopedia, received magazines regularly, or had more than 25 books at home. The responses to these four questions were summarized according to the number of different types of reading materials students reported in their homes and the results are presented in TABLE 18.1.

The results indicate a strong positive relationship between achievement and a greater number of home reading materials within states, but they also indicate considerable variability across the states in students' access to these resources. In some states, such as Iowa, Nebraska, New Hampshire, and North Dakota, 59 percent or more of the eighth-grade students reported all four types of reading material in their homes. At the other end of the continuum, 40 percent or fewer of the eighth graders in Arizona, California, Florida, Hawaii, New Mexico, Guam, and the Virgin Islands reported that they had home access to these four types of reading materials.

HOMEWORK ACROSS ALL SUBJECT AREAS

In addition to the questions concerning mathematics homework, eighth graders were asked to indicate the amount of time they spent daily on homework for all subjects. As shown in TABLE 18.2, the largest percentage of students in each state reported spending one hour per day on homework across all of their subjects. The next most frequent responses were "one-half hour or less" and "two hours," respectively. Further study of the data reflects a curvilinear pattern in the proficiency data for most states, as one moves from those that "have homework and don't do it" through the categories to those that spend more than two hours. The reasons for this relationship are unknown. However, at one end, this pattern may indicate teachers' hesitancy to assign homework to lower-performing students. At the other end of the continuum, teachers may assign more homework to some of the less-able eighth graders, perhaps in an effort to provide some remediation. Conversely, the pattern may indicate that it takes less proficient students more time to complete their homework assignments than teachers anticipate. Based on the reports about mathematics homework, more students than teachers reported longer homework assignments (see Chapter 15).

READING IN SCHOOL AND FOR HOMEWORK

The eighth graders attending public schools were also asked to indicate how many pages of reading they did per day for school and homework across all subjects. Their responses are summarized in TABLE 18.3. In only slightly more than half the states did the greatest percentage of students report reading more than 10 pages per day, and in only one -- Idaho -- did almost half (48 percent) report that amount of reading per day. Eighth graders in the Virgin Islands and the District of Columbia reported the least amount of reading per day for school and homework, with half the students in each of these locations reading five or fewer pages per day.

An examination of the mathematical proficiency levels associated with the number of pages read for school or homework suggests lower mathematics proficiency for students who reported fewer pages read, particularly for those who reported reading five or fewer pages per day.

SCHOOL ATTENDANCE

Across the participating states, lower mathematics proficiency appeared to be related to a higher degree of absenteeism. Student reports about the number of days they were absent during the month preceding the assessment are shown in TABLES 18.4 (alphabetical order) and 18.5 (organized by percentage of students absent three days or more).

In thirteen of the participating states and territories (the District of Columbia, Oregon, New York, California, Guam, Rhode Island, Delaware, New Mexico, Maryland, Louisiana, Florida, Hawaii, and Arizona), more than one-fourth of the students reported that they had been absent three or more days during the previous month. North Dakota had the smallest percentage of its students indicating this level of absenteeism, although 14 percent of its eighth graders attending public schools reported that they had missed three or more school days.

PARENTS IN THE HOME

Eighth graders also were asked to indicate whether their parents or stepparents lived at home. The results are provided in TABLES 18.6 and 18.7 -- in alphabetical order and organized by the percentage of students indicating that they had two parents residing at home, respectively. Eighth graders with two parents in the home had the highest proficiency levels, and this did not vary across states. North Carolina, Georgia, Louisiana, the Virgin Islands, and the District of Columbia had fewer than three-fourths of their public-school eighth graders reporting both parents in the home, and tended to be among the lower-performing participating states.

TELEVISION WATCHING

In contrast to the positive effect of having more reading resource materials in the home, more hours of television watching were negatively related to students' mathematical proficiency. Students' reports on the television viewing are summarized in TABLE 18.8 (by alphabetical order) and in TABLE 18.9 (by the percentage of students viewing television six or more hours a day).

The overall pattern suggests that most eighth graders watched at least three hours of television each day, and many watched four to five hours per day. Among the lower-performing states and territories were some where sizable percentages of students reported watching six or more hours of television a day. For example, one-third of the students in the District of Columbia indicated that they watched television six or more hours per day. Five other states and territories (the Virgin Islands, Hawaii, North Carolina, Guam, and Arkansas) had 20 percent or more of their students indicating this high level of daily television watching. At the other end of the continuum, 17 percent or more of the students in Montana, Idaho, Oregon, Wyoming, Colorado, and New Hampshire (typically high-performing states) reported that they watched only one hour or less of television daily (although Guam also fit this category).

SUMMARY

Although there was great diversity in the resources and encouragement available to eighth graders attending public schools, the NAEP data suggest that many states were faced with problems associated with low levels of home support for learning, including excessive television viewing, substantial absenteeism, little parental encouragement to read and do homework, considerable percentages of students from families without both parents, and homes with few reading resources.

From 10 to 36 percent of the students in each state participating in NAEP's 1990 Trial State Assessment Program came from homes where reading and resource materials were in short supply or nonexistent. At the same time, approximately one-half of the eighth graders in many states reported access to a full array of reading materials in their homes. Students' reports of time spent on homework and pages read in support of schoolwork indicated, on average, about an hour's work outside of class on schoolwork, with most students reading an average of six to 10 pages total per day in support of their educational program. Eighth graders who had higher mathematics achievement reported more of these literacy-related factors.

The data on school attendance and television watching further reflected a less than committed approach to the task of education by some eighth graders attending public schools. Most eighth graders reported watching three or more hours of television per day, and in six states and territories one-fifth of the students reported that they watched six hours or more of television daily. Thirteen of the participating states and territories had more than one-fourth of their public-school eighth graders reporting that they had been absent from school three or more days during the previous month.

TABLE 18.1 | **Students' Reports of Types of Reading Materials in the Home**

GRADE 8 PUBLIC SCHOOLS	Zero to Two Types		Three Types		Four Types	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	21 (1.0)	244 (2.0)	30 (1.0)	258 (1.7)	48 (1.3)	272 (1.5)
Northeast	13 (2.0)	252 (3.9)	31 (2.7)	264 (2.9)	56 (3.7)	276 (4.3)
Southeast	26 (2.3)	235 (3.4)	29 (2.4)	248 (4.4)	46 (2.7)	266 (2.8)
Central	19 (2.1)	250 (3.4)	31 (2.2)	265 (3.6)	50 (1.8)	272 (2.1)
West	24 (1.6)	245 (4.1)	31 (1.4)	258 (2.4)	45 (1.9)	273 (3.2)
STATES						
Alabama	22 (1.1)	239 (1.9)	32 (0.8)	250 (1.4)	46 (1.4)	260 (1.2)
Arizona	27 (1.3)	246 (1.5)	33 (1.0)	259 (1.4)	40 (1.4)	270 (1.5)
Arkansas	23 (0.7)	244 (1.3)	31 (1.0)	253 (1.4)	47 (1.2)	263 (1.2)
California	32 (1.2)	242 (1.4)	31 (1.0)	256 (1.8)	37 (1.4)	269 (1.6)
Colorado	15 (0.7)	250 (1.7)	32 (0.8)	264 (1.2)	53 (1.0)	274 (1.1)
Connecticut	14 (0.9)	244 (2.4)	30 (1.0)	263 (1.6)	56 (1.3)	280 (0.9)
Delaware	17 (0.7)	247 (1.7)	31 (0.9)	255 (1.3)	52 (1.0)	269 (1.0)
District of Columbia	24 (0.9)	224 (1.1)	34 (1.2)	227 (1.2)	42 (1.0)	238 (1.3)
Florida	27 (1.2)	241 (1.7)	33 (0.9)	255 (1.5)	40 (1.4)	266 (1.4)
Georgia	20 (0.9)	241 (1.6)	32 (1.1)	254 (1.4)	48 (1.3)	269 (1.6)
Hawaii	31 (1.1)	239 (1.2)	34 (1.0)	253 (1.4)	35 (0.8)	260 (1.2)
Idaho	16 (0.9)	258 (1.9)	32 (0.9)	270 (1.2)	53 (1.2)	277 (0.8)
Illinois	18 (1.4)	243 (2.8)	31 (1.1)	258 (1.6)	51 (1.4)	268 (1.7)
Indiana	16 (0.8)	253 (1.9)	30 (0.9)	263 (1.6)	54 (1.4)	274 (1.1)
Iowa	12 (0.9)	262 (1.6)	29 (1.1)	275 (1.5)	59 (1.2)	283 (1.0)
Kentucky	22 (1.2)	243 (1.9)	30 (1.0)	252 (1.4)	48 (1.4)	266 (1.1)
Louisiana	24 (0.9)	237 (1.6)	33 (1.0)	242 (1.6)	43 (1.2)	253 (1.5)
Maryland	17 (0.8)	243 (1.7)	31 (0.9)	255 (1.6)	52 (1.2)	270 (1.5)
Michigan	16 (0.8)	249 (1.9)	33 (1.1)	260 (1.4)	50 (1.4)	272 (1.0)
Minnesota	12 (0.7)	258 (1.9)	31 (0.7)	274 (1.3)	57 (1.0)	281 (0.9)
Montana	12 (0.7)	269 (2.1)	32 (1.2)	277 (1.8)	55 (1.0)	285 (0.8)
Nebraska	12 (0.8)	256 (2.9)	28 (1.1)	271 (1.5)	60 (1.2)	282 (1.1)
New Hampshire	12 (0.8)	261 (2.1)	27 (1.3)	271 (1.4)	61 (1.3)	277 (1.2)
New Jersey	16 (0.9)	247 (2.1)	27 (0.9)	264 (1.3)	57 (1.2)	278 (1.3)
New Mexico	28 (1.1)	243 (1.4)	31 (0.9)	256 (1.1)	40 (1.1)	266 (1.3)
New York	21 (1.2)	243 (2.4)	29 (1.0)	256 (1.4)	50 (1.4)	271 (1.2)
North Carolina	22 (0.8)	234 (1.3)	32 (0.9)	245 (1.2)	46 (1.1)	261 (1.4)
North Dakota	10 (1.0)	261 (3.5)	30 (1.2)	280 (1.8)	60 (1.3)	285 (0.9)
Ohio	16 (1.0)	247 (1.4)	30 (0.8)	260 (1.4)	54 (1.1)	271 (1.1)
Oklahoma	22 (1.0)	252 (1.7)	32 (0.9)	259 (1.4)	46 (1.3)	271 (1.4)
Oregon	18 (0.8)	260 (1.6)	30 (1.0)	269 (1.3)	52 (1.2)	277 (1.0)
Pennsylvania	14 (0.7)	249 (2.5)	30 (1.2)	262 (1.5)	56 (1.4)	273 (1.6)
Rhode Island	20 (0.9)	237 (1.2)	30 (0.9)	256 (1.1)	50 (0.9)	271 (0.8)
Texas	30 (1.3)	243 (1.6)	29 (1.0)	256 (1.7)	42 (1.1)	269 (1.4)
Virginia	18 (0.9)	247 (1.7)	31 (1.1)	258 (1.4)	51 (1.2)	273 (2.1)
West Virginia	20 (1.0)	243 (1.5)	32 (1.1)	256 (1.2)	47 (1.3)	261 (1.2)
Wisconsin	14 (0.8)	260 (2.2)	29 (1.0)	270 (1.6)	57 (1.1)	280 (1.3)
Wyoming	14 (0.7)	260 (1.7)	32 (0.9)	270 (1.0)	54 (0.7)	276 (0.8)
TERRITORIES						
Guam	36 (1.2)	220 (1.1)	37 (1.5)	234 (1.3)	27 (1.0)	242 (1.3)
Virgin Islands	24 (1.1)	212 (1.3)	36 (1.6)	216 (1.4)	40 (1.4)	223 (1.2)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. Students were asked about four types of reading materials in the home, including 25 or more books, magazines, daily newspaper, and encyclopedia.

440

TABLE 18.2 | Students' Reports on Time Spent on Homework Each Day for All Subjects

GRADE 8 PUBLIC SCHOOLS	Don't Usually Have Homework Assigned		Have Homework But Don't Do It		One Half Hour or Less	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	7 (0.9)	243 (3.0)	8 (0.7)	253 (3.1)	19 (1.0)	261 (2.1)
Northeast	4 (1.5)	*** (***)	7 (2.2)	*** (***)	19 (2.3)	265 (4.2)
Southeast	8 (2.1)	231 (5.9)!	6 (1.0)	*** (***)	18 (2.2)	249 (4.6)
Central	6 (1.4)	*** (***)	9 (1.7)	254 (5.8)	21 (1.8)	273 (4.0)
West	9 (1.9)	245 (3.6)!	9 (1.1)	254 (6.5)	17 (1.6)	257 (3.6)
STATES						
Alabama	**5 (0.6)**	**237 (3.7)**	**8 (0.6)**	**252 (2.8)**	**20 (1.0)**	**253 (1.8)**
Arizona	**7 (0.6)**	**246 (2.5)**	**7 (0.6)**	**253 (2.5)**	**19 (1.0)**	**263 (1.8)**
Arkansas	**7 (0.7)**	**252 (2.9)**	**6 (0.6)**	**249 (2.7)**	**25 (0.9)**	**259 (1.5)**
California	**4 (0.6)**	**239 (5.2)**	**6 (0.4)**	**233 (2.6)**	**18 (1.0)**	**251 (2.1)**
Colorado	6 (0.8)	261 (2.8)	6 (0.5)	254 (2.4)	21 (1.0)	269 (1.6)
Connecticut	3 (0.5)	234 (3.5)	4 (0.4)	261 (3.2)	16 (0.8)	265 (2.0)
Delaware	3 (0.5)	*** (***)	6 (0.5)	246 (3.1)	21 (1.1)	258 (1.9)
District of Columbia	3 (0.5)	209 (2.9)	6 (0.5)	221 (2.5)	18 (0.8)	225 (1.5)
Florida	10 (0.8)	240 (2.7)	7 (0.6)	246 (2.9)	24 (0.9)	254 (1.7)
Georgia	**7 (0.7)**	**245 (3.5)**	**5 (0.5)**	**253 (3.1)**	**22 (0.6)**	**259 (1.6)**
Hawaii	**6 (0.5)**	**221 (3.0)**	**7 (0.5)**	**240 (2.7)**	**20 (0.7)**	**246 (1.4)**
Idaho	**12 (0.6)**	**270 (1.9)**	**6 (0.5)**	**264 (2.2)**	**21 (1.0)**	**274 (1.5)**
Illinois	**5 (1.0)**	**253 (4.6)**	**4 (0.4)**	**252 (4.6)**	**18 (1.1)**	**261 (2.5)**
Indiana	**6 (0.6)**	**257 (2.8)**	**5 (0.4)**	**256 (3.1)**	**20 (0.9)**	**260 (1.7)**
Iowa	5 (0.6)	273 (3.0)	5 (0.5)	268 (2.2)	23 (1.0)	282 (1.6)
Kentucky	11 (0.8)	251 (2.1)	5 (0.4)	250 (2.4)	20 (0.9)	260 (1.5)
Louisiana	4 (0.5)	234 (3.6)	5 (0.6)	241 (2.5)	19 (1.0)	247 (2.0)
Maryland	2 (0.4)	240 (4.1)	4 (0.4)	243 (3.3)	21 (1.0)	254 (1.9)
Michigan	7 (0.8)	260 (2.9)	4 (0.5)	255 (2.9)	20 (0.9)	267 (1.9)
Minnesota	**7 (0.6)**	**270 (2.6)**	**6 (0.6)**	**261 (2.9)**	**23 (0.9)**	**278 (1.6)**
Montana	**6 (0.6)**	**263 (3.0)**	**5 (0.6)**	**269 (4.0)**	**20 (1.0)**	**266 (1.7)**
Nebraska	**8 (0.7)**	**271 (3.4)**	**5 (0.6)**	**260 (3.5)**	**21 (1.4)**	**260 (2.2)**
New Hampshire	**2 (0.4)**	***** (***)**	**5 (0.4)**	**259 (2.7)**	**16 (0.6)**	**271 (2.0)**
New Jersey	**2 (0.4)**	***** (***)**	**3 (0.4)**	**260 (3.7)**	**19 (1.2)**	**268 (1.8)**
New Mexico	9 (0.6)	253 (2.4)	6 (0.4)	248 (2.5)	18 (0.6)	256 (1.4)
New York	3 (0.4)	*** (***)	4 (0.5)	256 (2.7)	19 (0.8)	258 (2.4)
North Carolina	7 (0.7)	237 (3.2)	5 (0.4)	243 (2.4)	20 (0.9)	246 (1.7)
North Dakota	8 (0.8)	285 (2.7)	5 (0.6)	274 (4.4)	22 (1.2)	285 (2.0)
Ohio	6 (0.6)	252 (2.7)	5 (0.4)	255 (2.5)	20 (1.0)	266 (1.8)
Oklahoma	**10 (0.8)**	**264 (2.9)**	**5 (0.5)**	**252 (2.9)**	**18 (1.0)**	**266 (2.1)**
Oregon	**8 (0.8)**	**260 (2.8)**	**6 (0.5)**	**262 (2.8)**	**22 (0.9)**	**271 (1.4)**
Pennsylvania	**4 (0.5)**	**253 (3.6)**	**5 (0.5)**	**253 (3.0)**	**24 (1.1)**	**265 (1.9)**
Rhode Island	**3 (0.3)**	**227 (4.5)**	**7 (0.5)**	**245 (2.6)**	**20 (0.6)**	**255 (1.3)**
Texas	**11 (0.8)**	**249 (2.3)**	**6 (0.5)**	**249 (2.8)**	**19 (0.6)**	**257 (2.1)**
Virginia	5 (0.5)	240 (2.9)	5 (0.5)	248 (2.9)	20 (0.7)	257 (2.1)
West Virginia	11 (0.9)	255 (1.9)	7 (0.6)	246 (2.7)	19 (0.9)	260 (1.7)
Wisconsin	7 (1.0)	273 (2.8)	5 (0.4)	262 (2.6)	22 (1.0)	279 (1.9)
Wyoming	8 (0.5)	267 (1.7)	7 (0.5)	260 (2.0)	20 (0.7)	277 (1.0)
TERRITORIES						
Guam	**13 (0.7)**	**219 (2.8)**	**9 (1.0)**	**225 (4.2)**	**19 (1.0)**	**226 (1.9)**
Virgin Islands	**11 (0.7)**	**211 (1.9)**	**5 (0.6)**	**213 (2.6)**	**21 (1.2)**	**217 (1.3)**

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

441

TABLE 18.2 | **Students' Reports on Time Spent on Homework Each Day for All Subjects (continued)**

GRADE 8 PUBLIC SCHOOLS	One Hour		Two Hours		More than Two Hours	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	42 (1.3)	265 (1.4)	17 (1.0)	267 (2.5)	7 (0.7)	261 (3.8)
Northeast	45 (3.1)	272 (3.8)	19 (3.7)	275 (7.6)!	7 (2.0)	*** (***)
Southeast	40 (2.3)	255 (2.7)	17 (1.8)	264 (3.0)	10 (1.6)	252 (3.7)
Central	44 (3.2)	267 (2.7)	16 (1.5)	266 (4.9)	5 (1.4)	*** (***)
West	41 (2.0)	265 (2.1)	17 (1.5)	266 (3.9)	8 (1.0)	266 (8.0)
STATES						
Alabama	40 (1.1)	254 (1.3)	21 (1.0)	254 (1.7)	7 (0.5)	248 (3.2)
Arizona	42 (1.1)	263 (1.4)	18 (0.9)	257 (1.9)	7 (0.7)	258 (2.5)
Arkansas	42 (1.1)	259 (1.1)	14 (0.8)	248 (2.2)	6 (0.5)	249 (3.0)
California	42 (1.1)	258 (1.5)	20 (1.1)	263 (1.9)	11 (0.7)	263 (2.7)
Colorado	42 (1.0)	269 (1.1)	19 (0.9)	268 (1.7)	7 (0.6)	266 (2.5)
Connecticut	46 (1.2)	270 (1.3)	23 (0.9)	278 (1.6)	8 (0.5)	271 (2.9)
Delaware	46 (1.6)	264 (1.4)	17 (0.9)	265 (1.7)	6 (0.7)	259 (4.3)
District of Columbia	41 (1.1)	232 (0.9)	21 (0.9)	237 (1.3)	9 (0.7)	236 (3.0)
Florida	37 (1.2)	260 (1.5)	16 (0.7)	259 (2.4)	6 (0.6)	257 (3.2)
Georgia	41 (1.1)	261 (1.4)	18 (0.9)	261 (2.3)	7 (0.6)	253 (3.3)
Hawaii	38 (1.0)	252 (1.3)	19 (1.0)	264 (1.6)	12 (0.6)	258 (2.4)
Idaho	42 (1.2)	273 (0.9)	14 (0.9)	271 (1.8)	5 (0.5)	264 (2.9)
Illinois	43 (1.1)	262 (1.7)	21 (1.0)	264 (2.4)	10 (0.7)	254 (2.8)
Indiana	45 (1.1)	266 (1.2)	18 (1.0)	270 (1.4)	8 (0.5)	266 (3.0)
Iowa	48 (1.2)	279 (1.1)	15 (0.9)	278 (1.8)	5 (0.6)	270 (3.7)
Kentucky	42 (1.4)	258 (1.5)	15 (0.9)	257 (1.6)	7 (0.7)	251 (3.0)
Louisiana	39 (1.1)	249 (1.3)	22 (1.0)	245 (2.0)	10 (0.6)	240 (2.4)
Maryland	43 (1.1)	263 (1.3)	21 (1.0)	267 (2.4)	8 (0.6)	263 (3.2)
Michigan	44 (1.0)	264 (1.3)	19 (1.0)	268 (1.8)	6 (0.6)	258 (4.3)
Minnesota	44 (1.2)	278 (1.0)	15 (1.0)	276 (1.5)	5 (0.4)	271 (3.1)
Montana	44 (1.2)	281 (1.0)	19 (1.0)	280 (1.4)	6 (0.8)	271 (3.9)
Nebraska	43 (1.1)	277 (1.0)	18 (1.0)	275 (1.6)	6 (0.7)	275 (2.7)
New Hampshire	47 (1.1)	275 (1.1)	22 (1.1)	277 (1.5)	8 (0.8)	276 (3.3)
New Jersey	48 (1.0)	271 (1.1)	22 (1.1)	272 (1.9)	8 (0.6)	269 (3.3)
New Mexico	41 (1.0)	257 (1.2)	19 (0.9)	259 (1.6)	7 (0.6)	256 (2.2)
New York	44 (0	264 (1.5)	21 (1.0)	264 (1.9)	9 (0.6)	257 (3.4)
North Carolina	41 (0.9)	252 (1.2)	19 (0.9)	255 (1.7)	9 (0.6)	253 (2.8)
North Dakota	41 (1.1)	281 (1.4)	19 (1.0)	280 (1.6)	5 (0.5)	275 (2.8)
Ohio	45 (1.0)	266 (1.3)	20 (1.0)	263 (1.7)	6 (0.5)	259 (2.8)
Oklahoma	41 (1.1)	263 (1.4)	18 (0.9)	262 (1.8)	8 (0.6)	258 (2.4)
Oregon	43 (1.0)	275 (1.0)	18 (0.9)	273 (1.5)	6 (0.5)	266 (2.8)
Pennsylvania	47 (1.0)	269 (1.6)	15 (0.8)	268 (2.6)	5 (0.5)	263 (5.3)
Rhode Island	43 (1.2)	263 (1.0)	19 (0.6)	267 (1.5)	8 (0.6)	264 (2.8)
Texas	38 (1.0)	262 (1.4)	18 (0.8)	260 (2.3)	8 (0.6)	252 (3.1)
Virginia	45 (1.1)	266 (1.3)	19 (0.9)	272 (3.1)	7 (0.6)	279 (3.3)
West Virginia	41 (1.1)	256 (1.2)	15 (0.9)	255 (1.5)	6 (0.5)	253 (2.9)
Wisconsin	43 (1.1)	277 (1.3)	17 (1.0)	271 (2.0)	7 (0.6)	264 (3.3)
Wyoming	42 (0.8)	274 (0.8)	17 (0.8)	272 (1.4)	6 (0.5)	264 (2.8)
TERRITORIES						
Guam	30 (1.0)	236 (1.4)	17 (1.0)	238 (1.9)	12 (1.0)	239 (2.5)
Virgin Islands	28 (1.0)	220 (1.4)	18 (0.9)	221 (1.2)	15 (1.2)	221 (2.4)

TABLE 18.3 | **Students' Reports on Number of Pages Read Each Day for School and Homework for All Subjects**

GRADE 8 PUBLIC SCHOOLS	More than 10 Pages		Six to 10 Pages		Five or Fewer Pages	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	35 (1.3)	267 (1.9)	28 (1.0)	265 (1.9)	37 (1.1)	255 (1.3)
Northeast	39 (4.7)	275 (4.7)	24 (2.4)	270 (5.6)	37 (2.8)	263 (2.7)
Southeast	31 (2.1)	261 (3.7)	31 (2.3)	257 (3.8)	38 (2.2)	243 (2.3)
Central	31 (1.6)	268 (3.9)	31 (2.1)	269 (3.6)	38 (2.0)	261 (2.4)
West	39 (2.5)	265 (3.0)	26 (1.4)	265 (3.0)	35 (2.6)	255 (3.0)
STATES						
Alabama	34 (1.2)	256 (1.6)	30 (1.0)	255 (1.3)	36 (1.4)	248 (1.5)
Arizona	41 (1.2)	262 (1.7)	25 (1.1)	260 (1.6)	34 (1.0)	257 (1.4)
Arkansas	28 (1.1)	259 (1.3)	28 (0.9)	259 (1.4)	44 (1.0)	252 (1.2)
California	42 (1.5)	263 (1.6)	29 (1.1)	255 (1.9)	30 (1.4)	249 (1.8)
Colorado	38 (1.2)	272 (1.2)	29 (1.0)	269 (1.2)	33 (1.2)	260 (1.5)
Connecticut	43 (1.3)	279 (1.3)	29 (0.8)	269 (1.3)	28 (1.2)	258 (1.4)
Delaware	32 (1.0)	268 (1.2)	29 (1.1)	267 (1.3)	39 (1.2)	251 (1.1)
District of Columbia	24 (0.9)	237 (2.0)	27 (1.1)	235 (1.4)	49 (0.9)	225 (0.8)
Florida	31 (0.9)	261 (1.6)	30 (0.9)	258 (1.8)	39 (1.2)	249 (1.5)
Georgia	36 (1.0)	265 (1.8)	28 (0.8)	261 (2.1)	35 (1.2)	250 (1.3)
Hawaii	36 (1.0)	256 (1.2)	26 (0.6)	254 (1.5)	38 (1.0)	247 (1.1)
Idaho	48 (1.0)	275 (0.9)	26 (0.9)	271 (1.4)	26 (1.1)	266 (1.2)
Illinois	43 (1.6)	264 (2.1)	29 (1.1)	260 (2.1)	28 (1.5)	256 (1.7)
Indiana	37 (1.3)	272 (1.4)	33 (1.0)	267 (1.8)	30 (1.3)	261 (1.5)
Iowa	43 (1.6)	280 (1.5)	31 (1.1)	279 (1.3)	27 (1.1)	275 (1.6)
Kentucky	36 (1.0)	263 (1.3)	32 (0.8)	256 (1.6)	32 (1.1)	250 (1.4)
Louisiana	36 (1.2)	253 (1.5)	30 (1.0)	246 (1.5)	34 (1.4)	238 (1.6)
Maryland	34 (1.4)	269 (1.8)	27 (0.9)	262 (1.8)	39 (1.5)	253 (1.6)
Michigan	31 (1.3)	269 (1.6)	30 (0.9)	267 (1.4)	38 (1.2)	259 (1.5)
Minnesota	36 (1.5)	279 (1.3)	30 (1.1)	277 (1.3)	34 (1.3)	272 (1.3)
Montana	44 (1.3)	284 (1.0)	31 (1.4)	279 (1.5)	25 (1.1)	277 (1.7)
Nebraska	42 (1.4)	279 (1.2)	33 (1.0)	276 (1.5)	25 (0.9)	272 (1.5)
New Hampshire	40 (1.0)	280 (1.4)	30 (1.0)	273 (1.0)	30 (1.0)	266 (1.2)
New Jersey	41 (1.4)	276 (1.4)	28 (0.8)	271 (1.6)	31 (1.2)	259 (1.6)
New Mexico	40 (1.0)	259 (1.2)	28 (1.1)	257 (1.2)	32 (0.9)	252 (1.2)
New York	35 (1.3)	269 (1.8)	32 (1.0)	261 (1.6)	34 (1.2)	254 (1.8)
North Carolina	37 (1.3)	256 (1.4)	28 (1.0)	252 (1.4)	35 (1.3)	242 (1.2)
North Dakota	41 (1.5)	284 (1.5)	32 (1.1)	281 (1.4)	28 (1.4)	277 (1.8)
Ohio	36 (1.1)	270 (1.4)	32 (1.0)	265 (1.4)	31 (1.1)	256 (1.3)
Oklahoma	37 (1.3)	265 (1.4)	30 (1.0)	265 (1.5)	33 (1.2)	258 (1.7)
Oregon	41 (1.5)	274 (1.2)	29 (0.6)	271 (1.2)	30 (1.2)	270 (1.5)
Pennsylvania	34 (1.3)	272 (2.1)	29 (1.1)	266 (1.5)	37 (1.4)	259 (1.9)
Rhode Island	38 (1.1)	270 (1.1)	28 (0.6)	261 (0.9)	34 (1.0)	248 (0.9)
Texas	34 (1.1)	263 (1.7)	30 (0.9)	260 (1.5)	36 (1.2)	252 (1.6)
Virginia	33 (1.4)	273 (2.3)	30 (1.1)	266 (1.9)	37 (1.4)	255 (1.5)
West Virginia	36 (1.3)	262 (1.4)	30 (1.0)	255 (1.3)	34 (1.1)	250 (1.1)
Wisconsin	38 (1.4)	279 (1.6)	32 (1.1)	274 (1.4)	30 (1.3)	270 (1.7)
Wyoming	43 (1.0)	275 (0.8)	27 (0.9)	272 (1.0)	30 (1.1)	268 (1.0)
TERRITORIES						
Guam	32 (1.0)	236 (1.7)	30 (1.2)	235 (1.3)	38 (1.2)	227 (1.3)
Virgin Islands	23 (0.8)	220 (1.4)	26 (1.2)	226 (1.4)	51 (1.2)	213 (1.0)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

443

TABLE 18.4 | Students' Reports on Days Absent from School During the Last Month

GRADE 8 PUBLIC SCHOOLS	Three Days or More		One or Two Days		None	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	23 (1.1)	250 (1.9)	32 (0.9)	266 (1.5)	45 (1.1)	265 (1.8)
Northeast	21 (3.0)	255 (5.5)	37 (3.1)	271 (2.8)	43 (2.2)	275 (3.6)
Southeast	22 (1.5)	242 (3.7)	32 (1.7)	260 (2.6)	46 (1.8)	253 (3.4)
Central	23 (2.0)	252 (3.3)	30 (2.0)	271 (3.4)	47 (1.7)	269 (2.5)
West	27 (1.8)	250 (3.1)	30 (1.4)	265 (3.0)	43 (2.7)	266 (3.5)
STATES						
Alabama	18 (1.0)	246 (1.9)	34 (1.0)	253 (1.3)	48 (1.3)	254 (1.6)
Arizona	26 (1.0)	252 (1.7)	34 (1.0)	262 (1.5)	40 (1.0)	264 (1.4)
Arkansas	23 (1.0)	247 (1.6)	36 (1.0)	257 (1.2)	42 (1.1)	260 (1.3)
California	28 (1.3)	246 (1.6)	33 (1.1)	259 (1.6)	39 (0.9)	263 (1.8)
Colorado	25 (0.9)	258 (1.4)	35 (1.0)	269 (1.3)	40 (0.9)	272 (1.1)
Connecticut	22 (0.9)	255 (2.1)	37 (1.1)	274 (1.3)	41 (1.1)	275 (1.3)
Delaware	28 (1.1)	251 (1.5)	34 (1.1)	264 (1.3)	38 (1.3)	265 (1.3)
District of Columbia	37 (1.2)	224 (1.2)	30 (1.3)	234 (1.5)	33 (1.1)	236 (1.1)
Florida	27 (1.0)	245 (1.6)	33 (1.0)	258 (1.5)	41 (1.1)	261 (1.7)
Georgia	22 (1.0)	248 (1.4)	34 (0.9)	264 (1.8)	43 (1.1)	260 (1.6)
Hawaii	26 (0.6)	238 (1.3)	30 (0.6)	255 (1.5)	44 (0.9)	257 (0.9)
Idaho	21 (1.0)	267 (1.3)	36 (1.0)	273 (1.1)	43 (1.0)	273 (1.1)
Illinois	21 (0.6)	253 (2.2)	32 (1.0)	261 (2.1)	47 (1.0)	264 (1.9)
Indiana	23 (0.9)	255 (1.7)	35 (0.9)	269 (1.3)	42 (1.1)	272 (1.4)
Iowa	20 (0.9)	269 (1.7)	35 (1.0)	277 (1.4)	45 (1.3)	283 (1.2)
Kentucky	23 (0.9)	246 (1.6)	33 (0.7)	259 (1.4)	44 (1.0)	261 (1.5)
Louisiana	27 (1.0)	239 (1.9)	35 (0.9)	247 (1.2)	39 (1.0)	249 (1.5)
Maryland	27 (1.0)	250 (1.8)	36 (0.9)	264 (1.6)	37 (1.1)	266 (1.7)
Michigan	25 (1.0)	252 (1.6)	35 (1.0)	267 (1.4)	41 (1.2)	270 (1.2)
Minnesota	20 (0.9)	265 (1.4)	36 (1.0)	278 (1.3)	44 (1.0)	280 (1.0)
Montana	21 (0.6)	272 (2.0)	39 (1.2)	282 (1.0)	40 (1.3)	284 (1.4)
Nebraska	19 (0.7)	266 (1.8)	35 (1.5)	279 (1.2)	46 (1.3)	278 (1.1)
New Hampshire	22 (1.2)	261 (1.8)	39 (1.3)	276 (1.2)	39 (1.2)	279 (0.9)
New Jersey	23 (1.0)	260 (1.7)	35 (1.1)	272 (1.4)	41 (1.2)	274 (1.1)
New Mexico	27 (1.0)	245 (1.2)	37 (1.1)	259 (1.3)	36 (1.0)	262 (1.0)
New York	29 (1.3)	252 (2.0)	30 (1.0)	263 (1.8)	41 (1.1)	267 (1.4)
North Carolina	25 (0.9)	242 (1.4)	32 (0.9)	254 (1.1)	42 (1.1)	252 (1.4)
North Dakota	14 (1.0)	269 (2.9)	36 (1.2)	281 (1.3)	50 (1.2)	285 (1.2)
Ohio	22 (0.9)	253 (1.4)	35 (1.1)	265 (1.2)	42 (1.2)	269 (1.2)
Oklahoma	22 (1.0)	256 (1.7)	33 (0.9)	263 (1.4)	45 (1.2)	266 (1.5)
Oregon	31 (1.1)	264 (1.4)	36 (1.2)	275 (1.1)	33 (1.2)	276 (1.3)
Pennsylvania	24 (1.0)	254 (2.1)	35 (1.1)	269 (1.8)	41 (1.1)	271 (1.5)
Rhode Island	28 (0.9)	250 (1.0)	33 (0.9)	264 (1.1)	39 (1.1)	264 (1.1)
Texas	18 (0.9)	249 (1.9)	33 (0.9)	259 (1.6)	49 (1.0)	261 (1.4)
Virginia	24 (0.9)	252 (1.7)	35 (0.8)	267 (2.0)	41 (1.1)	268 (1.7)
West Virginia	25 (1.0)	246 (1.6)	35 (0.9)	258 (1.0)	40 (1.2)	260 (1.2)
Wisconsin	21 (1.0)	263 (2.1)	37 (1.3)	276 (1.4)	42 (1.5)	279 (1.4)
Wyoming	23 (0.8)	264 (1.3)	35 (0.8)	272 (1.0)	42 (0.9)	276 (0.8)
TERRITORIES						
Guam	28 (1.0)	216 (1.3)	29 (1.2)	236 (1.6)	43 (1.1)	244 (1.0)
Virgin Islands	22 (1.2)	212 (1.4)	29 (1.2)	218 (1.2)	50 (1.5)	221 (0.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

444

TABLE 18.5

Students' Reports on Days Absent from School During the Last Month Organized by Percentage of Students Absent Three Days or More

GRADE 8 PUBLIC SCHOOLS	Three Days or More		One or Two Days		None	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
STATES/TERRITORIES						
District of Columbia	37 (1.2)	224 (1.2)	30 (1.3)	234 (1.5)	33 (1.1)	236 (1.1)
Oregon	31 (1.1)	264 (1.4)	36 (1.2)	275 (1.1)	33 (1.2)	275 (1.3)
New York	29 (1.3)	252 (2.0)	30 (1.0)	263 (1.8)	41 (1.1)	267 (1.4)
California	28 (1.3)	246 (1.6)	33 (1.1)	259 (1.6)	39 (0.9)	263 (1.6)
Guam	**28 (1.0)**	**216 (1.3)**	**29 (1.2)**	**236 (1.8)**	**43 (1.1)**	**244 (1.0)**
Rhode Island	**28 (0.9)**	**250 (1.0)**	**33 (0.9)**	**264 (1.1)**	**39 (1.1)**	**264 (1.1)**
Delaware	**28 (1.1)**	**251 (1.5)**	**34 (1.1)**	**264 (1.3)**	**38 (1.3)**	**265 (1.3)**
New Mexico	**27 (1.0)**	**245 (1.2)**	**37 (1.1)**	**259 (1.3)**	**36 (1.0)**	**262 (1.0)**
Maryland	**27 (1.0)**	**250 (1.8)**	**36 (0.9)**	**264 (1.8)**	**37 (1.1)**	**266 (1.7)**
Louisiana	27 (1.0)	239 (1.9)	35 (0.9)	247 (1.2)	39 (1.0)	249 (1.5)
Florida	27 (1.0)	245 (1.6)	33 (1.0)	258 (1.5)	41 (1.1)	261 (1.7)
Hawaii	26 (0.8)	238 (1.3)	30 (0.8)	255 (1.5)	44 (0.9)	257 (0.9)
Arizona	26 (1.0)	252 (1.7)	34 (1.0)	262 (1.5)	40 (1.0)	264 (1.4)
North Carolina	25 (0.9)	242 (1.4)	32 (0.9)	254 (1.1)	42 (1.1)	252 (1.4)
West Virginia	**25 (1.0)**	**248 (1.8)**	**35 (0.9)**	**258 (1.0)**	**40 (1.2)**	**260 (1.2)**
Michigan	**25 (1.0)**	**251 (1.8)**	**35 (1.0)**	**267 (1.4)**	**41 (1.2)**	**270 (1.2)**
Colorado	**25 (0.9)**	**258 (1.4)**	**35 (1.0)**	**269 (1.3)**	**40 (0.9)**	**272 (1.1)**
Pennsylvania	**24 (1.0)**	**254 (2.1)**	**35 (1.1)**	**266 (1.8)**	**41 (1.1)**	**271 (1.5)**
Virginia	**24 (0.9)**	**252 (1.7)**	**35 (0.8)**	**267 (2.0)**	**41 (1.1)**	**268 (1.7)**
Wyoming	23 (0.8)	264 (1.3)	35 (0.8)	272 (1.0)	42 (0.9)	276 (0.8)
New Jersey	23 (1.0)	260 (1.7)	35 (1.1)	272 (1.4)	41 (1.2)	274 (1.1)
Kentucky	23 (0.9)	246 (1.6)	33 (0.7)	259 (1.4)	44 (1.0)	261 (1.5)
Indiana	23 (0.9)	255 (1.7)	35 (0.9)	269 (1.3)	42 (1.1)	272 (1.4)
Arkansas	23 (1.0)	247 (1.6)	36 (1.0)	257 (1.2)	42 (1.1)	260 (1.3)
New Hampshire	**22 (1.2)**	**261 (1.8)**	**39 (1.3)**	**276 (1.2)**	**39 (1.2)**	**279 (0.9)**
Connecticut	**22 (0.9)**	**255 (2.1)**	**37 (1.1)**	**274 (1.3)**	**41 (1.1)**	**275 (1.3)**
Georgia	**22 (1.0)**	**248 (1.4)**	**34 (0.9)**	**264 (1.8)**	**43 (1.1)**	**260 (1.8)**
Ohio	**22 (0.9)**	**253 (1.4)**	**35 (1.1)**	**265 (1.2)**	**42 (1.2)**	**269 (1.2)**
Oklahoma	**22 (1.0)**	**256 (1.7)**	**33 (0.9)**	**263 (1.4)**	**45 (1.2)**	**266 (1.5)**
Virgin Islands	22 (1.2)	212 (1.4)	29 (1.2)	218 (1.2)	50 (1.5)	221 (0.9)
Montana	21 (0.8)	272 (2.0)	39 (1.2)	282 (1.0)	40 (1.3)	284 (1.4)
Idaho	21 (1.0)	267 (1.3)	36 (1.0)	273 (1.1)	43 (1.0)	273 (1.1)
Wisconsin	21 (1.0)	263 (2.1)	37 (1.3)	276 (1.4)	42 (1.5)	279 (1.4)
Illinois	21 (0.8)	253 (2.2)	32 (1.0)	261 (2.1)	47 (1.0)	264 (1.9)
Minnesota	**20 (0.9)**	**265 (1.4)**	**36 (1.0)**	**276 (1.3)**	**44 (1.0)**	**280 (1.0)**
Iowa	**20 (0.9)**	**269 (1.7)**	**35 (1.0)**	**277 (1.4)**	**45 (1.3)**	**283 (1.2)**
Nebraska	**19 (0.7)**	**268 (1.8)**	**35 (1.5)**	**279 (1.2)**	**46 (1.3)**	**278 (1.1)**
Alabama	**18 (1.0)**	**246 (1.9)**	**34 (1.0)**	**253 (1.3)**	**48 (1.3)**	**254 (1.6)**
Texas	18 (0.9)	249 (1.9)	33 (0.9)	259 (1.6)	49 (1.0)	261 (1.4)
North Dakota	14 (1.0)	269 (2.9)	36 (1.2)	281 (1.3)	50 (1.2)	285 (1.2)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE 18.6 | Students' Reports on Number of Parents Living at Home

GRADE 8 PUBLIC SCHOOLS	Both Parents		Single Parent		Neither Parent	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	75 (0.9)	267 (1.4)	22 (0.9)	254 (1.6)	3 (0.3)	238 (3.9)
Northeast	78 (2.3)	273 (3.1)	20 (2.2)	259 (4.4)	2 (0.5)	*** (***)
Southeast	69 (1.9)	259 (2.5)	28 (2.1)	249 (3.1)	3 (0.6)	*** (***)
Central	77 (2.4)	270 (2.7)	21 (2.0)	257 (3.8)	3 (0.7)	*** (***)
West	78 (1.3)	266 (2.7)	19 (1.3)	255 (2.6)	3 (0.7)	*** (***)
STATES						
Alabama	75 (1.1)	258 (1.2)	22 (1.0)	244 (1.4)	3 (0.4)	236 (4.3)
Arizona	75 (1.2)	263 (1.2)	23 (1.1)	256 (1.5)	2 (0.3)	*** (***)
Arkansas	77 (0.8)	260 (1.0)	19 (0.7)	248 (1.8)	3 (0.3)	240 (4.0)
California	78 (1.1)	261 (1.3)	20 (1.1)	253 (1.8)	2 (0.3)	*** (***)
Colorado	78 (1.0)	270 (1.0)	21 (0.8)	264 (1.6)	2 (0.3)	*** (***)
Connecticut	79 (0.8)	275 (1.0)	19 (0.7)	258 (1.7)	2 (0.2)	*** (***)
Delaware	75 (0.9)	265 (0.9)	22 (1.0)	254 (1.7)	3 (0.4)	249 (5.5)
District of Columbia	47 (1.2)	237 (1.3)	45 (1.2)	230 (1.0)	7 (0.6)	225 (2.4)
Florida	75 (1.0)	260 (1.3)	21 (0.9)	249 (2.2)	4 (0.3)	237 (3.1)
Georgia	73 (1.0)	265 (1.4)	23 (0.9)	249 (1.5)	4 (0.4)	239 (2.8)
Hawaii	78 (0.9)	255 (0.8)	18 (0.6)	249 (1.8)	4 (0.4)	229 (4.0)
Idaho	84 (0.7)	273 (0.7)	14 (0.7)	269 (1.8)	2 (0.2)	*** (***)
Illinois	78 (1.0)	266 (1.7)	20 (1.0)	252 (2.2)	2 (0.3)	*** (***)
Indiana	81 (1.0)	270 (1.1)	18 (1.0)	259 (1.5)	2 (0.3)	*** (***)
Iowa	83 (0.8)	281 (1.0)	15 (0.8)	270 (1.9)	2 (0.3)	*** (***)
Kentucky	79 (1.0)	259 (1.1)	19 (1.0)	250 (1.8)	2 (0.3)	249 (4.3)
Louisiana	73 (1.2)	250 (1.4)	23 (1.1)	240 (1.3)	4 (0.4)	232 (3.6)
Maryland	75 (1.3)	266 (1.4)	22 (1.2)	251 (2.4)	3 (0.4)	237 (3.5)
Michigan	77 (1.1)	269 (1.0)	21 (1.0)	252 (2.2)	2 (0.3)	*** (***)
Minnesota	83 (1.0)	279 (0.9)	16 (0.9)	267 (1.9)	1 (0.2)	*** (***)
Montana	83 (0.6)	282 (0.8)	15 (0.7)	276 (1.7)	2 (0.3)	*** (***)
Nebraska	85 (0.7)	279 (0.9)	14 (0.6)	266 (2.4)	1 (0.3)	*** (***)
New Hampshire	83 (1.1)	275 (1.1)	16 (1.1)	269 (1.8)	1 (0.2)	*** (***)
New Jersey	79 (1.0)	275 (1.0)	19 (1.0)	257 (1.9)	2 (0.3)	*** (***)
New Mexico	77 (1.0)	260 (0.9)	20 (1.0)	251 (1.5)	3 (0.4)	239 (3.1)
New York	76 (1.1)	267 (1.2)	21 (1.0)	252 (2.6)	3 (0.4)	237 (4.1)
North Carolina	74 (0.9)	256 (1.1)	22 (0.9)	241 (1.5)	3 (0.4)	233 (3.6)
North Dakota	85 (1.2)	284 (1.0)	13 (1.2)	273 (2.2)	1 (0.2)	*** (***)
Ohio	79 (0.9)	268 (1.0)	20 (0.9)	255 (1.4)	2 (0.2)	*** (***)
Oklahoma	78 (1.1)	265 (1.3)	19 (1.0)	258 (1.9)	3 (0.4)	*** (***)
Oregon	81 (0.9)	274 (1.1)	17 (0.8)	265 (1.6)	2 (0.3)	*** (***)
Pennsylvania	80 (1.2)	271 (1.4)	19 (1.0)	256 (2.4)	2 (0.3)	*** (***)
Rhode Island	78 (1.0)	264 (0.7)	20 (0.8)	253 (1.3)	2 (0.3)	*** (***)
Texas	77 (1.0)	263 (1.2)	19 (0.9)	252 (1.9)	3 (0.4)	237 (3.2)
Virginia	78 (0.9)	269 (1.7)	19 (0.9)	252 (1.8)	2 (0.3)	*** (***)
West Virginia	82 (0.8)	258 (0.9)	16 (0.8)	251 (1.6)	2 (0.3)	*** (***)
Wisconsin	81 (1.0)	278 (1.2)	18 (0.9)	264 (1.9)	1 (0.2)	*** (***)
Wyoming	85 (0.6)	274 (0.6)	14 (0.6)	267 (1.3)	1 (0.2)	*** (***)
TERRITORIES						
Guam	81 (1.0)	238 (1.0)	15 (1.1)	229 (2.8)	4 (0.7)	*** (***)
Virgin Islands	63 (1.2)	220 (0.9)	30 (1.1)	220 (1.7)	7 (1.0)	206 (2.8)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students.

TABLE 18.7

Students' Reports on Number of Parents Living at Home Organized by Percentage of Students with Both Parents at Home

GRADE 8 PUBLIC SCHOOLS	Both Parents		Single Parent		Neither Parent	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
STATES/TERRITORIES						
North Dakota	85 (1.2)	284 (1.0)	13 (1.2)	273 (2.2)	1 (0.2)	*** (***)
Nebraska	85 (0.7)	279 (0.9)	14 (0.8)	266 (2.4)	1 (0.3)	*** (***)
Wyoming	85 (0.6)	274 (0.6)	14 (0.6)	267 (1.3)	1 (0.2)	*** (***)
Idaho	84 (0.7)	273 (0.7)	14 (0.7)	269 (1.8)	2 (0.2)	*** (***)
Montana	83 (0.8)	282 (0.8)	15 (0.7)	278 (1.7)	2 (0.3)	*** (***)
New Hampshire	83 (1.1)	275 (1.1)	16 (1.1)	269 (1.6)	1 (0.2)	*** (***)
Minnesota	83 (1.0)	279 (0.9)	16 (0.9)	267 (1.9)	1 (0.2)	*** (***)
Iowa	83 (0.8)	281 (1.0)	15 (0.8)	270 (1.9)	2 (0.3)	*** (***)
West Virginia	82 (0.8)	258 (0.9)	16 (0.8)	251 (1.6)	2 (0.3)	*** (***)
Guam	81 (1.0)	238 (1.0)	15 (1.1)	229 (2.8)	4 (0.7)	*** (***)
Wisconsin	81 (1.0)	278 (1.2)	18 (0.9)	264 (1.9)	1 (0.2)	*** (***)
Oregon	81 (0.9)	274 (1.1)	17 (0.8)	266 (1.6)	2 (0.3)	*** (***)
Indiana	81 (1.0)	270 (1.1)	18 (1.0)	259 (1.5)	2 (0.3)	*** (***)
Pennsylvania	80 (1.2)	271 (1.4)	19 (1.0)	256 (2.4)	2 (0.3)	*** (***)
Connecticut	79 (0.8)	275 (1.0)	19 (0.7)	258 (1.7)	2 (0.2)	*** (***)
New Jersey	79 (1.0)	275 (1.0)	19 (1.0)	257 (1.9)	2 (0.3)	*** (***)
Kentucky	79 (1.0)	259 (1.1)	19 (1.0)	250 (1.8)	2 (0.3)	249 (4.3)
Ohio	79 (0.9)	268 (1.0)	20 (0.9)	255 (1.4)	2 (0.2)	*** (***)
Hawaii	79 (0.9)	265 (0.8)	18 (0.8)	249 (1.8)	4 (0.4)	229 (4.0)
California	78 (1.1)	261 (1.3)	20 (1.1)	253 (1.8)	2 (0.3)	*** (***)
Virginia	78 (0.9)	269 (1.7)	19 (0.9)	252 (1.8)	2 (0.3)	*** (***)
Oklahoma	78 (1.1)	265 (1.3)	19 (1.0)	258 (1.9)	3 (0.4)	*** (***)
Rhode Island	78 (1.0)	264 (0.7)	20 (0.8)	253 (1.3)	2 (0.3)	*** (***)
Illinois	78 (1.0)	265 (1.7)	20 (1.0)	252 (2.2)	2 (0.3)	*** (***)
Colorado	78 (1.0)	270 (1.0)	21 (0.8)	264 (1.8)	2 (0.3)	*** (***)
Texas	77 (1.0)	263 (1.2)	19 (0.9)	252 (1.9)	3 (0.4)	237 (3.2)
Arkansas	77 (0.8)	260 (1.0)	19 (0.7)	246 (1.8)	3 (0.3)	240 (4.0)
Michigan	77 (1.1)	269 (1.0)	21 (1.0)	252 (2.2)	2 (0.3)	*** (***)
New Mexico	77 (1.0)	260 (0.9)	20 (1.0)	251 (1.5)	3 (0.4)	236 (3.1)
New York	76 (1.1)	267 (1.2)	21 (1.0)	252 (2.6)	3 (0.4)	237 (4.1)
Arizona	75 (1.2)	263 (1.2)	23 (1.1)	256 (1.5)	2 (0.3)	*** (***)
Delaware	75 (0.9)	265 (0.9)	22 (1.0)	254 (1.7)	3 (0.4)	249 (5.5)
Maryland	75 (1.3)	266 (1.4)	22 (1.2)	251 (2.4)	3 (0.4)	237 (3.5)
Florida	75 (1.0)	260 (1.3)	21 (0.9)	249 (2.2)	4 (0.3)	237 (3.1)
Alabama	75 (1.1)	258 (1.2)	22 (1.0)	244 (1.4)	3 (0.4)	238 (4.3)
North Carolina	74 (0.9)	256 (1.1)	22 (0.9)	241 (1.5)	3 (0.4)	233 (3.6)
Georgia	73 (1.0)	265 (1.4)	23 (0.9)	249 (1.5)	4 (0.4)	228 (2.8)
Louisiana	73 (1.2)	250 (1.4)	23 (1.1)	240 (1.3)	4 (0.4)	232 (3.8)
Virgin Islands	63 (1.2)	220 (0.9)	30 (1.1)	220 (1.7)	7 (1.0)	208 (2.8)
District of Columbia	47 (1.2)	237 (1.3)	45 (1.2)	230 (1.0)	7 (0.8)	225 (2.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students.

417

TABLE 18.8 | **Students' Reports on Amount of Time Spent Watching Television Each Day**

GRADE 8 PUBLIC SCHOOLS	Six Hours or More		Four to Five Hours		Three Hours		Two Hours		One Hour or Less	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	16 (1.0)	245 (1.7)	28 (1.1)	260 (1.7)	22 (0.8)	265 (1.7)	21 (0.9)	268 (1.8)	12 (0.8)	269 (2.2)
Northeast	15 (3.3)	254 (5.5)!	28 (2.6)	268 (4.1)	23 (1.2)	271 (3.5)	21 (2.3)	278 (3.1)	12 (1.3)	277 (4.4)
Southeast	18 (1.4)	236 (2.8)	28 (1.6)	251 (3.6)	22 (1.9)	258 (3.3)	19 (2.1)	258 (4.2)	12 (1.3)	262 (6.2)
Central	14 (1.6)	247 (3.4)	27 (3.0)	261 (2.9)	25 (2.4)	271 (4.0)	22 (1.7)	274 (3.2)	11 (1.6)	270 (3.5)
West	16 (2.0)	246 (2.6)	29 (1.7)	263 (2.9)	20 (1.2)	262 (3.2)	20 (1.6)	265 (3.6)	14 (1.8)	269 (3.6)
STATES										
Alabama	16 (0.9)	239 (2.0)	34 (0.9)	253 (1.2)	22 (0.9)	254 (1.9)	18 (0.6)	261 (2.0)	10 (0.5)	258 (2.2)
Arizona	12 (0.6)	245 (2.0)	25 (0.9)	256 (1.5)	24 (0.9)	263 (1.6)	23 (0.9)	[illegible] (1.4)	15 (0.8)	265 (2.5)
Arkansas	20 (0.9)	245 (1.5)	33 (1.1)	257 (0.9)	22 (0.8)	261 (1.6)	18 (0.8)	260 (1.9)	8 (0.5)	255 (2.5)
California	11 (0.7)	244 (2.7)	28 (1.0)	251 (1.5)	23 (1.0)	257 (1.8)	24 (0.9)	250 (1.7)	18 (0.9)	268 (2.1)
Colorado	9 (0.7)	249 (2.2)	25 (0.9)	262 (1.4)	24 (0.7)	267 (1.3)	25 (0.9)	273 (1.4)	17 (0.8)	276 (1.7)
Connecticut	12 (0.8)	247 (2.6)	25 (1.0)	265 (1.6)	23 (1.0)	269 (1.6)	23 (0.9)	279 (1.4)	16 (1.1)	281 (2.1)
Delaware	18 (0.9)	243 (1.9)	31 (1.0)	258 (1.2)	22 (1.0)	264 (1.5)	19 (1.2)	272 (2.0)	9 (0.7)	271 (3.2)
District of Columbia	33 (1.1)	227 (1.2)	31 (1.2)	233 (1.2)	16 (0.7)	229 (1.7)	12 (0.6)	232 (2.0)	8 (0.7)	236 (6.2)
Florida	19 (1.0)	241 (2.0)	29 (0.9)	256 (1.4)	21 (0.8)	258 (1.6)	19 (0.9)	262 (2.1)	12 (0.7)	261 (2.5)
Georgia	17 (0.9)	243 (1.6)	30 (0.6)	257 (1.6)	23 (0.9)	261 (1.8)	19 (0.6)	267 (1.9)	12 (0.7)	266 (3.0)
Hawaii	23 (0.6)	240 (1.4)	31 (0.6)	251 (1.2)	19 (0.7)	256 (1.7)	18 (0.6)	258 (2.1)	10 (0.6)	255 (2.6)
Idaho	7 (0.6)	256 (2.7)	34 (1.0)	266 (1.5)	24 (0.6)	272 (1.2)	28 (1.1)	276 (1.3)	19 (0.9)	278 (1.1)
Illinois	14 (1.0)	242 (2.6)	29 (1.2)	257 (1.6)	23 (0.6)	265 (1.7)	23 (1.1)	268 (2.3)	12 (0.8)	270 (2.4)
Indiana	11 (0.7)	249 (2.2)	28 (0.9)	262 (1.5)	26 (0.9)	270 (1.4)	23 (0.9)	274 (1.5)	13 (0.7)	274 (1.7)
Iowa	8 (0.7)	263 (1.9)	28 (1.2)	275 (1.4)	26 (1.0)	277 (1.4)	24 (1.0)	285 (1.7)	14 (1.0)	285 (1.9)
Kentucky	14 (0.7)	243 (1.6)	30 (1.0)	255 (1.5)	25 (0.9)	260 (1.6)	21 (0.8)	261 (2.1)	10 (0.6)	263 (3.5)
Louisiana	19 (1.1)	235 (1.7)	31 (1.1)	245 (1.3)	22 (0.8)	250 (1.9)	17 (0.8)	253 (1.7)	10 (0.7)	248 (2.9)
Maryland	19 (0.9)	240 (1.4)	30 (1.0)	257 (1.5)	21 (0.7)	265 (1.7)	20 (0.9)	272 (2.2)	11 (0.8)	277 (3.5)
Michigan	14 (0.9)	244 (2.4)	27 (0.9)	260 (1.3)	24 (0.8)	266 (1.7)	22 (0.9)	274 (1.7)	13 (0.9)	274 (2.1)
Minnesota	7 (0.5)	260 (2.3)	25 (0.7)	271 (1.4)	26 (0.9)	277 (1.1)	27 (0.8)	281 (1.5)	15 (0.8)	281 (1.7)
Montana	6 (0.6)	261 (2.[illegible])	20 (1.1)	275 (1.6)	24 (1.0)	278 (1.2)	30 (1.2)	285 (1.2)	21 (0.9)	290 (1.5)
Nebraska	9 (0.5)	256 (2.4)	27 (1.2)	271 (1.4)	26 (1.0)	278 (1.4)	24 (1.0)	283 (1.3)	14 (0.7)	282 (1.9)
New Hampshire	7 (0.7)	255 (3.0)	25 (0.9)	268 (1.2)	24 (0.6)	274 (1.6)	26 (1.1)	276 (1.7)	17 (0.9)	282 (1.9)
New Jersey	13 (0.6)	247 (2.1)	28 (1.0)	265 (1.6)	25 (0.6)	271 (1.5)	23 (0.9)	276 (1.9)	12 (0.6)	284 (2.2)
New Mexico	11 (0.7)	243 (2.0)	27 (1.2)	252 (1.2)	24 (0.9)	257 (1.3)	24 (1.0)	263 (1.7)	14 (0.6)	261 (2.0)
New York	17 (1.0)	242 (2.3)	29 (0.9)	257 (1.5)	22 (1.0)	265 (1.7)	20 (0.8)	273 (2.0)	12 (0.6)	271 (2.2)
North Carolina	21 (1.0)	235 (1.6)	32 (1.0)	248 (1.3)	20 (0.8)	256 (1.5)	18 (0.7)	258 (1.6)	10 (0.8)	259 (3.1)
North Dakota	6 (0.7)	264 (3.1)	26 (1.3)	279 (2.3)	26 (1.2)	282 (1.6)	27 (1.2)	283 (1.3)	14 (0.9)	289 (2.0)
Ohio	11 (0.8)	244 (1.9)	28 (0.9)	259 (1.1)	24 (0.9)	268 (1.4)	24 (1.0)	272 (1.5)	13 (0.7)	272 (1.9)
Oklahoma	14 (0.6)	249 (1.8)	30 (1.1)	260 (1.5)	24 (1.0)	266 (1.6)	22 (0.9)	268 (1.8)	10 (0.7)	271 (2.7)
Oregon	9 (0.6)	253 (2.2)	34 (0.6)	265 (1.4)	24 (0.9)	272 (1.3)	28 (0.9)	276 (1.5)	18 (0.9)	280 (1.7)
Pennsylvania	10 (0.6)	244 (2.7)	25 (1.0)	262 (1.6)	26 (1.1)	269 (1.6)	24 (1.1)	272 (1.8)	14 (0.7)	276 (2.4)
Rhode Island	12 (0.5)	237 (1.9)	29 (1.0)	256 (1.1)	25 (0.6)	262 (1.4)	22 (1.0)	270 (1.5)	19 (0.6)	269 (2.1)
Texas	15 (0.9)	243 (2.0)	30 (0.6)	257 (1.4)	23 (1.0)	264 (1.6)	19 (0.6)	262 (2.2)	13 (0.7)	261 (2.9)
Virginia	16 (0.9)	247 (1.7)	29 (1.1)	257 (1.5)	21 (0.7)	269 (1.8)	21 (1.1)	272 (2.4)	13 (0.8)	279 (3.4)
West Virginia	16 (0.7)	243 (1.6)	30 (0.8)	254 (1.0)	25 (0.7)	258 (1.5)	20 (0.9)	263 (1.6)	9 (0.6)	263 (2.5)
Wisconsin	8 (0.7)	249 (2.7)	25 (0.9)	268 (1.6)	25 (0.9)	275 (1.4)	26 (0.9)	282 (1.3)	16 (0.8)	284 (2.1)
Wyoming	7 (0.6)	253 (2.2)	24 (0.8)	266 (1.1)	25 (0.9)	273 (1.1)	26 (0.9)	275 (1.1)	18 (1.0)	281 (1.2)
TERRITORIES										
Guam	20 (1.1)	230 (2.4)	23 (1.1)	236 (1.8)	20 (0.6)	236 (1.6)	18 (0.9)	233 (2.0)	19 (0.9)	219 (1.7)
Virgin Islands	27 (1.0)	217 (1.0)	24 (1.5)	221 (1.7)	17 (1.3)	220 (1.9)	14 (1.0)	217 (2.1)	18 (1.2)	214 (1.4)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ! Interpret with caution - the nature of the sample does not allow accurate determination of the variability of this estimated statistic.

448

TABLE 18.9 | Students' Reports on Amount of Time Spent Watching Television Organized by Percentage of Students Watching Six Hours or More Each Day

GRADE 8 PUBLIC SCHOOLS	Six Hours or More		Four to Five Hours		Three Hours		Two Hours		One Hour or Less	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
STATES/TERRITORIES										
District of Columbia	33 (1.1)	227 (1.2)	31 (1.2)	233 (1.2)	16 (0.7)	229 (1.7)	12 (0.8)	232 (2.0)	8 (0.7)	236 (6.2)
Virgin Islands	27 (1.0)	217 (1.0)	24 (1.5)	221 (1.7)	17 (1.3)	220 (1.9)	14 (1.0)	217 (2.1)	18 (1.2)	214 (1.4)
Hawaii	23 (0.8)	240 (1.4)	31 (0.8)	251 (1.2)	19 (0.7)	256 (1.7)	18 (0.8)	258 (2.1)	10 (0.6)	255 (2.6)
North Carolina	21 (1.0)	235 (1.6)	32 (1.0)	248 (1.3)	20 (0.8)	256 (1.5)	18 (0.7)	258 (1.6)	10 (0.6)	259 (3.1)
Guam	**20 (1.1)**	**230 (2.4)**	**23 (1.1)**	**238 (1.8)**	**20 (0.8)**	**236 (1.6)**	**18 (0.9)**	**233 (2.0)**	**19 (0.9)**	**219 (1.7)**
Arkansas	**20 (0.9)**	**245 (1.5)**	**33 (1.1)**	**257 (0.9)**	**22 (0.8)**	**261 (1.6)**	**16 (0.8)**	**260 (1.9)**	**8 (0.5)**	**255 (2.5)**
Louisiana	**19 (1.1)**	**235 (1.7)**	**31 (1.1)**	**245 (1.3)**	**22 (0.8)**	**250 (1.9)**	**17 (0.8)**	**253 (1.7)**	**10 (0.7)**	**248 (2.9)**
Florida	**19 (1.0)**	**241 (2.0)**	**29 (0.9)**	**258 (1.4)**	**21 (0.8)**	**258 (1.6)**	**19 (0.9)**	**262 (2.1)**	**12 (0.7)**	**261 (2.5)**
Maryland	**19 (0.9)**	**240 (1.4)**	**30 (1.0)**	**257 (1.5)**	**21 (0.7)**	**265 (1.7)**	**20 (0.9)**	**272 (2.2)**	**11 (0.8)**	**277 (3.5)**
Alabama	18 (0.9)	239 (2.0)	34 (0.9)	253 (1.2)	22 (0.9)	254 (1.9)	16 (0.6)	261 (2.0)	10 (0.5)	258 (2.2)
Delaware	18 (0.9)	243 (1.9)	31 (1.0)	258 (1.2)	22 (1.0)	264 (1.5)	19 (1.2)	272 (2.0)	9 (0.7)	271 (3.2)
New York	17 (1.0)	242 (2.3)	29 (0.9)	257 (1.5)	22 (1.0)	265 (1.7)	20 (0.8)	273 (2.0)	12 (0.6)	271 (2.2)
Georgia	17 (0.9)	243 (1.6)	30 (0.8)	257 (1.6)	23 (0.9)	261 (1.8)	19 (0.8)	267 (1.9)	12 (0.7)	266 (3.0)
Virginia	16 (0.9)	247 (1.7)	29 (1.1)	257 (1.5)	21 (0.7)	269 (1.8)	21 (1.1)	272 (2.4)	13 (0.8)	279 (3.4)
West Virginia	**16 (0.7)**	**243 (1.6)**	**30 (0.8)**	**254 (1.0)**	**25 (0.7)**	**258 (1.5)**	**20 (0.9)**	**263 (1.6)**	**9 (0.6)**	**263 (2.5)**
Texas	**15 (0.9)**	**243 (2.0)**	**30 (0.8)**	**257 (1.4)**	**23 (1.0)**	**264 (1.8)**	**19 (0.8)**	**262 (2.2)**	**13 (0.7)**	**261 (2.9)**
Michigan	**14 (0.9)**	**244 (2.4)**	**27 (0.9)**	**260 (1.3)**	**24 (0.8)**	**266 (1.7)**	**22 (0.9)**	**274 (1.7)**	**13 (0.9)**	**274 (2.1)**
Oklahoma	**14 (0.8)**	**249 (1.8)**	**30 (1.1)**	**260 (1.5)**	**24 (1.0)**	**266 (1.8)**	**22 (0.9)**	**268 (1.8)**	**10 (0.7)**	**271 (2.7)**
Kentucky	**14 (0.7)**	**243 (1.8)**	**30 (1.0)**	**256 (1.5)**	**25 (0.9)**	**260 (1.6)**	**21 (0.8)**	**261 (2.1)**	**10 (0.8)**	**263 (3.5)**
Illinois	14 (1.0)	242 (2.8)	29 (1.2)	257 (1.8)	23 (0.8)	265 (1.7)	23 (1.1)	268 (2.3)	12 (0.8)	270 (2.4)
New Jersey	13 (0.8)	247 (2.1)	28 (1.0)	265 (1.8)	25 (0.8)	271 (1.5)	23 (0.9)	278 (1.9)	12 (0.8)	284 (2.2)
Rhode Island	12 (0.5)	237 (1.9)	29 (1.0)	256 (1.1)	25 (0.8)	262 (1.4)	22 (1.0)	270 (1.5)	13 (0.8)	269 (2.1)
Arizona	12 (0.6)	245 (2.0)	25 (0.9)	256 (1.5)	24 (0.9)	263 (1.6)	23 (0.8)	264 (1.4)	15 (0.8)	265 (2.5)
Connecticut	12 (0.8)	247 (2.6)	25 (1.0)	265 (1.6)	23 (1.0)	269 (1.6)	23 (0.9)	279 (1.4)	16 (1.1)	281 (2.1)
Ohio	**11 (0.6)**	**244 (1.9)**	**28 (0.9)**	**259 (1.1)**	**24 (0.9)**	**266 (1.4)**	**24 (1.0)**	**272 (1.5)**	**13 (0.7)**	**272 (1.9)**
New Mexico	**11 (0.7)**	**243 (2.0)**	**27 (1.2)**	**252 (1.2)**	**24 (0.9)**	**257 (1.3)**	**24 (1.0)**	**263 (1.7)**	**14 (0.6)**	**261 (2.0)**
California	**11 (0.7)**	**244 (2.7)**	**28 (1.0)**	**251 (1.5)**	**23 (1.0)**	**257 (1.8)**	**24 (0.9)**	**259 (1.7)**	**16 (0.9)**	**266 (2.1)**
Indiana	**11 (0.7)**	**249 (2.2)**	**28 (0.9)**	**262 (1.5)**	**26 (0.9)**	**270 (1.4)**	**23 (0.9)**	**274 (1.5)**	**13 (0.7)**	**274 (1.7)**
Pennsylvania	**10 (0.6)**	**244 (2.7)**	**25 (1.0)**	**262 (1.6)**	**26 (1.1)**	**269 (1.6)**	**24 (1.1)**	**272 (1.8)**	**14 (0.7)**	**276 (2.4)**
Colorado	9 (0.7)	249 (2.2)	25 (0.9)	262 (1.4)	24 (0.7)	267 (1.3)	25 (0.9)	273 (1.4)	17 (0.8)	276 (1.7)
Oregon	9 (0.6)	253 (2.2)	24 (0.8)	265 (1.4)	24 (0.9)	272 (1.3)	26 (0.9)	278 (1.5)	18 (0.9)	280 (1.7)
Nebraska	9 (0.5)	255 (2.4)	27 (1.2)	271 (1.4)	26 (1.0)	278 (1.4)	24 (1.0)	283 (1.3)	14 (0.7)	282 (1.9)
Wisconsin	8 (0.7)	249 (2.7)	25 (0.9)	268 (1.6)	25 (0.9)	275 (1.4)	26 (0.9)	282 (1.3)	16 (0.8)	284 (2.1)
Iowa	8 (0.7)	263 (1.9)	28 (1.2)	275 (1.4)	26 (1.0)	277 (1.4)	24 (1.0)	285 (1.7)	14 (1.0)	285 (1.9)
Wyoming	**7 (0.6)**	**253 (2.2)**	**24 (0.6)**	**266 (1.1)**	**25 (0.9)**	**273 (1.1)**	**28 (0.9)**	**275 (1.1)**	**16 (1.0)**	**281 (1.2)**
New Hampshire	**7 (0.7)**	**255 (3.0)**	**25 (0.9)**	**266 (1.2)**	**24 (0.8)**	**274 (1.6)**	**28 (1.1)**	**278 (1.7)**	**17 (0.9)**	**282 (1.9)**
Idaho	**7 (0.5)**	**256 (2.7)**	**24 (1.0)**	**266 (1.5)**	**24 (0.6)**	**272 (1.2)**	**28 (1.1)**	**276 (1.3)**	**19 (0.9)**	**278 (1.1)**
Minnesota	**7 (0.5)**	**260 (2.3)**	**25 (0.7)**	**271 (1.4)**	**26 (0.9)**	**277 (1.1)**	**27 (0.8)**	**281 (1.5)**	**15 (0.8)**	**281 (1.7)**
North Dakota	6 (0.7)	264 (3.1)	26 (1.3)	279 (2.3)	26 (1.2)	282 (1.6)	27 (1.2)	283 (1.3)	14 (0.9)	289 (2.0)
Montana	6 (0.6)	261 (2.9)	20 (1.1)	275 (1.6)	24 (1.0)	278 (1.2)	30 (1.2)	285 (1.2)	21 (0.9)	290 (1.5)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

449

APPENDICES

Appendix A

State Contextual Background Factors: Summary of Students' Backgro‘‘nd Characteristics and Co-Statistics from Sources Exte...al to NAEP

The purpose of this appendix is to facilitate access to state background factors that can be used in interpreting the state level results contained in Part Two of this report.

TABLES A.1 through A.3 summarize state background characteristics from the NAEP data presented in Part Two. Results are provided for student population distributions by race/ethnicity, type of community, parents' highest level of education, and gender, as well as for the number of grades that students had attended school in each participating state. Definitions of these subgroups are provided in Appendix C.

TABLES A.4 through A.6 contain information gathered by National Center for Education Statistics staff from sources external to NAEP. These tables contain information for the states participating in the Trial State Assessment Program, including per capita income, gross state product per school-age child, percent minority students, resident population per square mile, percent students in large-city population, percent students in free lunch programs, current per-pupil expenditure, pupil/teacher ratio, average annual teacher salary, length of school year, length of school day, units required in mathematics, and competency test requirements.

TABLE A.1 | **Characteristics of NAEP Students by Race/Ethnicity and by Type of Community**

GRADE 8 PUBLIC SCHOOLS	Percentage of Students by Race/Ethnicity					Percentage of Students by Type of Community			
	White	Black	Hispanic	Asian / Pacific Islander	American Indian	Advantaged Urban	Disadvantaged Urban	Extreme Rural	Other
NATION	70 (0.5)	16 (0.3)	10 (0.4)	2 (0.5)	2 (0.7)	10 (3.3)	10 (2.8)	10 (3.0)	70 (4.4)
Northeast	80 (4.2)	12 (4.2)	5 (1.2)	3 (1.1)	1 (0.3)	23 (7.3)	8 (5.7)	14(10.3)	55(11.2)
Southeast	63 (3.0)	32 (3.0)	3 (0.8)	1 (0.4)	0 (0.1)	0 (0.0)	2 (2.3)	9 (5.3)	89 (5.8)
Central	79 (2.6)	13 (3.2)	5 (1.0)	1 (0.4,	1 (0.4)	3 (3.1)	10 (4.3)	8 (6.0)	79 (7.7)
West	63 (1.9)	7 (2.0)	21 (1.5)	4 (1.3)	4 (2.3)	14 (8.5)	19 (7.5)	10 (3.8)	58(10.1)
STATES									
Alabama	64 (1.9)	29 (1.8)	5 (0.6)	1 (0.3)	1 (0.2)	10 (2.8)	12 (3.0)	12 ([illegible])	[illegible]
Arizona	69 (1.8)	3 (0.4)	20 (1.3)	2 (0.3)	7 (1.5)	15 (2.7)	[illegible] (4.0)	8 ([illegible])	[illegible]
Arkansas	72 (1.5)	22 (1.5)	4 (0.4)	1 (0.2)	2 (0.3)	5 (2.1)	6 (2.1)	34 ([illegible])	[illegible] (4.4)
California	45 (1.8)	7 (0.8)	35 (1.4)	12 (1.1)	2 (0.4)	18 (4.5)	18 (4.5)	0 (0.0)	[illegible]
Colorado	73 (1.3)	4 (1.0)	19 (1.6)	2 (0.3)	2 (0.3)	29 (3.9)	6 (2.4)	15 (3.0)	50 (4.9)
Connecticut	77 (1.5)	10 (1.0)	10 (0.9)	2 (0.3)	1 (0.2)	33 (3.4)	14 (2.4)	0 (0.0)	53 (3.7)
Delaware	68 (1.0)	24 (0.5)	5 (0.5)	1 (0.2)	1 (0.3)	8 (0.1)	0 (0.0)	21 (0.2)	71 (0.2)
District of Columbia	3 (0.4)	84 (1.0)	10 (0.6)	1 (0.2)	2 (0.3)	17 (0.2)	67 (0.2)	0 (0.0)	17 (0.1)
Florida	60 (2.0)	20 (1.2)	17 (2.1)	2 (0.4)	1 (0.2)	15 (3.7)	18 (3.2)	8 (1.9)	59 (4.6)
Georgia	59 (1.8)	33 (1.7)	6 (0.6)	1 (0.2)	1 (0.1)	14 (3.4)	8 (2.5)	18 ([illegible])	60 ([illegible])
Hawaii	18 (0.8)	2 (0.3)	10 (0.6)	67 (1.0)	1 (0.2)	10 (0.1)	16 (0.2)	0 (0.0)	74 (0.2)
Idaho	90 (0.8)	0 (0.1)	6 (0.8)	1 (0.3)	2 (0.4)	4 (0.1)	0 (0.1)	27 (1.9)	67 (1.2)
Illinois	67 (1.9)	17 (1.9)	12 (1.4)	3 (0.5)	1 (0.2)	21 (3.7)	21 ([illegible])	14 ([illegible])	[illegible]
Indiana	84 (1.2)	9 (1.2)	4 (0.7)	1 (0.3)	1 (0.3)	13 (3.5)	8 (3.0)	17 ([illegible])	[illegible]
Iowa	91 (0.7)	2 (0.7)	4 (0.4)	1 (0.2)	1 (0.3)	6 (2.1)	4 (2.3)	37 (3.9)	53 (4.6)
Kentucky	85 (1.1)	9 (1.0)	4 (0.5)	1 (0.2)	1 (0.2)	7 (2.2)	10 (2.8)	33 (3.9)	49 (5.0)
Louisiana	55 (2.1)	38 (1.9)	5 (0.6)	1 (0.2)	1 (0.3)	8 (3.1)	23 (4.1)	14 (3.3)	54 (5.8)
Maryland	59 (1.5)	28 (1.5)	7 (0.8)	4 (0.7)	1 (0.3)	28 (4.0)	18 (3.4)	4 (1.6)	50 (4.4)
Michigan	77 (1.4)	13 (1.1)	5 (0.8)	2 (0.4)	2 (0.5)	17 (3.7)	13 (3.4)	13 (2.5)	56 (4.8)
Minnesota	90 (0.9)	2 (0.5)	3 (0.4)	3 (0.4)	2 (0.5)	24 (3.3)	0 (0.0)	29 (4.6)	47 ([illegible])
Montana	87 (1.1)	0 (0.1)	3 (0.4)	1 (0.3)	6 (1.1)	2 (0.1)	0 (0.0)	31 (2.6)	[illegible] (2.8)
Nebraska	66 (0.8)	5 (0.4)	5 (0.5)	1 (0.2)	1 (0.2)	9 (0.8)	4 (0.1)	[illegible] (3.1)	[illegible] (2.9)
New Hampshire	94 (0.6)	1 (0.2)	2 (0.4)	1 (0.2)	2 (0.2)	8 (0.5)	0 (0.0)	3 ([illegible])	[illegible]
New Jersey	66 (2.0)	15 (2.0)	13 (1.0)	5 (0.6)	1 (0.2)	30 (4.5)	16 (2.5)	0 (0.0)	[illegible] (4.6)
New Mexico	40 (1.3)	2 (0.4)	45 (1.3)	1 (0.3)	11 (0.8)	5 (0.1)	7 (0.1)	18 (0.9)	70 (0.9)
New York	60 (1.9)	17 (1.6)	17 (1.7)	4 (0.8)	1 (0.3)	15 (3.6)	29 (4.6)	3 (1.2)	53 (5.4)
North Carolina	62 (1.7)	30 (1.3)	5 (0.5)	1 (0.2)	3 (0.9)	4 (2.2)	4 (1.8)	17 (3.3)	75 (4.3)
North Dakota	91 (1.4)	1 (0.3)	3 (0.4)	1 (0.4)	5 (1.2)	9 (0.4)	3 (0.4)	37 (2.5)	50 (2.3)
Ohio	82 (0.9)	11 (0.8)	3 (0.4)	1 (0.3)	1 (0.3)	14 (3.3)	13 (1.7)	10 (2.2)	63 (4.2)
Oklahoma	74 (1.8)	11 (1.2)	5 (0.7)	2 (0.4)	9 (1.0)	11 (2.9)	8 (2.9)	22 (3.5)	[illegible]
Oregon	86 (0.9)	1 (0.4)	7 (0.6)	3 (0.3)	4 (0.5)	10 (2.6)	6 (2.7)	13 (3.1)	[illegible] (4.1)
Pennsylvania	81 (2.5)	12 (2.3)	6 (0.8)	1 (0.2)	1 (0.3)	12 (2.4)	14 (3.3)	7 (2.7)	67 (4.3)
Rhode Island	83 (0.8)	5 (0.5)	8 (0.5)	2 (0.3)	1 (0.2)	19 (0.4)	17 (1.7)	0 (0.0)	[illegible] (1.4)
Texas	47 (2.1)	13 (1.3)	36 (2.1)	2 (0.6)	1 (0.2)	15 (3.4)	17 (3.8)	9 (2.2)	60 (5.3)
Virginia	68 (1.5)	23 (1.5)	5 (0.5)	4 (0.4)	1 (0.2)	25 (3.9)	4 (1.3)	11 (1.7)	60 (4.3)
West Virginia	90 (0.7)	3 (0.5)	4 (0.4)	1 (0.2)	2 (0.3)	0 (0.0)	11 (2.7)	19 (4.0)	70 (4.8)
Wisconsin	85 (1.2)	8 (1.1)	4 (0.3)	2 (0.3)	1 (0.2)	7 (2.4)	10 (2.2)	24 (3.2)	60 (4.1)
Wyoming	86 (0.8)	1 (0.2)	9 (0.6)	1 (0.2)	3 (0.4)	0 (0.0)	0 (0.0)	27 (0.8)	73 (0.8)
TERRITORIES									
Guam	7 (0.7)	1 (0.4)	19 (1.0)	72 (1.2)	1 (0.2)	0 (0.0)	0 (0.0)	26 (0.1)	74 (0.1)
Virgin Islands	2 (0.2)	77 (1.1)	20 (1.0)	0 (0.2)	1 (0.2)	0 (0.0)	0 (0.0)	19 (0.2)	81 (0.2)

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample.

TABLE A.2 | **Characteristics of NAEP Students by Parents' Highest Level of Education and by Gender**

GRADE 8 PUBLIC SCHOOLS	Percentage of Students by Parents' Highest Level of Education				Percentage of Students by Gender	
	Did Not Finish High School	Graduated High School	Some Education after High School	Graduated College	Male	Female
NATION	10 (0.8)	25 (1.2)	17 (0.9)	39 (1.9)	51 (1.1)	49 (1.1)
Northeast	7 (2.2)	23 (3.3)	15 (3.0)	49 (5.8)	50 (2.1)	50 (2.1)
Southeast	14 (2.1)	27 (1.6)	18 (1.7)	32 (3.3)	49 (2.8)	51 (2.8)
Central	7 (0.9)	33 (2.1)	19 (0.9)	35 (1.8)	50 (1.4)	50 (1.4)
West	10 (1.3)	19 (2.5)	16 (1.2)	42 (4.0)	55 (2.1)	45 (2.1)
STATES						
Alabama	**12 (0.6)**	**30 (1.0)**	**18 (0.7)**	**34 (1.5)**	**50 (1.0)**	**50 (1.0)**
Arizona	**9 (0.6)**	**22 (0.9)**	**20 (0.9)**	**37 (1.2)**	**50 (0.9)**	**50 (0.9)**
Arkansas	**12 (0.6)**	**32 (0.9)**	**17 (0.6)**	**31 (1.1)**	**50 (1.1)**	**50 (1.1)**
California	**11 (0.7)**	**17 (0.9)**	**18 (0.7)**	**38 (1.6)**	**51 (0.9)**	**49 (0.9)**
Colorado	7 (0.7)	19 (0.9)	19 (0.9)	47 (1.6)	51 (1.0)	49 (1.0)
Connecticut	5 (0.4)	23 (1.2)	16 (0.8)	47 (1.6)	48 (0.8)	52 (0.8)
Delaware	8 (0.8)	31 (1.0)	17 (0.8)	38 (0.9)	52 (1.2)	48 (1.2)
District of Columbia	8 (0.7)	31 (1.0)	17 (0.8)	34 (1.2)	47 (0.9)	53 (0.9)
Florida	9 (0.9)	26 (0.9)	18 (0.7)	37 (1.3)	51 (1.1)	49 (1.1)
Georgia	**11 (0.9)**	**29 (1.1)**	**18 (0.9)**	**36 (1.6)**	**51 (0.6)**	**49 (0.6)**
Hawaii	**5 (0.5)**	**27 (0.9)**	**18 (0.7)**	**36 (1.0)**	**53 (1.0)**	**47 (1.0)**
Idaho	**6 (0.5)**	**19 (0.7)**	**22 (0.9)**	**48 (1.3)**	**52 (1.2)**	**48 (1.2)**
Illinois	**8 (0.6)**	**25 (1.5)**	**19 (0.9)**	**39 (1.6)**	**52 (1.1)**	**48 (1.1)**
Indiana	**8 (0.7)**	**31 (1.1)**	**21 (0.9)**	**35 (1.4)**	**51 (0.9)**	**49 (0.9)**
Iowa	5 (0.6)	27 (1.0)	21 (0.9)	42 (1.3)	50 (1.2)	50 (1.2)
Kentucky	16 (1.1)	32 (1.1)	18 (0.8)	26 (1.7)	51 (1.1)	49 (1.1)
Louisiana	13 (0.8)	33 (1.1)	19 (0.9)	28 (1.2)	50 (1.1)	50 (1.1)
Maryland	7 (0.7)	27 (1.3)	17 (0.7)	43 (1.8)	51 (0.8)	49 (0.8)
Michigan	6 (0.6)	27 (1.0)	20 (0.8)	39 (1.5)	52 (1.0)	48 (1.0)
Minnesota	**4 (0.3)**	**27 (1.0)**	**22 (0.6)**	**42 (1.2)**	**50 (1.0)**	**50 (1.0)**
Montana	**5 (0.7)**	**23 (1.3)**	**23 (0.9)**	**45 (1.3)**	**51 (1.4)**	**49 (1.4)**
Nebraska	**4 (0.5)**	**27 (1.1)**	**20 (0.7)**	**43 (1.0)**	**52 (1.2)**	**48 (1.2)**
New Hampshire	**6 (0.6)**	**25 (0.8)**	**19 (0.9)**	**48 (0.9)**	**53 (1.1)**	**47 (1.1)**
New Jersey	**7 (0.5)**	**24 (1.1)**	**18 (1.0)**	**45 (1.5)**	**51 (1.0)**	**49 (1.[illegible])**
New Mexico	11 (0.6)	27 (1.1)	19 (0.8)	33 (1.0)	50 (1.2)	50 (1.2)
New York	8 (0.7)	22 (0.9)	17 (0.9)	40 (1.2)	49 (1.3)	51 (1.3)
North Carolina	11 (0.7)	32 (1.0)	17 (0.8)	33 (1.3)	51 (1.0)	49 (1.0)
North Dakota	4 (0.7)	24 (1.3)	19 (0.8)	49 (1.3)	51 (1.6)	49 (1.6)
Ohio	7 (0.7)	32 (1.1)	20 (0.8)	36 (1.7)	53 (0.9)	47 (0.9)
Oklahoma	**8 (0.6)**	**28 (1.3)**	**21 (0.9)**	**40 (1.7)**	**50 (0.9)**	**50 (0.9)**
Oregon	**6 (0.6)**	**19 (0.6)**	**21 (0.6)**	**47 (1.4)**	**52 (0.9)**	**48 (0.9)**
Pennsylvania	**6 (0.6)**	**34 (1.2)**	**20 (0.9)**	**35 (1.4)**	**51 (1.1)**	**49 (1.1)**
Rhode Island	**8 (0.6)**	**28 (1.0)**	**15 (0.7)**	**41 (1.0)**	**50 (0.9)**	**50 (0.9)**
Texas	**17 (1.1)**	**23 (1.1)**	**15 (0.6)**	**34 (1.5)**	**50 (1.0)**	**50 (1.0)**
Virginia	10 (0.7)	27 (1.0)	16 (0.8)	40 (1.5)	49 (0.9)	51 (0.9)
West Virginia	12 (0.9)	38 (1.3)	17 (0.8)	27 (1.5)	52 (1.1)	48 (1.1)
Wisconsin	5 (0.5)	31 (1.1)	23 (0.9)	34 (1.4)	50 (1.1)	50 (1.1)
Wyoming	5 (0.4)	23 (1.0)	23 (0.8)	43 (1.0)	51 (0.8)	49 (0.8)
TERRITORIES						
Guam	**10 (0.7)**	**30 (1.2)**	**11 (0.6)**	**27 (1.1)**	**51 (1.2)**	**49 (1.2)**
Virgin Islands	**15 (1.0)**	**29 (1.5)**	**10 (0.7)**	**21 (1.4)**	**49 (1.1)**	**51 (1.1)**

The standard errors of the estimated percentages appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. The percentages for parents' highest level of education do not add to 100 percent because some students responded "I don't know."

TABLE A.3 | **NAEP Students' Reports on the Number of Grades They Have Attended School in the State from Kindergarten Through Eighth-Grade**

GRADE 8 PUBLIC SCHOOLS	Two Grades or Less		Three to Five Grades		More than Five Grades	
	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency	Percent of Students	Average Proficiency
NATION	7 (0.7)	252 (3.6)	7 (0.6)	262 (2.5)	85 (0.9)	264 (1.4)
Northeast	5 (0.7)	*** (***)	4 (0.6)	*** (***)	91 (1.2)	271 (3.3)
Southeast	9 (1.8)	247 (5.7)	9 (1.7)	*** (***)	82 (2.9)	255 (2.6)
Central	5 (1.0)	*** (***)	7 (1.3)	*** (***)	89 (1.4)	267 (2.5)
West	9 (1.3)	252 (6.5)	9 (1.0)	261 (2.8)	82 (1.6)	264 (2.9)
STATES						
Alabama	7 (0.5)	251 (3.2)	8 (0.7)	258 (3.0)	85 (1.1)	253 (1.1)
Arizona	11 (0.7)	258 (2.0)	15 (0.6)	264 (2.1)	74 (1.0)	260 (1.3)
Arkansas	7 (0.5)	253 (3.0)	9 (0.6)	260 (2.6)	84 (0.9)	258 (0.9)
California	6 (0.6)	249 (3.4)	10 (0.8)	257 (2.7)	84 (1.0)	259 (1.3)
Colorado	9 (0.8)	267 (2.4)	12 (0.7)	269 (1.7)	79 (1.1)	268 (1.0)
Connecticut	6 (0.5)	261 (3.4)	9 (0.5)	268 (2.9)	85 (0.8)	272 (0.9)
Delaware	10 (0.6)	257 (2.9)	10 (0.7)	260 (2.6)	79 (1.0)	262 (0.8)
District of Columbia	8 (0.7)	230 (2.5)	8 (0.6)	231 (3.1)	84 (1.0)	233 (1.0)
Florida	12 (0.8)	251 (2.6)	15 (0.9)	261 (2.3)	72 (1.1)	256 (1.2)
Georgia	9 (0.6)	258 (3.1)	11 (0.7)	265 (2.6)	80 (1.2)	259 (1.4)
Hawaii	13 (0.7)	243 (2.8)	9 (0.6)	255 (2.8)	78 (0.6)	254 (0.8)
Idaho	8 (0.7)	264 (2.6)	9 (0.6)	272 (2.5)	83 (1.0)	273 (0.7)
Illinois	5 (0.4)	254 (3.7)	5 (0.5)	257 (5.5)	90 (0.7)	262 (1.6)
Indiana	5 (0.5)	259 (3.2)	6 (0.6)	266 (2.9)	88 (0.8)	268 (1.1)
Iowa	5 (0.5)	269 (3.1)	6 (0.5)	275 (3.7)	89 (0.7)	279 (1.0)
Kentucky	5 (0.4)	252 (3.8)	6 (0.5)	257 (2.5)	89 (0.6)	258 (1.1)
Louisiana	6 (0.6)	243 (2.5)	7 (0.6)	246 (3.4)	87 (0.9)	247 (1.3)
Maryland	9 (0.6)	256 (2.4)	11 (0.6)	260 (2.6)	80 (0.9)	263 (1.4)
Michigan	5 (0.6)	256 (3.3)	6 (0.5)	260 (2.9)	89 (0.8)	266 (1.1)
Minnesota	4 (0.4)	267 (3.8)	5 (0.4)	270 (3.3)	90 (0.6)	277 (0.8)
Montana	7 (0.7)	277 (3.2)	8 (0.6)	278 (2.6)	85 (1.2)	281 (0.8)
Nebraska	6 (0.5)	272 (2.9)	8 (0.6)	273 (2.2)	86 (0.7)	277 (0.9)
New Hampshire	8 (0.6)	273 (3.1)	13 (0.6)	274 (1.8)	79 (0.9)	274 (1.1)
New Jersey	5 (0.5)	258 (3.5)	7 (0.6)	272 (3.1)	87 (0.7)	271 (1.1)
New Mexico	10 (0.8)	257 (2.5)	10 (0.7)	262 (3.2)	79 (0.9)	257 (0.9)
New York	5 (0.6)	246 (4.1)	8 (0.7)	256 (3.8)	88 (0.9)	264 (1.0)
North Carolina	9 (0.8)	244 (2.2)	9 (0.8)	254 (3.0)	82 (1.3)	252 (0.9)
North Dakota	5 (0.7)	271 (4.1)	5 (0.7)	274 (5.7)	90 (1.0)	283 (1.1)
Ohio	4 (0.4)	257 (3.4)	6 (0.5)	262 (2.6)	90 (0.6)	265 (1.0)
Oklahoma	7 (0.6)	254 (3.3)	8 (0.6)	265 (3.4)	85 (0.9)	264 (1.2)
Oregon	8 (0.6)	267 (2.2)	9 (0.5)	270 (2.1)	83 (0.6)	273 (1.1)
Pennsylvania	5 (0.5)	257 (3.7)	5 (0.5)	267 (3.0)	90 (0.8)	268 (1.6)
Rhode Island	7 (0.4)	253 (2.8)	9 (0.5)	257 (2.2)	85 (0.6)	262 (0.7)
Texas	6 (0.5)	248 (3.7)	8 (0.6)	257 (2.5)	86 (1.0)	261 (1.2)
Virginia	9 (0.6)	263 (2.6)	11 (0.8)	270 (2.8)	79 (0.8)	264 (1.5)
West Virginia	6 (0.6)	246 (3.3)	5 (0.5)	257 (3.7)	89 (0.7)	25[illegible] (0.8)
Wisconsin	4 (0.4)	257 (3.3)	6 (0.5)	271 (3.3)	90 (0.8)	276 (1.2)
Wyoming	9 (0.6)	267 (2.0)	10 (0.6)	273 (1.6)	80 (0.9)	273 (0.7)
TERRITORIES						
Guam	18 (1.3)	237 (2.2)	10 (0.7)	240 (3.0)	72 (1.2)	235 (0.8)
Virgin Islands	14 (1.1)	212 (2.0)	7 (0.9)	218 (2.7)	79 (1.5)	219 (0.9)

The standard errors of the estimated percentages and proficiencies appear in parentheses. It can be said with 95 percent certainty that for each population of interest, the value for the whole population is within plus or minus two standard errors of the estimate for the sample. ***Sample size insufficient to permit reliable estimate. There were fewer than 62 students.

TABLE A.4 | **Population Characteristics from Non-NAEP Sources**

	Per Capita Income 1989	Gross State Product per School-Age Child 1986	Percent Minority Students 1986	Resident Population Per Square Mile 1988	Percent Public School Students in Large City Population 1987-88	Percent Students Free Lunch 1987
NATION	$17,596	$92,854	30.0	69.5	13.2	24
STATES						
Alabama	13,625	67,062	38.0	80.8	0.0	36
Arizona	15,802	84,663	37.8	30.7	24.1	23
Arkansas	12,901	67,019	25.3	46.0	0.0	30
California	[illegible]	109,525	48.3	181.2	21.5	26
Colorado	[illegible]	95,703	21.3	31.9	11.0	17
Connecticut	[illegible]	[illegible]	22.8	663.6	13.7	14
Delaware	[illegible]	101,701	31.7	341.7	0.0	18
District of Columbia	[illegible]	[illegible]	96.0	9792.0	100	42
Florida	17,647	96,174	34.8	227.8	15.2	26
Georgia	16,053	82,668	33.3	109.2	6.7	28
Hawaii	18,472	98,571	76.5	170.9	0.0	22
Idaho	13,707	59,058	7.4	12.2	0.0	19
Illinois	18,824	95,669	30.2	206.7	22.5	25
Indiana	15,797	78,341	11.3	154.6	5.5	15
Iowa	15,687	80,729	5.4	50.6	0.0	18
Kentucky	13,743	71,322	10.8	93.9	0.0	31
Louisiana	12,921	78,501	43.5	99.0	10.5	46
Maryland	21,013	87,096	40.3	489.9	15.0	17
Michigan	17,444	84,710	23.6	162.2	11.1	18
Minnesota	17,657	96,216	6.1	54.1	5.9	15
Montana	14,078	74,620	7.3	5.5	0.0	18
Nebraska	15,446	87,818	6.6	20.9	0.0	18
New Hampshire	20,267	99,027	2.0	120.7	0.0	8
New Jersey	23,778	118,180	30.8	1033.9	10.7	17
New Mexico	13,140	76,365	56.9	12.4	0.0	35
New York	21,073	116,337	31.6	378.0	39.2	30
North Carolina	15,198	84,609	31.6	132.9	0.0	25
North Dakota	13,683	91,311	7.6	9.6	0.0	19
Ohio	16,373	84,668	16.9	264.7	7.4	18
Oklahoma	14,154	78,820	21.0	47.2	11.8	24
Oregon	15,919	83,559	10.2	28.8	0.0	18
Pennsylvania	17,269	88,505	15.6	267.4	13.2	19
Rhode Island	17,950	92,713	12.1	940.9	16.1	17
Texas	15,702	86,358	49.0	64.3	24.3	30
Virginia	18,927	101,121	27.4	151.5	0.0	17
West Virginia	12,345	69,079	4.1	77.6	0.0	26
Wisconsin	16,449	84,180	13.4	89.2	8.4	17
Wyoming	14,508	109,093	9.3	4.9	0.0	14

Per Capita Income 1969 – Source: U.S. Department of Commerce Bureau of Economic Analysis, *Commerce News*, August 1990. **Gross State Product per School-Age Child, 1986** – Source: Gross State Product figures: *Survey of Current Business*, Volume 68, No. 5 [illegible] 1988, U.S. Department of Commerce; School-Age Child figures: *Current Population Report*, Series P-25, No. 1024, U.S. [illegible] of the Census. Note: Calculated using 1985-86 Census data for resident persons age 5-17 years. **Percent Minority Students, 1986** – Source: *Elementary and Secondary School Civil Rights Survey, State Summaries of Projected Data*, U.S. Department of Education, Office of Civil Rights. Reprinted in *Results in Education: 1989*, National Governors' Association. **Resident Population per Square Mile, 1988** – Source: Table 26 in *Statistical Abstract of the United States: 1990* (110th Edition), U.S. Bureau of the Census. **Percent Public School Students in Large City Population, 1987-88** – Source: *Assigning Type of Locale Codes to the 1987-88 CCD Public School Universe*, U.S. Department of Education, National Center for Education Statistics. Reprinted in *Results in Education: 1989*, National Governors' Association. **Percent Students Free Lunch, 1987** – Source: Calculated from data provided by U.S. Department of Agriculture, Food and Nutrition Service, 1987; and *Statistical Abstract of the United States: 1987*. Reprinted in *Results in Education: 1989*, National Governors' Association.

TABLE A.5 | School System Characteristics from Non-NAEP Sources

	Current Expenditure Per Pupil 1987-88	Percent of Total Current Expenditures, by Function			Pupil-Teacher Ratio Fall 1988	Average Annual Teacher Salary	
		Instruction	Support Services	Non-Instructional		(NEA) 1988-89	(AFT) 1988-89
NATION	$4,243	61.7	35.0	3.3	17.4[1]	$29,547	$29,629
STATES							
Alabama	2,718	63.7	30.5	5.8	18.7	25,190	25,190
Arizona	3,744	58.5	39.2	2.3	18.2	28,499	28,499
Arkansas	2,989	61.7	33.7	4.7	15.7	21,395	21,736
California	**3,840**	**59.2**	**37.8**	**3.0**	**22.7**	**34,884**	**35,172**
Colorado	**4,462**	**59.8**	**38.1**	**2.1**	**17.8**	**29,558**	**29,557**
Connecticut	**6,230**	**64.9**	**33.3**	**1.9**	**13.1**	**37,343**	**37,869**
Delaware	**5,017**	**67.0**	**30.6**	**2.4**	**16.4**	**31,585**	**31,585**
District of Columbia	**6,132**	**69.8**	**24.5**	**5.7**	**13.3**	**36,280**	**36,767**
Florida	4,092	57.5	39.2	3.3	17.1	26,974	26,971
Georgia	3,434	64.5	33.5	2.1	18.5	26,920	26,920
Hawaii	3,919	61.9	33.1	5.0	21.1	30,778	31,307
Idaho	2,667	62.0	33.1	4.9	20.6	22,734	22,732
Illinois	4,369	60.3	36.4	3.3	17.1	31,145	31,195
Indiana	**3,794**	**62.3**	**35.5**	**2.2**	**17.8**	**29,331**	**29,169**
Iowa	**4,124**	**59.1**	**38.1**	**2.8**	**15.8**	**25,778**	**25,884**
Kentucky	**3,011**	**74.2**	**21.1**	**4.7**	**17.8**	**24,830**	**24,820**
Louisiana	**3,138**	**57.2**	**34.9**	**7.9**	**18.2**	**22,470**	**22,469**
Maryland	**5,201**	**62.2**	**35.9**	**2.0**	**16.8**	**33,665**	**33,900**
Michigan	4,692	57.0	40.7	2.3	19.8	34,419	35,530
Minnesota	4,386	62.5	32.9	4.6	17.0	30,660	31,395
Montana	4,246	61.7	32.2	6.2	15.8	24,421	24,421
Nebraska	3,943	64.6	32.9	2.5	15.0	23,845	23,845
New Hampshire	4,457	64.3	34.4	1.3	16.2	26,702	26,703
New Jersey	**6,564**	**64.0**	**33.2**	**2.8**	**13.6**	**33,037**	**32,862**
New Mexico	**3,891**	**57.5**	**37.3**	**5.2**	**18.5**	**23,997**	**24,554**
New York	**7,151**	**65.4**	**31.5**	**3.1**	**14.9**	**36,654**	**36,654**
North Carolina	**3,368**	**65.1**	**31.0**	**3.9**	**17.5**	**25,738**	**25,650**
North Dakota	**3,519**	**61.5**	**34.3**	**4.2**	**15.4**	**22,249**	**22,249**
Ohio	3,998	58.3	38.5	3.1	17.6	29,671	29,168
Oklahoma	3,093	68.5	27.7	3.8	16.5	22,370	23,400
Oregon	4,789	56.1	40.4	3.5	18.4	29,390	29,385
Pennsylvania	4,989	61.4	35.3	3.3	15.9	31,248	31,248
Rhode Island	5,329	67.2	30.2	2.6	14.6	34,233	34,234
Texas	**3,608**	**60.3**	**35.7**	**3.9**	—	**26,527**	**26,513**
Virginia	**4,149**	**65.4**	**32.1**	**2.5**	**16.1**	**28,795**	**29,056**
West Virginia	**3,858**	**48.3**	**46.7**	**5.0**	**15.1**	**21,904**	**21,904**
Wisconsin	**4,747**	**62.8**	**35.3**	**1.8**	**16.0**	**30,779**	**31,046**
Wyoming	**5,051**	**60.2**	**38.1**	**1.6**	**14.6**	**27,685**	**27,660**

Current Expenditure per Pupil, 1987-88 – Source: Table 155, "Current expenditure per pupil in average daily attendance in public elementary and secondary schools, by State: 1959-60 to 1987-88", *Digest of Education Statistics, 1990*. U.S. Department of Education, National Center for Education Statistics, Common Core of Data Surveys. Note: Amounts are in current dollars. **Percent of Total Current Expenditures, by Function** – Source: Table 152, "Current expenditures for public elementary and secondary education, by function and State: 1987-88", *Digest of Education Statistics, 1990*. U.S. Department of Education, National Center for Education Statistics, Common Core of Data Surveys. Note: Excludes expenditures for State education agencies. **Pupil-Teacher Ratio, Fall 1988** – Source: Table 60, "Teachers, enrollment, and pupil-teacher ratios in public elementary and secondary schools, by State: Fall 1988", *Digest of Education Statistics, 1990*, U.S. Department of Education, National Center for Education Statistics, Common Core of Data Surveys. [1]U.S. total includes imputation for nonreporting State. Note: Teachers reported in full-time equivalents. **Average Annual Teacher Salary (NEA)** – Source: *Estimates of School Statistics, 1988-89*, National Education Association; and Table 72, "Estimated average annual salary of teachers in public elementary and secondary schools, by State: 1969-70 to 1988-89", *Digest of Education Statistics, 1990*, U.S. Department of Education, National Center for Education Statistics. **Average Annual Teacher Salary (AFT)** – Source: *Survey and Analysis of Salary Trends, 1989*, American Federation of Teachers; and Table 73, "Minimum and average teacher salaries, by State: 1988-89", *Digest of Education Statistics, 1990*, U.S. Department of Education, National Center for Education Statistics. Note: Data in this table reflect results of surveys conducted by the American Federation of Teachers. Because of differing survey and estimation methods, these data are not entirely comparable with figures appearing in other columns and tables.

TABLE A.6 | Curricula and School Policies from Non-NAEP Sources

	Length of the School Year 1989	Length of the School Day, Grades 7-8 1989	Units Required in Mathematics 1989	Competency Test Required 1989
STATES				
Alabama	175	6.0	2.0	Yes
Arizona	175	6.0	2.0	No
Arkansas	178	5.5	3.0[1]	Yes
California	180	4.0	2.0	Yes
Colorado	180	-.-	-.-	No
Connecticut	180	4.0	3.0	No
Delaware	180	6.0	2.0	No
District of Columbia	180	6.0	2.0	No
Florida	180	6.0	3.0	No
Georgia	180	6.0	2.0	Yes
Hawaii	183	6.0	2.0	Yes
Idaho	180	5.5	2.0	No
Illinois	180	5.0	2.0	No
Indiana	180	6.0	2.0	No
Iowa	180	5.5	-.-	No
Kentucky	175	6.0	3.0	No
Louisiana	180	5.5	3.0	Yes
Maryland	180	6.0	3.0	Yes
Michigan	180	-.-	-.-	No
Minnesota	175	6.0	1.0	No
Montana	180	6.0	2.0	No
Nebraska	-.-	-.-	-.-	Yes
New Hampshire	180	5.5	2.0	No
New Jersey	180	4.0	3.0	Yes
New Mexico	180	6.0	3.0	No
New York	180	5.5	2.0	Yes
North Carolina	180	5.5	2.0	Yes
North Dakota	180	5.5	2.0	No
Ohio	182	5.5	2.0	No
Oklahoma	175	6.0	2.0	No
Oregon	175	-.-	2.0	Yes
Pennsylvania	180	5.5	3.0	No
Rhode Island	180	5.5	2.0	No
Texas	175	7.0	3.0	Yes
Virginia	180	5.5	3.0[1]	No
West Virginia	180	5.5	2.0	No
Wisconsin	180	6.5	2.0	No
Wyoming	175	6.0	-.-	No

Source: Council of Chief State School Officers' 1989 Policies and Practices Questionnaire, Tables 13, 14, 17, and 19 in *State Education Indicators, 1989*, Washington, DC, Council of Chief State School Officers. (-.-) No statewide policy. [1]A unit of science may be substituted for one of the mathematics units.

Appendix B

State-Level Participation Rates

This appendix presents detailed information about the sample participation rates for each state participating in the 1990 Trial State Assessment Program. TABLES B.1 through B.5 contain the results for school participation rates, student participation rates, rates for excluded students, rates for absent IEP and LEP students, and questionnaire response rates. The guidelines for school and student sample participation and an explanation of the derivation of weighted rates are discussed following the tables. Although virtually all states met or exceeded all four guidelines, the exceptions have been noted on TABLES B.1 and B.2.

Appendix C contains a brief summary of the sampling procedures for the trial state assessments. For more detailed information about state-level sampling procedures, see the *Technical Report for the 1990 Trial State Assessment*.

TABLE B.1 | School Participation Rates

GRADE 8 PUBLIC SCHOOLS	Weighted Percentage School Participation Before Substitution	Weighted Percentage School Participation After Substitution	Number Schools in Original Sample	Number Schools Not Eligible
NATION	88	92	145	13
Northeast	72	90	25	3
Southeast	94	94	40	1
Central	94	94	31	4
West	88	90	49	5
STATES				
Alabama	86	97	108	5
Arizona[3]	97	97	110	7
Arkansas	100	100	107	0
California	94	94	106	2
Colorado	100	100	107	2
Connecticut	100	100	108	5
Delaware[2]	100	100	30	0
District of Columbia[2]	100	100	36	0
Florida[3]	98	98	108	6
Georgia	100	100	109	3
Hawaii[2]	100	100	57	4
Idaho	97	97	108	2
Illinois	78	98	107	2
Indiana[3]	89	94	105	1
Iowa[1]	91	91	108	7
Kentucky	100	100	112	8
Louisiana	100	100	108	9
Maryland	100	100	107	2
Michigan	90	97	105	4
Minnesota	90	93	108	3
Montana	90	90	124	8
Nebraska	87	94	121	8
New Hampshire	91	97	107	3
New Jersey	97	98	112	3
New Mexico	100	100	108	2
New York[3]	86	86	105	0
North Carolina	100	100	111	5
North Dakota	96	100	111	5
Ohio	96	98	105	2
Oklahoma	78	89	112	0
Oregon	100	100	109	3
Pennsylvania	90	93	108	4
Rhode Island[2]	94	97	52	0
Texas[3]	88	97	107	4
Virginia	99	99	106	1
West Virginia	100	100	107	6
Wisconsin[3]	99	99	109	3
Wyoming	100	100	69	0
TERRITORIES				
Guam[2]	100	100	7	1
Virgin Islands[2]	100	100	6	0

[1]The nonparticipating schools included a group of schools with similar characteristics, who together accounted for more than 5 percent of the state's eighth-grade population in public schools. The types of schools from which a state needed minimum levels of student representation were determined by urbanicity, minority enrollment, and median family income. See explanations following the tables of the notations and guidelines about sample representativeness and for the derivation of weighted participation. [2]The Trial State Assessment was based on all eligible schools. There was no sampling of schools.

459

TABLE B.1 | **School Participation Rates (continued)**

GRADE 8 PUBLIC SCHOOLS	Number Schools in Original Sample that Participated	Number Substitute Schools Provided	Number Substitute Schools that Participated	Total Number Schools that Participated
NATION	117	15	3	120
Northeast	17	5	2	19
Southeast	35	4	0	35
Central	26	1	0	26
West	39	5	1	40
STATES				
Alabama	**87**	**13**	**11**	**98**
Arizona	**102**	**0**	**0**	**102**
Arkansas	**107**	**0**	**0**	**107**
California	**98**	**0**	**0**	**98**
Colorado	105	0	0	105
Connecticut	103	0	0	103
Delaware	30	0	0	30
District of Columbia	36	0	0	36
Florida	101	0	0	101
Georgia	**106**	**0**	**0**	**106**
Hawaii	**52**	**0**	**0**	**52**
Idaho	**101**	**4**	**0**	**101**
Illinois	**82**	**21**	**19**	**101**
Indiana	**92**	**6**	**6**	**98**
Iowa	92	9	0	92
Kentucky	104	0	0	104
Louisiana	99	0	0	99
Maryland	105	0	0	105
Michigan	90	9	8	98
Minnesota	**94**	**5**	**3**	**97**
Montana	**100**	**4**	**0**	**100**
Nebraska	**94**	**10**	**9**	**103**
New Hampshire	**94**	**4**	**4**	**98**
New Jersey	**106**	**2**	**1**	**107**
New Mexico	106	0	0	106
New York	91	0	0	91
North Carolina	106	0	0	106
North Dakota	98	8	8	106
Ohio	99	4	2	101
Oklahoma	**85**	**26**	**23**	**108**
Oregon	**106**	**0**	**0**	**106**
Pennsylvania	**92**	**4**	**3**	**95**
Rhode Island	**49**	**2**	**2**	**51**
Texas	**92**	**10**	**9**	**101**
Virginia	104	0	0	104
West Virginia	101	0	0	101
Wisconsin	106	0	0	106
Wyoming	69	0	0	69
TERRITORIES				
Guam	**6**	**0**	**0**	**6**
Virgin Islands	**6**	**0**	**0**	**6**

[3]For one school, an assessment was conducted, but the materials were destroyed in shipping via the U.S. Postal Service. The school was included in the counts of participating schools, both before and after substitution. However, in the weighted results, the school was treated in the same manner as a nonparticipating school because no student responses were available for analysis and reporting. In Arizona, materials for two schools were destroyed in shipping. [4]One school in the original sample initially declined and then decided to participate after a substitute for that school had been provided. Although the substitute school also participated, the state's estimates will be based on the sampling including the original school and not the substitute school. Note: Weighted percentages for the nation and region are based on schools sampled for all subject areas assessed in 1990 (reading, science, and mathematics). However, based on the national sampling design, the rates shown also are the best estimates for the mathematics assessment.

TABLE B.2 | **Student Participation Rates**

GRADE 8 PUBLIC SCHOOLS	Weighted Percentage Student Participation After Make-ups	Number Students Original Sample	Number Students Supplemental Sample	Number Students Withdrawn
NATION	90	11,871	--	--
Northeast	91	1,922	--	--
Southeast	91	3,163	--	--
Central	91	2,491	--	--
West	88	4,295	--	--
STATES				
Alabama	95	2,906	99	186
Arizona	93	2,945	161	206
Arkansas	95	3,104	127	183
California	93	2,933	63	135
Colorado	94	3,074	103	192
Connecticut	95	3,085	58	115
Delaware	93	2,455	83	163
District of Columbia	88	2,758	72	237
Florida	92	3,005	148	209
Georgia	94	3,175	126	254
Hawaii	93	2,933	82	120
Idaho	96	2,941	90	123
Illinois	96	3,021	66	103
Indiana	95	2,910	81	143
Iowa	96	2,714	40	73
Kentucky	95	3,068	88	179
Louisiana	94	2,949	108	204
Maryland	94	3,151	82	115
Michigan	95	2,941	64	140
Minnesota	95	2,657	50	105
Montana	96	2,684	70	99
Nebraska	95	2,766	58	93
New Hampshire	95	2,670	52	80
New Jersey	94	3,149	63	113
New Mexico	94	3,091	122	236
New York	93	2,704	56	98
North Carolina	95	3,160	97	42
North Dakota	96	2,672	55	58
Ohio	95	3,030	90	138
Oklahoma[1]	80	3,007	107	194
Oregon	93	3,073	110	188
Pennsylvania[2]	94	2,849	51	77
Rhode Island	93	3,152	91	178
Texas	96	2,909	140	196
Virginia	94	3,120	85	195
West Virginia	94	3,008	77	152
Wisconsin	94	3,101	52	92
Wyoming	96	2,973	83	126
TERRITORIES				
Guam	93	1,610	62	58
Virgin Islands	93	1,490	1	16

[1]The weighted student response rate within participating schools was below 85 percent. Oklahoma, however, was the only state that required signed parental permission forms on a statewide basis. See explanations following the tables of the notations and the guidelines about sample representativeness and for the derivation of weighted participation rates. [2]For six students, the assessment was conducted, but the materials were destroyed in shipping via the U.S. Postal Service. Therefore, these students were treated in the same manner as absent students because no student responses were available for analysis and reporting. (--) Because student sampling for the nation was implemented within several days of the assessment, there was no supplemental sample and the number of students withdrawn was negligible. Note: Weighted percentages for the nation and region are based on students sampled for all subject areas assessed in 1990 (reading, science, and mathematics). However, based on the national sampling design, the rates shown also are the best estimates for the mathematics assessment.

TABLE B.2 | Student Participation Rates (continued)

GRADE 8 PUBLIC SCHOOLS	Number Students Excluded	Number Students to be Assessed	Number Students Assessed Initial Sessions	Number Students Assessed Make-ups	Total Number Students Assessed
NATION	741	11,130	9,775	147	9,922
Northeast	96	1,826	1,622	11	1,633
Southeast	119	3,044	2,752	0	2,752
Central	219	2,272	2,017	22	2,039
West	307	3,988	3,384	114	3,498
STATES					
Alabama	182	2,659	2,511	20	2,531
Arizona	158	2,742	2,480	78	2,558
Arkansas	344	2,804	2,640	29	2,669
California	242	2,619	2,353	71	2,424
Colorado	142	2,843	2,632	43	2,675
Connecticut	213	2,815	2,646	26	2,672
Delaware	122	2,253	2,052	58	2,110
District of Columbia	156	2,437	2,017	118	2,135
Florida	200	2,744	2,475	59	2,534
Georgia	117	2,930	2,736	30	2,766
Hawaii	151	2,744	2,452	89	2,541
Idaho	78	2,830	2,707	9	2,716
Illinois	171	2,813	2,637	46	2,683
Indiana	144	2,704	2,534	35	2,569
Iowa	104	2,577	2,462	12	2,474
Kentucky	158	2,819	2,660	20	2,680
Louisiana	130	2,723	2,544	28	2,572
Maryland	152	2,966	2,732	62	2,794
Michigan	129	2,736	2,524	63	2,587
Minnesota	67	2,715	2,537	47	2,584
Montana	69	2,598	2,459	27	2,486
Nebraska	84	2,647	2,497	22	2,519
New Hampshire	132	2,710	2,548	20	2,568
New Jersey	234	2,865	2,675	35	2,710
New Mexico	185	2,792	2,600	43	2,643
New York	171	2,491	2,242	60	2,302
North Carolina	107	3,008	2,791	52	2,843
North Dakota	91	2,578	2,483	2	2,485
Ohio	174	2,808	2,642	31	2,673
Oklahoma	184	2,756	2,208	14	2,222
Oregon	92	2,903	2,634	74	2,708
Pennsylvania	148	2,675	2,506	22	2,528
Rhode Island	206	2,857	2,633	42	2,675
Texas	196	2,857	2,525	17	2,542
Virginia	174	2,836	2,633	28	2,661
West Virginia	172	2,761	2,532	68	2,600
Wisconsin	145	2,916	2,705	45	2,750
Wyoming	106	2,824	2,662	39	2,701
TERRITORIES					
Guam	75	1,739	1,573	44	1,617
Virgin Islands	48	1,427	1,299	27	1,326

TABLE B.3 | **Weighted Percentages of Students Excluded (IEP and LEP) from Original Sample**

GRADE 8 PUBLIC SCHOOLS	Total Percentage Students Identified IEP and LEP	Total Percentage Students Excluded	Percentage Students Identified IEP	Percentage Students Excluded IEP	Percentage Students Identified LEP	Percentage Students Excluded LEP
NATION	8	6	6	5	2	1
Northeast	6	4	6	4	1	0
Southeast	6	4	6	4	0	0
Central	9	8	8	6	2	2
West	10	6	6	4	4	2
STATES						
Alabama	10	6	10	6	0	0
Arizona	13	5	7	4	6	2
Arkansas	12	8	11	8	0	0
California	16	8	7	4	9	5
Colorado	10	5	9	4	1	1
Connecticut	12	7	10	6	2	1
Delaware	10	5	9	4	1	1
District of Columbia	7	6	5	5	1	1
Florida	12	7	9	5	3	2
Georgia	7	4	7	4	0	0
Hawaii	10	5	7	4	3	1
Idaho	7	3	6	2	1	0
Illinois	10	6	9	5	1	1
Indiana	8	5	7	5	0	0
Iowa	10	4	10	4	0	0
Kentucky	8	5	8	5	0	0
Louisiana	7	5	6	4	0	0
Maryland	11	5	10	4	1	1
Michigan	9	5	8	4	1	0
Minnesota	9	3	8	3	1	0
Montana	7	2	7	2	0	0
Nebraska	9	3	8	3	0	0
New Hampshire	12	5	12	5	0	0
New Jersey	13	6	10	6	2	2
New Mexico	10	7	9	6	2	1
New York	12	7	9	5	4	2
North Carolina	9	3	9	3	0	0
North Dakota	8	3	8	3	1	0
Ohio	8	6	8	6	0	0
Oklahoma	9	6	8	5	1	0
Oregon	9	3	8	3	1	0
Pennsylvania	11	6	10	5	1	0
Rhode Island	15	7	12	5	4	2
Texas	14	7	8	5	5	2
Virginia	10	6	8	5	2	1
West Virginia	10	6	10	6	0	0
Wisconsin	8	5	8	4	1	0
Wyoming	9	4	8	4	1	0
TERRITORIES						
Guam	7	4	5	4	2	1
Virgin Islands	4	3	4	3	0	0

IEP = Individual Education Plan and LEP = Limited English Proficiency. To be excluded, a student was supposed to be IEP or LEP and judged incapable of participating in the assessment. A student reported as both IEP and LEP is counted once in the overall rate (first column), once in the overall excluded rate (second column), and separately in the remaining columns. Note: Weighted percentages for the nation and region are based on students sampled for all subject areas assessed in 1990 (reading, science, and mathematics). However, based on the national sampling design, the rates shown also are the best estimates for the mathematics assessment.

TABLE B.4 | **Weighted Percentages of Absent, IEP, and LEP Students Based on Those Invited to Participate in the Assessment**

GRADE 8 PUBLIC SCHOOLS	Weighted Percentage Student Participation After Make-Ups	Weighted Percentage Absent	Weighted Percentage Assessed IEP	Weighted Percentage Absent IEP	Weighted Percentage Assessed LEP	Weighted Percentage Absent LEP
NATION	90	10	91	9	87	13
Northeast	91	9	86	14	81	19
Southeast	91	9	93	7	0	0
Central	91	9	98	2	100	0
West	88	12	88	12	87	13
STATES						
Alabama	95	5	92	8	100	0
Arizona	93	7	90	10	89	11
Arkansas	95	5	91	9	100	0
California	93	7	97	3	94	6
Colorado	94	6	92	8	100	0
Connecticut	95	5	93	7	100	0
Delaware	93	7	94	6	80	20
District of Columbia	88	12	92	8	0	0
Florida	92	8	88	12	79	21
Georgia	94	6	97	3	93	7
Hawaii	93	7	85	15	100	0
Idaho	96	4	97	3	100	0
Illinois	95	5	92	8	100	0
Indiana	95	5	93	7	100	0
Iowa	96	4	97	3	100	0
Kentucky	95	5	94	6	100	0
Louisiana	94	6	96	4	100	0
Maryland	94	6	88	12	100	0
Michigan	95	5	94	6	100	0
Minnesota	95	5	96	4	100	0
Montana	96	4	90	10	100	0
Nebraska	95	5	95	5	100	0
New Hampshire	95	5	95	5	100	0
New Jersey	94	6	88	12	94	6
New Mexico	94	6	95	5	95	5
New York	93	7	94	6	100	0
North Carolina	95	5	93	7	100	0
North Dakota	96	4	95	5	100	0
Ohio	95	5	97	3	100	0
Oklahoma	80	20	76	24	100	0
Oregon	93	7	91	9	100	0
Pennsylvania	94	6	95	5	100	0
Rhode Island	93	7	92	8	91	9
Texas	96	4	97	3	94	6
Virginia	94	6	91	9	90	10
West Virginia	94	6	94	6	100	0
Wisconsin	94	6	93	7	93	7
Wyoming	96	4	93	7	100	0
TERRITORIES						
Guam	93	7	75	25	100	0
Virgin Islands	93	7	73	27	100	0

Note: Weighted percentages for the nation and region are based on students sampled for all subject areas assessed in 1990 (reading, science, and mathematics). However, based on the national sampling design, the rates shown also are the best estimates for the mathematics assessment.

TABLE B.5 | Questionnaire Response Rates

GRADE 8 PUBLIC SCHOOLS	Weighted Percentage of Students Matched to Mathematics Teacher Questionnaires	Percentage of Mathematics Teacher Questionnaires Returned	Weighted Percentage of Students Matched to School Characteristics/ Policies Questionnaires	Percentage of School Characteristics/ Policies Questionnaires Returned	Percentage of Excluded Student Questionnaires Returned
NATION	76	72	88	84	90
Northeast	65	60	94	88	100
Southeast	78	73	91	87	85
Central	79	80	70	75	79
West	77	72	88	88	97
STATES					
Alabama	94	91	100	100	100
Arizona	85	84	99	99	98
Arkansas	92	90	98	98	100
California	86	86	98	97	95
Colorado	85	87	99	99	100
Connecticut	89	87	99	99	96
Delaware	85	83	96	97	98
District of Columbia	94	87	98	97	99
Florida	88	86	98	97	97
Georgia	87	89	98	98	100
Hawaii	91	88	99	98	99
Idaho	87	87	98	99	97
Illinois	85	84	95	96	98
Indiana	87	86	98	98	93
Iowa	89	90	99	99	99
Kentucky	93	89	100	100	100
Louisiana	90	86	99	99	100
Maryland	89	90	99	99	99
Michigan	91	91	100	100	99
Minnesota	88	85	99	99	97
Montana	94	88	100	100	100
Nebraska	89	88	99	99	99
New Hampshire	88	83	100	100	99
New Jersey	91	88	99	99	97
New Mexico	90	88	97	97	93
New York	85	86	96	99	96
North Carolina	91	90	96	98	97
North Dakota	94	87	95	97	99
Ohio	83	83	100	100	96
Oklahoma	91	91	99	99	99
Oregon	84	84	94	94	100
Pennsylvania	87	85	98	98	97
Rhode Island	87	84	100	100	100
Texas	84	89	99	99	99
Virginia	93	93	96	97	99
West Virginia	91	88	99	99	100
Wisconsin	87	81	99	99	96
Wyoming	84	81	100	99	99
TERRITORIES					
Guam	98	85	100	100	100
Virgin Islands	88	85	100	100	100

The Mathematics Teacher Questionnaire consisted of in two parts -- the first requesting background information about the teacher and the second asking about instruction in particular classes. The percentage of students matched to questionnaires is provided for Part II. If they differed, the match rates for Part I were higher. Note: For the nation and regions, the percentage of excluded student questionnaires returned is based on students sampled for all subjects assessed in 1990. However, based on the sampling design, this rate also is the best estimate of the comparable rate for the mathematics assessment.

GUIDELINES FOR SAMPLE PARTICIPATION AND EXPLANATION OF DERIVATION OF WEIGHTED PARTICIPATION

State representatives, the National Assessment Governing Board, and several committees of external advisers to NAEP and NCES discussed the procedures for reporting the NAEP Trial State Assessment results. Because sample participation rates across the states had to be uniformly high to permit fair and valid comparisons, NCES established guidelines for levels of school and student participation in the Trial State Assessment Program. If any state's participation levels fell below the guidelines, a notation was made on TABLES B.1 and B.2.

However, virtually every state met or exceeded the four guidelines, which were based on the standards for sample surveys set forth in the U.S. Department of Education's *Standards and Policies* (1987). In brief, they cover levels of school and student participation, both overall and for particular population subgroups.

GUIDELINES FOR USE IN REPORTING TRIAL STATE ASSESSMENT SCHOOL AND STUDENT PARTICIPATION RATES

The following guidelines concerning school and student participation rates in the Trial State Assessment Program were established to address four significant ways in which nonresponse bias could be introduced into the state sample estimates. Nonresponse bias can occur if data are not obtained from portions of the state population to the extent that overall sample representativeness could be affected.

1. **Either the weighted participation rate for the initial sample of schools was 85 percent or above or the weighted school participation rate after substitution was 90 percent or above.**

All states participating in the 1990 Trial State Assessment had school participation rates that exceeded either the first or second part of the guideline, or both parts. For states that did not use substitute schools, the participation rates were based on participating schools from the original sample. In these situations, the NCES standards specify weighted school participation rates of 85 percent or better to guard against potential bias due to school nonresponse. The first part of the guideline, which refers to the weighted school participation rate for the initial sample of schools, is in direct accordance with NCES standards.

To help ensure adequate sample representation for each state participating in the 1990 Trial State Assessment Program, NAEP provided substitutes for nonparticipating schools. When possible, a substitute school was provided for each initially selected school that declined participation before November 10, 1989. For states that did use substitute schools, the assessment results are based on all participating schools from both the original sample and the list of substitutes.

The NCES standards do not explicitly address the use of substitute schools to replace initially selected schools that decided not to participate in the assessment. However, considerable technical consideration was given to this issue. Even though the characteristics of the substitute schools were matched as closely as possible to the characteristics of the initially selected schools, substitution does not entirely eliminate bias due to the nonparticipation of initially selected schools. Thus, for the weighted school participation rates including substitute schools, the guideline was set at 90 percent. However, to evaluate the potential for bias due to nonparticipation in state's where substitute schools were used, the participation rates both with and without substitutes were considered.

2. **The nonparticipating schools did not include a group of schools with similar characteristics, which together accounted for more than 5 percent of the state's total eighth-grade population in public schools. The types of schools from which a state needed minimum participation levels of student representation were determined by urbanicity, minority enrollment, and median family income.**

The NCES standards also specify that attention should be given to the representativeness of the sample coverage. Thus, if some important segment of the state's population is not adequately represented, it is of concern, regardless of the overall participation rate. Virtually all states met this guideline, which is based on the NCES standard for stratum-specific school nonresponse rates..

A notation that the nonparticipating schools did include such a group of schools addresses the fact that, if nonparticipating schools are concentrated within a particular class of schools, the potential for substantial bias remains, even if the overall level of school participation appears to be satisfactory. Nonresponse adjustment strata have been formed within each state, and the schools within each stratum are similar with respect to minority enrollment, urbanicity, and/or median household income, as appropriate for each state. If more than 5 percent (weighted) of the sampled schools are nonparticipants from a single adjustment stratum, then the potential for nonresponse bias may be too great.

3. **The weighted student response rate within participating schools was 85 percent or above.**

This guideline follows the NCES standard of 85 percent for overall student participation rates. The weighted student participation rate is based on all eligible students from initially selected or substitute schools who participated in the assessment in either an initial session or a make-up session. If the rate fell below 85 percent, then the potential for bias due to students' nonresponse may be to great and a notation has been made. Again, however, virtually all states that participated in the 1990 Trial State Assessment Program met this guideline.

4. **The nonresponding students within participating schools did not include a group of students with similar characteristics, who together accounted for more than 5 percent of the state's assessable public-school population. Student groups from which a state needed minimum levels of participation were determined by age of respondent and type of assessment session (unmonitored or monitored), as well as school urbanicity, minority enrollment, and median family income.**

All states met this guideline, which is based on the NCES standard for stratum-specific student nonresponse rates. However, a notation to the contrary addresses the fact that, if nonparticipating students are concentrated within a particular class of students, the potential for substantial bias remains, even if the overall student participation level appears to be satisfactory. Student nonresponse adjustment strata have been formed using the school-level nonresponse adjustment strata, together with the student's age and the nature of the assessment session (unmonitored or monitored). If more than 5 percent (weighted) of the invited students who do not participate in the assessment are from a single stratum, then the potential for nonresponse bias may be too great.

DERIVATION OF WEIGHTED PARTICIPATION RATES

Weighted School Participation Rates. The weighted school participation rates within each state give the percentages of eighth-grade students in public schools who are represented by the schools participating in the assessment, prior to statistical adjustments for school nonresponse.

Two weighted school participation rates are computed for each state. The first rate is based only on participating schools that were initially selected for the assessment, while the second rate includes schools selected as substitutes for nonparticipating schools. The numerator in the before-substitution rate is the sum of the number of students represented by each initially selected school that participated in the assessment. The numerator in the after-substitution rate is the sum of the number of students represented by each of the initially selected participating schools and each of the participating substitute schools. The denominator of both rates is the sum of the number of students represented by each of the initially selected schools (both participating and nonparticipating) -- an estimate of the total number of eighth-grade students in the state's public schools.

In general, different schools in the sample can represent different numbers of students in the state population. The number of students represented by an initially selected school (the school weight) is the eighth-grade enrollment of the school divided by the probability that the school was included in the sample. The number of students represented by a substitute school is the number of students represented by the replaced nonparticipating school. A school with a selection probability of less than 1.0 represents more students in the population than its enrollment, while a school with a selection probability of 1.0 represents only the students attending that school. Thus, a selected school with an eighth-grade enrollment of 150 and a selection probability of 0.2 represents 750 students from that state, while a school with an enrollment of 1,000 and a selection probability of 1.0 represents only the 1,000 students attending that school.

Because each school represents different numbers of students in the population, the weighted school participation rates differ somewhat from the simple unweighted rates. (The unweighted rates are calculated from the initial raw counts by dividing the number of participating schools by the number of schools in the sample.) The difference between the weighted and the unweighted rates is potentially largest in smaller states where all schools with eighth-grade students were included in the sample. In those states, each school represents only its own students. Therefore, the nonparticipation of a large school reduces the weighted school participation rate by a greater amount than does the nonparticipation of a small school.

The nonparticipation of larger schools also has greater impact than that of smaller schools on reducing weighted school participation rates in larger states where less than all of the schools were included in the sample. However, since the number of students represented by each school is more nearly constant in larger states, the difference between the impact of nonparticipation by either large or small schools is less marked than in states where all schools were selected.

In general, the larger the state is, the less the difference between the weighted and unweighted school participation rates. However, even in the smaller states, the differences tend to be small -- typically within one percentage point. Furthermore, in the 1990 Trial State Assessment, whenever the difference exceeded one percentage point, it was always because the weighted participation rate exceeded the unweighted rate.

Weighted Student Participation Rate. The weighted student participation rate shows the percentage of the eligible student population within the state that is represented by the students who participated in the assessment (in either an initial session or a makeup session), after accounting for school nonparticipation. The eligible student population within a state consists of all public-school students who were in the eighth grade and who, if selected, would not have been excluded from the assessment. The numerator of this rate is the sum, across all assessed students, of the number of students represented by each assessed student. The denominator is the sum of the number of students represented by each selected student who was invited and eligible to participate (i.e., not excluded), including students who did not participate. In other words, the denominator is an estimate of the total number of assessable students in the state.

The number of students represented by a single selected student (the student weight) is 1.0 divided by the probability that the student was selected for assessment, with adjustments to account for nonparticipation of schools. In general, each sampled student within a state represents approximately the same number of students from that state's population. Consequently, there is little difference between the weighted and the unweighted student participation rate.

WEIGHTED PERCENTAGES OF EXCLUDED STUDENTS

Weighted Percentage of Excluded Students. The weighted percentage of excluded students estimates the percentage of the eighth-grade population in the state's public schools that is represented by the students who were excluded from the assessment, after accounting for school nonparticipation. The numerator is the sum, across all excluded students, of the number of students represented by each excluded student. The denominator is the sum of the number of students represented by each of the students who was sampled and had not withdrawn from the state's schools.

Weighted Percentage of Individualized Education Plan (IEP) Students. The weighted percentage of IEP students estimates the percentage of the eighth-grade population in the state's public schools that is represented by students who were classified as IEP, after accounting for school nonparticipation. The numerator is the sum, across all students classified as IEP, of the number of students represented by each IEP student. The denominator is the sum of the number of students represented by each of the students who was sampled and had not withdrawn from the state's schools.

Weighted Percentage of Excluded IEP Students. The weighted percentage of IEP students who were excluded estimates the percentage of students in the state represented by those IEP students who were excluded from the assessment, after accounting for school nonparticipation. The numerator is the sum, across all students classified as IEP and excluded from the assessment, of the number of students represented by each excluded IEP student. The denominator is the sum of the number of students represented by each of the students who was sampled and had not withdrawn from the state's schools.

Weighted Percentage of Limited English Proficiency (LEP) Students. The weighted percentage of LEP students estimates the percentage of the eighth-grade population in the state's public schools that is represented by the students who were classified as LEP, after accounting for school nonparticipation. The numerator is the sum, across all students classified as LEP, of the number of students represented by each LEP student. The denominator is the sum of the number of students represented by each of the students who was sampled and had not withdrawn form the state's schools.

Weighted Percentage of Excluded LEP Students. The weighted percentage of LEP students who were excluded estimates the percentage of students in the state that is represented by LEP students who were excluded from the assessment, after accounting for school nonparticipation. The numerator is the sum, across all students classified as LEP and excluded from the assessment, of the number of students represented by each excluded LEP student. The denominator is the sum of the number of students represented by each of the students who was sampled and had not withdrawn from the state's schools.

Appendix C

Overview of Procedures Used in the 1990 Mathematics Assessment

This appendix provides further information about the methods and procedures used in NAEP's 1990 mathematics assessment. The forthcoming *NAEP 1990 Technical Report* and the *Technical Report for the 1990 Trial State Assessment* provide more extensive information about procedures.

NAEP'S 1990 MATHEMATICS ASSESSMENT

As described in the report, the objectives for the assessment were developed through a consensus process managed by the Council of Chief State School Officers, and the items were developed through a similar process managed by Educational Testing Service. The development of the 1990 mathematics assessment, including the Trial State Assessment Program, benefitted from the involvement of hundreds of representatives from state education agencies who attended numerous NETWORK meetings; served on committees; reviewed the framework, objectives, and questions; and in general, provided important suggestions on all aspects of the program.

The framework underlying the assessment is a five-by-three matrix specifying five content areas -- numbers and operations; measurement; geometry; data analysis, statistics, and probability; and algebra and functions -- and three process or ability areas. These include conceptual understanding, procedural knowledge, and problem solving (for brief descriptions, see Chapter Three).[65] TABLES A.1 and A.2 show the approximate percentage distribution of questions by content area, mathematical ability, and grade.

---

[65] *Mathematics Objectives, 1990 Assessment* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1988).

TABLE C.1 Percentage Distribution of Questions by Grade and Content Area

Content Area	Grade 4	Grade 8	Grade 12
Numbers and Operations	45	30	25
Measurement	20	15	15
Geometry	15	20	20
Data Analysis, Statistics, and Probability	10	15	15
Algebra and Functions	10	20	25

TABLE C.2 Percentage Distribution of Questions by Grade and Mathematical Ability

Mathematical Ability	Grade 4	Grade 8	Grade 12
Conceptual Understanding	40	40	40
Procedural Knowledge	30	30	30
Problem Solving	30	30	30

The 1990 mathematics assessment contained 143 questions at grade 4, with 41 of them requiring students to construct their responses. At grade 8, there were 191 questions, and 42 of them were open-ended. Similarly, twelfth graders were administered a total of 203 questions, of which 47 required constructed responses.

THE ASSESSMENT DESIGN

Each student received a booklet containing a set of general background questions, a set of subject-specific background questions, and three 15-minute segments or blocks of cognitive items. At each grade level, the mathematics assessment included 10 different blocks of multiple-choice and constructed-response content questions. Students received different blocks of cognitive items in their booklets according to a careful plan. The 1990 assessment was based on an adaptation of matrix sampling called balanced incomplete block (BIB) spiraling--a design that enables broad coverage of mathematics content while minimizing the burden for any one student. The balanced incomplete block part of the design assigns blocks of items to booklets and each pair of blocks appears together in at least one booklet. The spiraling part of the method cycles the booklets for administration, so that typically only a few students in any assessment session receive the same booklet.

Seven of the 10 blocks at each grade were assembled in accordance with this design, whereby the seven blocks were presented in seven booklets. Each block appeared in exactly three booklets, and each block appeared with every other block in at least one booklet. Students were given calculators to use with two of the seven blocks and trained in their use prior to the assessment session. At the fourth grade, students were provided with four-function calculators and at grades 8 and 12, they were provided with scientific calculators. For another one of the seven blocks, fourth-grade students were provided with a ruler, and eighth-and twelfth-grade students with a protractor/ruler.

The eighth-grade trial state assessments used the same seven grade 8 booklets as the national assessment, including the two blocks requiring scientific calculators and the one requiring a protractor/ruler. The seven blocks included 137 questions, of which 35 required constructed responses.

To provide additional information about national performance, the three remaining blocks at each grade were designed as part of a special study using a paced-audiotape format to measure students' estimation and problem-solving skills. This format provided for both an oral and written presentation of the questions. Through pilot testing, NAEP determined that, without some method of pacing, students tend to "work out" actual answers rather than to estimate their solutions, even when the directions call for estimation. The paced-audiotape format was also intended to facilitate problem solving in more complex situations, where students might have difficulty reading the information provided or might spend too little or too much time on particular questions. The three blocks accompanied by the audiotape were assembled into one booklet at each grade.

At each grade, each booklet included two student background questionnaires. The first, consisting of general background questions, included questions about race/ethnicity, mother's and father's level of education, reading materials in the home, homework, attendance, academic expectations, and which parents live at home. The second, consisting of mathematics background questions, included questions about instructional activities, courses taken, use of specialized resources such as calculators in mathematics class, and views on the utility and value of the subject matter. Students were given five minutes to complete each questionnaire, with the exception of the fourth graders, who were given longer because the items in the general questionnaire were read aloud for them.

SCHOOL AND TEACHER QUESTIONNAIRES

As part of the 1990 mathematics assessment, including the Trial State Assessment Program, questionnaires were given to the mathematics teachers of the fourth- and eighth-grade students participating in the assessment and to the principal or other administrator in each participating school. An expert panel developed guidelines for the school and teacher questionnaires focusing on six educational areas: curriculum, instructional practices, teacher qualifications, educational standards and reform, school conditions, and conditions outside of school that facilitate learning and instruction.[66] Similar to the development of the materials given to students, the policy guidelines and the teacher and school questionnaires were prepared through an iterative process that involved extensive development, field testing, and review by external advisory groups. The questionnaire for eighth-grade mathematics teachers consisted of two parts. The first requested information about the teacher, such as race/ethnicity and gender as well as academic degrees held, teaching certification, training in mathematics, and ability to get instructional resources. In the second part, teachers were asked to provide information on each class they taught that included one or more students who participated in the assessment. The information included, among other things, the amount of time spent on mathematics instruction and homework, the extent to which textbooks or worksheets were used, the instructional emphasis placed on different mathematical topics, and the use of various instructional approaches. Because the sampling for the questionnaires was based on participating students, the responses to the mathematics teacher questionnaire do not necessarily represent all fourth- or eighth-grade mathematics teachers in the nation, or all eighth-grade mathematics teachers in a state or territory. Rather, they represent teachers of the representative sample of students assessed.

The extensive school questionnaire completed by principals or other administrators in the participating schools contained questions about the individuals completing the questionnaire, school policies, course offerings, and special priority areas and resources, among other topics.

It is important to note that in this report, as in all NAEP reports, the student is always the unit of analysis, even when information from the teacher or school questionnaire is being reported. Using the student as the unit of analysis makes it possible to describe the instruction received by representative samples of students. Although this approach may provide a different perspective from that obtained by simply collecting information from teachers or schools, it is consistent with NAEP's goal of providing information about the educational context and performance of students.

NATIONAL SAMPLING

Sampling and data collection activities for the 1990 NAEP assessment were conducted by Westat, Inc. As with all NAEP national assessments, the results for the national samples were based on a stratified, three-stage sampling plan. The first stage included defining geographic primary sampling units (PSUs), which are typically groups of contiguous counties, but sometimes a single county; classifying the PSUs into strata defined by region and community type; and randomly selecting PSUs. For each grade, the second stage included listing, classifying, and randomly selecting schools, both public and private, within each PSU selected at the first stage. The third stage involved randomly selecting students within a school for participation. Some students that were selected (fewer than 6 percent) were excluded because

[66]National Assessment of Educational Progress, *1990 Policy Information Framework* (Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service, 1989).

of limited English proficiency or severe disability. In 1984, NAEP began collecting descriptive information on these excluded students in order to describe this group more fully. Further information about excluded students will be available in the *NAEP 1990 Technical Report.*

The sample at each grade consisted of two equivalent half samples. The assessment was administered to the first half sample in the January to mid-March time frame, while it was administered to the second half sample in the mid-March to mid-May time frame.

TABLE C.3 presents the students and school sample sizes and the cooperation and response rates that provide the basis for part one of this report.

TABLE C.3 Student and School Sample Sizes, 1990

Grade	Number of Participating Schools	Percent of Schools Participating	Number of Students	Percent of Student Completion
4	527	88.3	8,902	92.9
8	406	86.7	8,888	89.1
12	304	81.3	8,862	81.3
Total	1,237		26,472	

Although sampled schools that refused to participate were occasionally replaced, school cooperation rates were computed based on the schools originally selected for participation in the assessments. The rates, which are based on schools sampled for all subjects assessed in 1990 (reading, science, and mathematics), are also the best estimates for the mathematics assessment. The student completion rates represent the percentage of students assessed of those invited to be assessed in mathematics, including in follow-up sessions, when necessary. The BIB-spiraled portion of the assessment (seven blocks, seven booklets) was administered to 6,467 students at grade 4; 6,473 students at grade 8; and 6,311 students at grade 12. Of the participating schools, 790 were public schools, and 447 were Catholic and other private schools.

TRIAL STATE ASSESSMENT SAMPLING

For the 40 jurisdictions participating in the 1990 Trial State Assessment Program the basic design was to select a sample of 100 schools from each state, with a sample of 30 students drawn from each school. In states with fewer than 100 schools, all schools were included in the sample with certainty, with the exception of Wyoming, where only a sample of the state's smaller schools was drawn, the larger ones being included with certainty.

In states where a sample of schools was drawn, schools were stratified using a number of characteristics. Of the three variable types utilized in stratification, the first was urbanicity. Percentage enrollment of Black and Hispanic students was utilized when appropriate within urbanicity strata. Within these strata, schools were sorted using median household income. Special procedures were used for small schools and for identifying and including new schools in the sampling frame for each jurisdiction. To minimize the potential for nonresponse bias, substitutes for nonparticipating schools were selected on a one-by-one basis to be similar to the original school in terms of urbanicity, minority enrollment, median household income, and total eighth-grade enrollment.

A systematic equal probability sample of the desired number of students (usually 30, but sometimes more) was drawn from each school, yielding a sample size in excess of 2,500 students for each participating state and territory. The state assessments were conducted during February.

Full information about school and student participation rates for each state (including the District of Columbia) and territory is contained in Appendix B. Appendix B also contains comparable information for the national and regional subsamples used at grade 8 in Part Two of this report as a basis for comparison to states and territories. More specifically, the eighth-grade results in Part Two are based on students attending public schools (not private schools) who were assessed in the first national half sample (January to mid-March).

Though this procedure reduced the data available for the national comparison by more than half, it provides a more precise basis for comparison in terms of both the target sample of students and the time of year of the assessment. In 1992, NAEP plans to ameliorate the situation considerably by conducting the full national assessment during January to March. For 1992, the state-to-national comparisons will be based on the full national assessment sample, excluding only those students attending private schools.

DATA COLLECTION

Data collection for the 1990 assessment was conducted by a trained field staff. For the national assessment, this was accomplished by Westat staff. However, as part of the legislative requirements of the Trial State Assessment Program, the state assessments were conducted by personnel from each of the participating states. NAEP's responsibilities included selecting the sample of schools and students for each participating state, developing the administration procedures and manuals, training the personnel who would conduct the assessments, and conducting an extensive quality assurance program.

Each participating state and territory was asked to appoint a State Coordinator to be the liaison between NAEP and participating schools. The State Coordinator was asked to gain cooperation of the selected schools, assist in scheduling, provide information necessary for sampling, and notify personnel about training. At the local school level, the administrators, usually school or district staff, were responsible for attending training, identifying excluded students, distributing school and teacher questionnaires, notifying sampled students and their teachers, administering the assessment session, completing the necessary paperwork, and preparing the materials for shipment.

Westat staff trained assessment administrators within the states in six-hour sessions that included a videotape and practice exercises to provide uniformity in procedures. In all, 356 such training sessions were held, on average nine per state, with 3,463 local administrators trained.

To provide quality control across states, a randomly selected 50 percent of the state assessment sessions were monitored by Westat staff. The identity of the schools to be monitored was not revealed to state, district, or school personnel until shortly before the assessment was to commence. The analysis of the results for the unmonitored schools as compared to the monitored schools yielded no systematic differences that would suggest different procedures were used. See the *Technical Report for the 1990 Trial State Assessment* for details and results of this analysis.

SCORING

Materials from the 1990 assessment, including the Trial State Assessment, were shipped to National Computer Systems in Iowa City for processing. Receipt and quality control were managed through a sophisticated bar-coding and tracking system. After all appropriate materials were received from a school, they were forwarded to the professional scoring area, where the responses to the open-ended items were evaluated by trained staff using guidelines prepared by NAEP. Each open-ended question had a unique scoring guide that defined the criteria to be used in evaluating students' responses. For national mathematics assessment and the Trial State Assessment Program approximately 2.5 million students responses were scored, including a 20 percent reliability sample. The overall percentage of agreement between readers for both the national and Trial State Assessment reliability samples was 97 percent. Subsequent to the professional scoring, the booklets were scanned, and all information was transcribed to the NAEP database at ETS. Each processing activity was conducted with rigorous quality control.

DATA ANALYSIS AND IRT SCALING

After the assessment information had been compiled in the database, the data were weighted according to the population structure. The weighting for the national and state samples reflected the probability of selection for each student as a result of the sampling design, adjusted for nonresponse. Through poststratification, the weighting assured that the representation of certain subpopulations corresponded to figures from the U.S. Census and the Current Population Survey.[67]

Analyses were then conducted to determine the percentages of students who gave various responses to each cognitive and background question. Item response theory (IRT) was used to estimate average proficiency for the nation, various subgroups of interest within the nation, and for the states and territories.

IRT models the probability of answering an item correctly as a mathematical function of

---

[67] For additional information about the use of weighting procedures in NAEP, see Eugene G. Johnson, "Considerations and Techniques for the Analysis of NAEP Data" in Journal of Educational Statistics (December 1989).

proficiency or skill. The main purpose of IRT analysis is to provide a common scale on which performance can be compared across groups, such as those defined by grades, and subgroups, such as those defined by race/ethnicity or gender. Because of the BIB spiraling design used by NAEP, students do not receive enough questions about a specific topic to provide reliable information about individual performance. Traditional test scores for individual students, even those based on IRT, would lead to misleading estimates of population characteristics, such as subgroup means and percentages of students at or above a certain proficiency level. Instead, NAEP constructs sets of plausible values designed to represent the distribution of proficiency in the population. A plausible value for an individual is not a scale score for that individual but may be regarded as a representative value from the distribution of potential scale scores for all students in the population with similar characteristics and identical patterns of item response. Statistics describing performance on the NAEP proficiency scale are based on these plausible values. They estimate values that would have been obtained had individual proficiencies been observed -- that is, had each student responded to a sufficient number of cognitive items so that proficiency could be precisely estimated.[68]

For the 1990 mathematics assessment, NAEP first created five IRT proficiency scales ranging from 0 to 500 for each of the five content areas specified in the framework -- and an overall mathematics proficiency scale based on a composite of the content area scales weighted to reflect the distributions shown previously in TABLES A.1 and A.2. Finally, an estimation scale for national performance was created based on the estimation questions in the special paced-tape study.

As described earlier, the NAEP proficiency scales make it possible to examine relationships between students' performance and a variety of background factors measured by NAEP. The fact that a relationship exists between achievement and another variable, however, does not reveal the underlying cause of the relationship, which may be influenced by a number of other variables. Similarly, the assessments do not capture the influence of unmeasured variables. The results are most useful when they are considered in combination with other knowledge about the student population and the educational system, such as trends in instruction, changes in the school-age population, and societal demands and expectations.

LINKING THE TRIAL STATE RESULTS TO THE NATIONAL RESULTS

Although the assessment booklets used in the Trial State Assessment Program were identical to the seven booklets used in the national assessment at grade 8, the various differences between the national and trial state assessments, including those in administration procedures, required

[68]For theoretical justification of the procedures employed, see Robert J. Mislevy, ETS Research Report #88-54-ONR, *Randomization-Based Inferences About Latent Variables form Complex Samples* (Princeton, NJ: Educational Testing Service, 1988).

For computational details, see *Focusing the New Design: NAEP 1988 Technical Report* (Princeton, NJ: Educational Testing Service, National Assessment of Education Progress, 1990) and the *1990 NAEP Technical Report*.

that careful and complex equating procedures based on a special design be used to create an appropriate basis for comparison between the national and state results.

The results from the Trial State Assessment were linked to those from the national assessment through a linking function determined by comparing the results for the aggregate of students assessed in the Trial State Assessment (except those in Guam and the Virgin Islands) with the results for students in the State Aggregate Comparison subsample of the national assessment. This subsample is representative of the population of all grade-eligible public-school students within the aggregate of the 37 participating states and the District of Columbia who were assessed as part of the first January to mid-March half sample.

The linking was accomplished for each subscale by matching the mean and standard deviation of the subscale proficiencies across all students in the Trial State Assessment (excluding Guam and the Virgin Islands) to the corresponding subscale mean and standard deviation across all students in the State Aggregate Comparison subsample.

NAEP REPORTING GROUPS

This report contains results for the nation, participating states, and groups of students within the nation and states defined by shared characteristics. The definitions for subgroups as defined by race/ethnicity, size and type of community, parents' education level, gender, and region follow.

Race/Ethnicity. Results are presented for students of different racial/ethnic groups based on the students' self-identification of race/ethnicity according to the following mutually exclusive categories: White, Black, Hispanic, Asian/Pacific Islander, and American Indian (including Alaskan Native). Based on criteria described in the following section, at least 62 students in a particular subpopulation must participate in order for the results for that subpopulation to be considered reliable. State results for racial/ethnic groups with fewer than 62 students are not reported. For the nation, some racial/ethnic group results are not reported for background variables, because this further breakdown results in too few students. However, the data for all students, regardless of whether their racial/ethnic group was reported separately, were included in computing the overall national or state level results.

Type of Community. Results are provided for four mutually exclusive community types -- advantaged urban, disadvantaged urban, extreme rural, and other -- as described below.

Advantaged Urban: Students in this group reside in metropolitan statistical areas and attend schools where a high proportion of the students' parents are in professional or managerial positions.

Disadvantaged Urban: Students in this group reside in metropolitan statistical areas and attend schools where a high proportion of the students' parents are on welfare or are not regularly employed.

Extreme Rural: Students in this group do not reside in metropolitan statistical areas. They attend schools in areas with a population below 10,000 where many of the students' parents are farmers or farm workers.

Other: Students in the "Other" category attend schools in areas other than those defined as advantaged urban, disadvantaged urban, or extreme rural.

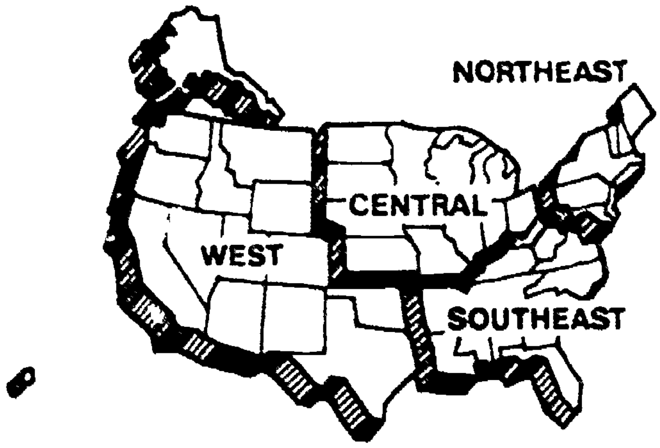
The information about parents' occupation was obtained from the Principal's Questionnaire completed by each sampled school.

The reporting of results by each type of community was also subject to a minimum student sample size of 62.

Parents' Education Level. Students were asked to indicate the extent of schooling for each of their parents -- did not finish high school, graduated high school, had some education after high school, or graduated college. The response indicating the higher level of education for either parent was selected for reporting.

Gender. Results are reported separately for males and females. Gender was reported by the student.

Region. The United States has been divided into four regions: Northeast, Southeast, Central, and West. States in each region are shown on the following map.



MINIMUM SUBGROUP SAMPLE SIZES

As described earlier, results for mathematics proficiency and background variables were tabulated and reported for groups defined by race/ethnicity and type of community, as well as by gender and parents' education level. However, in many states or territories and for some regions of the country, the number of students in some of these population subgroups was not sufficiently high to permit accurate estimation of proficiency and/or background variable results. As a result, data are not provided for the subgroups with very small sample sizes. For results to be reported for any subgroup, a minimum sample size of 62 students was required. This number was determined by computing the sample size required to detect an effect size of .2 at the 5 percent significance level, with a probability of .8 or greater.

ESTIMATING VARIABILITY

Because the statistics presented in this report are estimates of group and subgroup performance based on samples of students, rather than the values that could be calculated if every student in the nation answered every question, it is important to have measures of the degree of uncertainty of the estimates. Two components of uncertainty are accounted for in the variability of statistics based on proficiency: the uncertainty due to sampling only a relatively small number of students and the uncertainty due to sampling only a relatively small number of mathematics questions. The variability of estimates of percentages of students having certain background characteristics or answering a certain cognitive question correctly is accounted for by the first component alone.

In addition to providing estimates of percentages of students and their proficiency, this report also provides information about the uncertainty of each statistic. Because NAEP uses complex sampling procedures, conventional formulas for estimating sampling variability that assume simple random sampling are inappropriate and NAEP uses a jackknife replication procedure to estimate standard errors. The jackknife standard error provides a reasonable measure of uncertainty for any information about students that can be observed without error, but each student typically responds to so few items within any content area that the proficiency measurement for any single student would be imprecise. In this case, using plausible values technology makes it possible to describe the performance of groups and subgroups of students, but the underlying imprecision that makes this step necessary adds an additional component of variability to statistics based on NAEP proficiencies.[69]

DRAWING INFERENCES FROM THE RESULTS

The use of *confidence intervals*, based on the standard errors, provides a way to make inferences about the population means and proportions in a manner that reflects the uncertainty associated with the sample estimates. An estimated sample mean proficiency ± 2 standard errors represents a 95 percent confidence interval for the corresponding population quantity. This means that with approximately 95 percent certainty, the average performance of the entire population of interest is within ± 2 standard errors of the sample mean.

As an example, suppose that the average mathematics proficiency of students in a particular group was 256, with a standard error of 1.2. A 95 percent confidence interval for the population quantity would be as follows:

$$\text{Mean} \pm 2 \text{ standard errors} = 256 \pm 2 \bullet (1.2) = 256 \pm 2.4 =$$
$$256 - 2.4 \text{ and } 256 + 2.4 = 253.6, 258.4$$

Thus, one can conclude with 95 percent certainty that the average proficiency for the entire population of students in that group is between 253.6 and 258.4.

Similar confidence intervals can be constructed for percentages, provided that the percentages are not extremely large (greater than 90) or extremely small (less than 10). For extreme percentages, confidence intervals constructed in the above manner may not be appropriate, and procedures for obtaining accurate confidence intervals are quite complicated.

To determine whether there is a real difference between the mean proficiency (or proportion of a certain attribute) for two groups in the population, one needs to obtain an estimate of the degree of uncertainty associated with the difference between the proficiency means or proportions of these groups for the sample. This estimate of the degree of uncertainty -- called

[69]For further details, see Eugene G. Johnson, "Considerations and Techniques for the Analysis of NAEP Date" in *Journal of Educational Statistics* (December 1989)

the standard error of the difference between the groups -- is obtained by taking the square of each group's standard error, summing these squared standard errors, and then taking the square root of this sum.

Similar to the manner in which the standard error for an individual group mean or proportion is used, the standard error of the difference can be used to help determine whether differences between groups in the population are real. The difference between the mean proficiency or proportion of the two groups ± 2 standard errors of the difference represents an approximate 95 percent confidence interval. If the resulting interval includes zero, there is insufficient evidence to claim a real difference between groups in the population. If the interval does not contain zero, the difference between groups is statistically significant (different) at the .05 level.

The procedures described in this section, and the certainty ascribed to intervals (e.g., a 95 percent confidence interval) are based on statistical theory that assumes that only one confidence interval or test of statistical significance is being performed. When one considers sets of confidence intervals, like those for the average proficiency of all participating states and territories, statistical theory indicates that the certainty associated with the entire set of intervals is less than that attributable to each individual comparison from the set. If one wants to hold the certainty level for a specific set of comparisons at a particular level (e.g., .95), adjustments (called multiple-comparisons procedures) need to be made. One such procedure -- the Bonferroni method -- was used to form confidence intervals for the differences between the average proficiency of states that became the basis of the "higher than, same as, and lower than" figures in Chapter Eleven. A more detailed description of the use of the Bonferroni procedure appears in the *Technicol Report for the 1990 Trial State Assessment.*

Multiple-comparisons procedures are useful for controlling the overall error rate for a defined set of hypothesis tests. However, especially when the number of potential comparisons which could be made is large, as in NAEP data, this protection comes at the substantial loss of power in detecting specific consistent patterns in the data. For example, more powerful and commplex tests of significance designed to identify consistent patterns in the data might judge that two groups were significantly different when a Bonferroni multiple-comparisons procedure would not. For this reason, NAEP reports the occurrance of patterns in the data even when individual comparisons would not be significant when a multiple-comparisons procedure was employed.

The standard errors for means and proportions reported by NAEP are statistics and subject to a certain degree of uncertainty. In certain cases, typically when the standard error is based on a small number of students or when the group of students is enrolled in a small number of schools, the amount of uncertainty associated with the standard errors may be quite large. Throughout this report, estimates of standard errors subject to a large degree of uncertainty are designated by the symbol "!". In such cases, the standard errors -- and any confidence intervals or significance tests involving these standard errors -- should be interpreted cautiously.

Appendix D

The NAEP Scale Anchoring Process for the 1990 Mathematics Assessment and Additional Example Anchor Items

INTRODUCTION

This Appendix describes the updated anchoring process carried out for NAEP's 1990 mathematics scale. In brief, NAEP's scale anchoring procedure was based on comparing item level performance by students at four levels on the 0 to 500 overall mathematics proficiency scale--Levels 200, 250, 300, and 350. This analysis delineated four sets of anchor items that discriminated between adjacent performance levels on the scale. The four sets of empirically derived anchor items were studied by a panel of mathematics educators who carefully considered and articulated the types of knowledge, skills, and reasoning abilities demonstrated by correct responses to the items in each set. The 19 panelists and NAEP staff involved in the process worked first in two independent groups to develop descriptions. As might be expected, the two sets of descriptions were quite similar, but not identical. The panelists met subsequently as a whole to review both sets and decide how best to present the combined view of the entire group. The draft of this effort was subsequently edited, reviewed, and eventually presented in this report as FIGURE 1.1.

This appendix also contains the remaining anchor items available for public release, together with their performance results. Among other purposes, these items are presented in addition to those shown in Chapter One to help provide further support and detail for the anchor level descriptions.

THE SCALE ANCHORING ANALYSIS

NAEP's scale anchoring is grounded in an empirical process whereby the scaled assessment results are analyzed to delineate sets of items that discriminate between adjacent performance levels on the scale. For the 1990 mathematics assessment, these levels were 200, 250, 300, and 350. For these four levels, items were identified that were likely to be answered correctly by students performing at a particular level on the scale and much less likely to be answered correctly by students performing at the next lower level.

To provide a sufficient pool of respondents, students at Level 200 were defined as those whose estimated mathematics proficiency was between 187.5 and 212.5, students at 250 were defined as those with estimated proficiency between 237.5 and 262.5, those at 300 had estimated proficiencies between 287.5 and 312.5, and those at 350 between 337.5 and 362.5. In theory, proficiency levels above 350 or below 200 could have been defined; however, so few students in the assessment performed at the extreme ends of the scale that it was not possible to do so.

The 1990 mathematics scale anchoring analysis was based on the scaled proficiency results for fourth, eighth, and twelfth graders participating in the 1990 assessment. As illustrated here, ETS determined the weighted percentage and raw frequency for students at each of the four scale levels correctly answering each item. This was done for each grade level at which the item was administered, and for the grade levels combined, if the item was administered at more than one grade level. Regardless of the grade level, the data for each item were analyzed as shown in the following sample.

Sample Scale Anchoring Results				
Scale Point	200	250	300	350
Weighted P-Value	0.49	0.85	0.96	0.98
Raw Frequency	902	1555	1271	276

The percentages of students answering the item correctly at the four scale levels differ from the overall p-value for the total sample at any one grade level, although the p-values for the total sample are also provided as part of the scale anchoring analysis.

Criteria were applied to the scale-level results, and an analysis was conducted to delineate the items that discriminated between scale levels. Because it was the lowest level being defined, Level 200 did not have to be analyzed in terms of the next lower level, but was examined for the percentage of students at that level answering the item correctly. More specifically, for an item to anchor at Level 200:

1) The p-value for students at Level 200 had to be greater than or equal to 0.65.
2) The calculation of the p-value at that level had to have been based on at least 100 students.

As an example:

Level 200 Anchor Item Results				
Scale Point	200	250	300	350
Weighted P-Value	0.65	0.89	0.98	1.00
Raw Frequency	116	706	510	23

For an item to anchor at the remaining levels, additional criteria had to be met. For example, to anchor at Level 250:

1) The p-value for students at Level 250 had to be greater than or equal to 0.65.
2) The p-value for students at Level 200 had to be less than or equal to 0.50.
3) The difference between the two p-values had to be at least 0.30.
4) The calculations of the p-values at both levels 200 and 250 had to have been based on at least 100 students.

The following data set illustrates the results for a Level 250 anchor item:

Level 250 Anchor Item Results				
Scale Point	200	250	300	350
Weighted P-Value	0.38	0.75	0.89	0.98
Raw Frequency	247	569	509	83

The same principles were used to identify anchor items at Levels 300 and 350. For example:

1) The p-value at the anchor level had to be greater than or equal to 0.65.

2) The p-value at the adjacent lower level had to be less than or equal to 0.50.

3) The differences between the p-values had to be greater than or equal to 0.30.

4) The p-values at the adjacent levels being considered had to have been based on at least 100 students.

For example, the following results were obtained for an item anchoring at Level 300:

Level 300 Anchor Item Results				
Scale Point	200	250	300	350
Weighted P-Value	0.11	0.28	0.83	1.00
Raw Frequency	134	670	512	52

The results below are for an item anchoring at Level 350:

Level 350 Anchor Item Results				
Scale Point	200	250	300	350
Weighted P-Value	0.00	0.22	0.37	0.94
Raw Frequency	50	324	585	241

For any given anchor item, the students at the anchor level are likely to answer the item correctly ($p \geq .65$), while the students at the next lower level are less likely to answer the item correctly ($p \geq .30$), and those at the next lower level are somewhat unlikely to answer the item correctly ($p \leq .50$). Collectively, as identified through this procedure, the 1990 NAEP mathematics items at each anchor level represented advances in students' understandings from one level to the next -- mathematical areas where students at that level were more likely to answer items correctly than were students at the next lower level.

PREPARING FOR THE MATHEMATICS ITEM ANCHORING PANEL MEETING

The analysis procedures yielded 35 questions that anchored at Level 200, 30 questions at Level 250, 48 questions at Level 300, and 30 questions at Level 350. To provide information for cross-referencing purposes, items that almost anchored were also identified. These items fulfilled all the criteria, but one of the p-values under consideration was less than 0.05 different from the criterion value. These items included those that, because of rounding, had results that appeared to meet the criteria but were not identified in the analysis. This procedure yielded some additional items at each score point (Level 200 -- 8 items, Level 250 -- 16 items, Level 300 -- 16 items, Level 350 -- 13 items) that could be used for further context in developing descriptions. Of the 275 items used in the anchoring process, 79 did not anchor.

In preparation for use by the scale anchoring panelists, the items were placed in notebooks by section in the following order: anchored at 200, almost anchored at 200, anchored at 250, almost anchored at 250, anchored at 300, etc. Again, for further cross-referencing purposes, the remaining items in the assessment were also included in the notebook under the "did not anchor" heading. Each item was accompanied by its scoring guide (for open-ended items) and by the full anchoring documentation, which included anchoring information for each grade level at which an item was administered, the anchoring information across grades, the p-value for the total population of respondents at each grade level, and the mathematics content area and process classifications for the items.

As described in *Mathematics Objectives, 1990 Assessment*, the mathematics assessment was designed to measure five content areas, each with three ability levels. To ensure that the anchoring performance descriptions related to the assessment specifications, the items within anchor level sections in the notebooks were sorted by the five content areas--numbers and operations; measurement; geometry; data analysis, statistics, and probability; and algebra and functions. Within content area, the items were sorted by mathematical ability--procedural knowledge, conceptual understanding, and problem solving.

THE SCALE ANCHORING PANEL

Twenty mathematics educators were invited to participate in the anchoring process. They represented teachers at the various grade levels assessed, state mathematics supervisors from several of the 38 states (including Washington, D.C.) participating in the Trial State Assessment, large-city mathematics curriculum coordinators, and college mathematics professors and researchers. The group was also balanced by region of the country, race/ethnicity, and gender. One panelist was unable to attend, resulting in 19 participants.

THE PROCESS FOR DEVELOPING THE DESCRIPTIONS

The two-and-one-half day anchoring meeting began in the afternoon of the first day, when panelists were thoroughly briefed in the anchoring process and given their assignment. With the objectives for the 1990 mathematics assessment as a reference, the panelists were instructed to use the information in the anchor item notebooks to describe the mathematical knowledge, understandings, and problem-solving abilities demonstrated by the students at each anchor level in each of the five content areas. Based on the items anchoring at each anchor level (cross-referenced with "almost anchored" and "did not anchor" items), the panelists were asked to draft a description of achievement at each level in one-half page or less.

The meeting was structured so that the entire second day was devoted to the panelists working with staff in two independent groups to accomplish this task. In each of the independent groups, panelists and staff worked together to analyze the knowledge, skills, and reasoning abilities required by each item, and lists portraying these for each mathematics content area at each anchor level were developed. Based on the two independent question-by-question analyses, each separate group of panelists then continued to work independently to draft a description of performance for each anchor level.

On the third day, panelists and staff met as a whole to combine the two independently derived sets of descriptions. They also worked on developing short titles or descriptors for each category and selecting example items to accompany the anchor- level descriptions. Finally, the panelists were asked to discuss and indicate where the material at the four levels might generally occur in the typical K-12 curriculum.

Both groups agreed that the two drafts were very similar and that with some final review and editing, either set would have appropriately described the anchor item information. However, they viewed the cross-validation process and the fact that more people were able to participate in the process as helpful. As the groups worked through the two descriptions, they identified preferences for some parts of each of the descriptions, resolved some issues, and made some formatting decisions. The combined set of descriptions was checked by staff against the anchoring data, edited, and sent to the panelists for final review.

REPORTING THE ANCHOR ITEM RESULTS

Because some items are not disclosed because they will be used in future assessments to measure trends in performance across time, not all of the anchor items are shown here. However, the panelists decided that in addition to the seven or eight items (at least one from each of the five mathematics content areas, if possible) selected to accompany the descriptions in the main body of the report, the remaining anchor items available for public release should also be contained in an appendix.

The panelists also decided that each anchor item in the report should, for each grade level at which it was administered, be accompanied by the overall percentage of success on the item as well as the anchor-level information for each grade at which it was administered. This information should help prevent confusion between the percentages of success on the individual anchor items illustrating particular levels on the scale and the percentage of students who perform at or above each scale level.

Additional Example Anchor Items

Level 200

Example

Grade 4: 82% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
80	87	100	--

Multiply: 43 × 67

Answer: 2,881

Did you use the calculator on this question?

Yes No

Example

Grade 4: 81% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
74	94	100	--

Which number is the GREATEST?

A 2,573

B 2,537

C 2,753

D 2,735

E I don't know.

Example

Grade 8: 82% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
65	83	88	100

Which number is a common factor of 10 and 15?

A 5

B 10

C 15

D 30

E 150

F I don't know.

Level 200 (continued)

Example

$(150 \div 3) + (6 \times 2) =$

A 10

B 58

C 62

D 112

Did you use the calculator on this question?

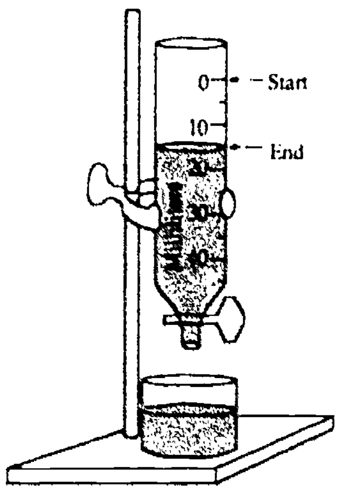
Yes No

Grade 8: 94% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
83	94	97	100

Example



In the figure above, the tube was filled to the 0 mark at the start
How much liquid has been let out?

A 10 milliliters

B 15 milliliters

C 25 milliliters

D 40 milliliters

E 50 milliliters

Grade 8: 92% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
67	92	99	100

Grade 12: 96% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
72	90	98	100

Level 200 (continued)

Example

Grade 4: 80% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
75	94	100	--

Which of the following is the most reasonable distance for a person to walk in one hour?

(A) 2 miles

B 2 yards

C 2 inches

D 2 feet

Example

Grade 4: 81% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
74	95	100	--

Which is worth the most?

A 35 pennies

B 1 quarter

(C) 4 dimes

D I don't know.

Example

Grade 8: 90% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
65	89	98	100

Which unit would you use to measure the length of a pencil?

(A) centimeter

B meter

C kilometer

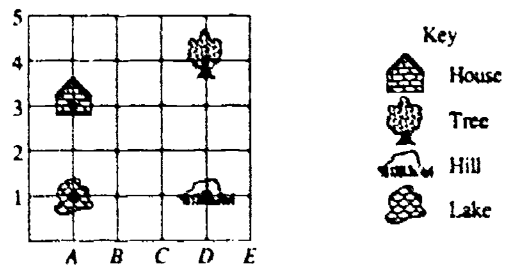
D I don't know

Example

Grade 4: 90% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
89	98	93	--



On the map above, which ordered pair gives the location of the house?

A (D,1)

B (D,4)

C (A,1)

D (A,3)

Example

Grade 4: 94% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
93	99	100	--

$$3 + \square = 7$$

What number should go in the box to make this number sentence TRUE?

Answer: 4

Level 250

Example

Grade 4: 51% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
33	81	100	--

If the sum of 39 and 66 is divided by 3, the result is

A 35

B 61

C 79

D 315

Did you use the calculator on this question?

Yes No

Example

Grade 4: 52% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
40	78	100	--

When you subtract one of these numbers from 900, the answer is greater than 400. Which number is it?

A 712

B 667

C 579

D 459

Example

Grade 4: 61% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
49	84	100	--

By how much would the value of 5,647 be decreased if the 5 were replaced by a 2?

A 3

B 300

C 3,000

D 30,000

Example

Grade 4: 45% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
29	75	100	--

Carol buys a ball for 55 cents and a game for 37 cents. How much change should she get back from $1.00?

A 8 cents

B 18 cents

C 45 cents

D 63 cents

E 92 cents

F I don't know.

Example

Grade 4: 47% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
28	76	71	--

A class is trying to collect 450 soup can labels to help get some new gym equipment. In the first week the students collected 60 labels, and in the second week they collected 82 labels. How many more labels do they need to reach their goal?

A 208

B 308

C 390

D 592

Example

Grade 4: 60% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
49	82	100	--

On a flight from Los Angeles to New York, the cost of a fare was $400. Every seat was sold. What additional information do you need to find the total for all fares?

A None

B The number of employees on the plane

C The number of passenger seats on the plane

D The distance from Los Angeles to New York

Did you use the calculator on this question?

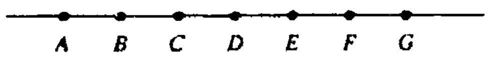
Yes No

Example

Grade 4: 60% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
45	86	94	--



In the figure above, points labeled *A* through *G* are spaced evenly along a line. Which of the following distances is the greatest?

A From *A* to *D*

B From *C* to *F*

C From *E* to *G*

D From *E* to *A*

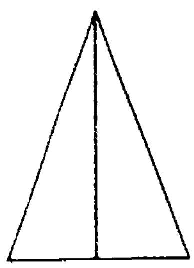
Example

Grade 4: 43% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
32	68	95	--

Draw a line of symmetry on the triangle below.

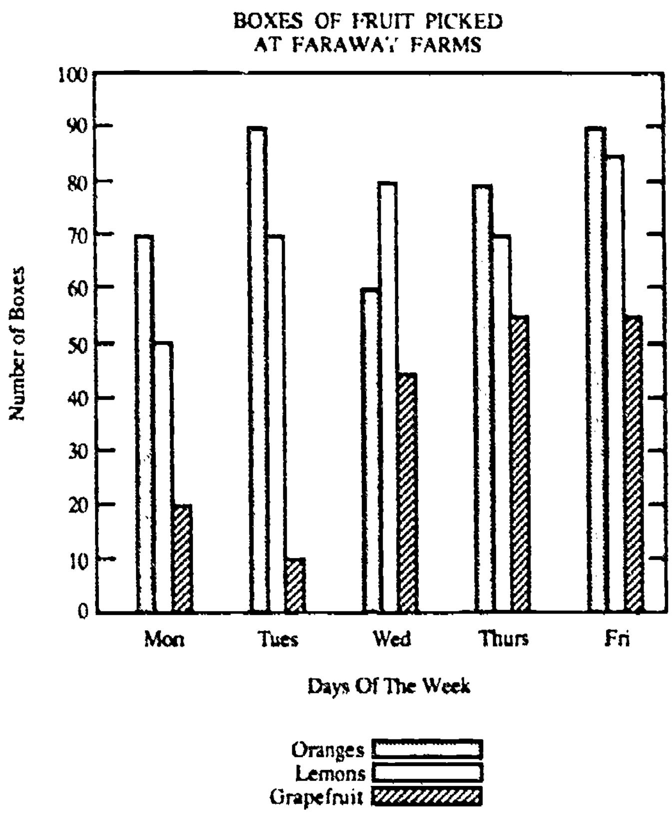


Did you use the calculator on this question?

Yes No

Level 250 (continued)

Example



Grade 4: 42% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
26	73	100	--

Grade 8: 74% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
33	69	93	100

On which day were more boxes of lemons picked than either boxes of oranges or boxes of grapefruit?

A Monday

B Tuesday

C Wednesday

D Thursday

E Friday

F No day

G I don't know.

Level 300

Example

Grade 8: 50% Correct Overall

<u>**Percent Correct for Anchor Levels**</u>

200	250	300	350
16	37	76	100

Write this number as a decimal.

$3\frac{3}{10}$ = 3.3

Example

Grade 12: 75% Correct Overall

<u>**Percent Correct for Anchor Levels**</u>

200	250	300	350
46	43	85	99

What is $\frac{2}{3}$ of 15 marbles?

A 10 marbles

B 9 marbles

C 8 marbles

D 5 marbles

Did you use the calculator on this question?

Yes No

Example

Grade 8: 54% Correct Overall

<u>**Percent Correct for Anchor Levels**</u>

200	250	300	350
13	35	88	95

Which number is between .07 and .08 ?

A .008

B .06

C .075

D .75

E I don't know.

Example

Grade 8: 55% Correct Overall

Percent Correct for Anchor Levels			
200	250	300	350
39	44	76	100

Which of the following is true about 125% of 10?

A It is greater than 10.

B It is less than 10.

C It is equal to 10.

D Can't tell.

E I don't know.

Example

Grade 12: 75% Correct Overall

Percent Correct for Anchor Levels			
200	250	300	350
32	34	85	99

Which of the following is true about 87% of 10 ?

A It is greater than 10.

B It is less than 10.

C It is equal to 10.

D Can't tell.

E I don't know.

Example

Grade 12: 76% Correct Overall

Percent Correct for Anchor Levels			
200	250	300	350
40	43	85	97

Which number is between 1.2 and 1.3 ?

A .123

B .132

C 1.23

D 1.32

E I don't know.

Level 300 (continued)

Example

Grade 8: 49% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
11	28	83	100

The weight of an object on the Moon is $\frac{1}{6}$ the weight of that object on the Earth. An object that weighs 30 pounds on Earth would weigh how many pounds on the Moon?

Answer: 5

Did you use the calculator on this question?

Yes No

Example

Grade 8: 51% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
32	38	71	89

One liter is how many milliliters?

A 10

B 100

C 1000

D I don't know.

Example

Grade 12: 69% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
75	42	72	95

A meter is CLOSEST in length to which one of the following?

A A foot

B An inch

C A mile

D A yard

E I don't know.

Level 300 (continued)

Example

Grade 12: 68% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
17	30	79	99

A triangle has a 120° angle. Indicate whether each of the following MUST be true, MAY be true, or CANNOT be true about the triangle.

The triangle is a right triangle.

A Must be true.

B May be true.

C Cannot be true.

D I don't know.

Example

Grade 8: 61% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
14	49	90	100

Here are the ages of five children:

13, 8, 6, 4, 4

What is the average age of these childrer

A 4

B 6

C 7

D 8

E 9

F 13

G I don't know.

Level 300 (continued)

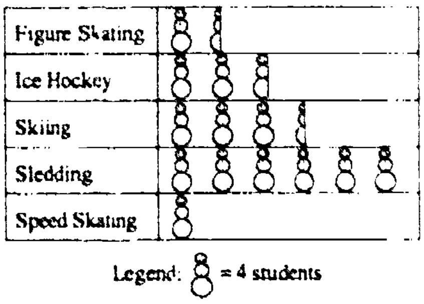
Example

Grade 12: 67% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
00	33	74	94

FAVORITE WINTER SPORTS
OF EIGHTH GRADE STUDENTS



According to the graph above, about how many students chose skiing as their favorite winter sport?

A $3\frac{1}{2}$

B 4

C $12\frac{1}{2}$

D 14

E 16

Did you use the calculator on this question?

Yes No

Example

Grade 8: 48% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
13	28	77	97

Grade 12: 68% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
36	33	77	97

The average weight of 50 prize-winning tomatoes is 2.36 pounds. What is the combined weight, in pounds, of these 50 tomatoes?

A 0.0472

B 11.8

C 52.36

D 59

E 118

Example

What is the least whole number x for which $2x > 11$?

A 5

B 6

C 9

D 22

E 23

Grade 8: 45% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
15	29	68	100

Grade 12: 65% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
11	30	71	96

Example

$2x + 3y + 4x =$

A $9xy$

B $9x^2y$

C $5xy + 4x$

D $6x + 3y$

E I don't know.

Grade 8: 38% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
15	19	69	100

Grade 12: 79% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
00	47	92	99

Example

Grade 8: 44% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
20	24	80	100

Which of the following sentences is true when any number is substituted for x?

A $x + 1 = x$

B $x + 0 = 0$

C $x \cdot 1 = 1$

D $x \cdot 1 = x$

E I don't know.

Level 300 (continued)

Example

Grade 12: 49% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
36	26	44	89

What percent of 175 is 7 ?

A 4%

B 12.25%

C 25%

D 40%

Did you use the calculator on this question?

Yes No

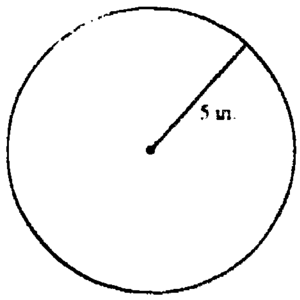
Level 350

Example

Grade 12: 31% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
00	08	24	83



Which measurement is closest to the circumference of this circle?

A 10 inches

B 15 inches

C 20 inches

D 25 inches

E 30 inches

F I don't know.

Example

Grade 8: 25% Correct Overall

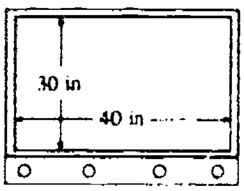
Percent Correct for Anchor Levels

200	250	300	350
09	13	42	81

Grade 12: 43% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
00	18	35	98



What is the diagonal measurement of the TV screen shown in the figure above?

A 25 inches

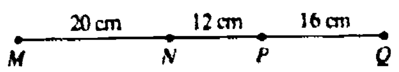
B 35 inches

C 50 inches

D 70 inches

E 1,200 inches

Example



What is the distance between the midpoint of MN and the midpoint of PQ shown above?

A 18 cm

B 24 cm

C 26 cm

D 28 cm

E 30 cm

Grade 8: 30% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
13	18	48	91

Grade 12: 47% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
00	12	49	94

Example

The length of a rectangle is 3 more than its width. If L represents the length, what is an expression for the width?

A $3 \div L$

B $L \div 3$

C $L \times 3$

D $L + 3$

E $L - 3$

Grade 8: 15% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
03	05	31	57

Grade 12: 27% Correct Overall

Percent Correct for Anchor Levels

200	250	300	350
00	05	24	68

Appendix E

National Data Appendix

GRADE 4 - OVERALL MATHEMATICS PROFICIENCY PERCENTAGE OF STUDENTS AT OR ABOVE ANCHOR POINTS

	N	WEIGHTED PCT [CV]	200	250	300	350
-- TOTAL --	6467	100.0(0.0) [0%]	71.8(1.1)	11.0(0.6)	0.0(0.0)	0.0(0.0)
SEX						
MALE	3349	51.7(0.6) [1%]	72.6(1.3)	11.7(0.8)	0.0(0.0)	0.0(0.0)
FEMALE	3118	48.3(0.6) [1%]	71.0(1.3)	10.2(0.7)	0.0(0.0)	0.0(0.0)
RACE/ETHNICITY						
WHITE	3794	70.2(0.1) [0%]	81.4(1.2)	14.1(0.9)	0.0(0.0)	0.0(0.0)
BLACK	1120	15.3(0.1) [1%]	40.5(2.1)	1.4(0.4)	0.0(0.0)	0.0(0.0)
HISPANIC	1154	10.7(0.1) [1%]	51.7(2.5)	3.1(0.8)	0.0(0.0)	0.0(0.0)
ASIAN/PACIFIC ISLANDER	228	2.0(0.3) [14%]	85.0(3.3)	22.5(4.6)	0.0(0.0)	0.0(0.0)
AMER IND/ALASKAN NATV	158	1.7(0.3) [16%]	65.7(5.1)	3.4(2.1)	0.0(0.0)	0.0(0.0)
REGION						
NORTHEAST	1331	21.6(0.8) [4%]	75.7(2.3)	13.4(1.3)	0.1(0.0)	0.0(0.0)
SOUTHEAST	1642	24.4(0.8) [4%]	62.0(2.6)	7.0(1.1)	0.0(0.0)	0.0(0.0)
CENTRAL	1478	25.8(0.6) [3%]	75.7(1.7)	10.3(1.0)	0.0(0.0)	0.0(0.0)
WEST	2016	28.2(0.6) [2%]	73.7(2.5)	13.1(1.4)	0.0(0.0)	0.0(0.0)
AGE						
BELOW MODAL AGE	24	0.4(0.1) [24%]!	72.3(10.0)	7.3(8.0)	0.0(0.0)	0.0(0.0)
AT MODAL AGE	4034	59.5(1.0) [2%]	77.7(1.3)	13.2(0.8)	0.0(0.0)	0.0(0.0)
ABOVE MODAL AGE	2409	40.1(1.0) [3%]	62.9(1.7)	7.7(0.9)	0.0(0.0)	0.0(0.0)
TYPE OF COMMUNITY						
EXTREME RURAL	450	10.8(1.4) [13%]	77.8(3.3)	8.6(2.3)	0.0(0.0)	0.0(0.0)
DISADVANTAGED URBAN	783	9.4(1.2) [13%]	49.6(4.2)	3.4(1.0)	0.0(0.0)	0.0(0.0)
ADVANTAGED URBAN	820	11.5(1.9) [16%]	88.6(2.3)	23.1(2.6)	0.1(0.0)	0.0(0.0)
OTHER	4414	68.3(2.7) [4%]	71.0(1.5)	10.3(0.7)	0.0(0.0)	0.0(0.0)
PARENTS' EDUCATION LEVEL						
LESS THAN H.S.	298	5.3(0.3) [6%]	59.2(4.7)	3.4(1.3)	0.0(0.0)	0.0(0.0)
GRADUATED H.S.	883	14.9(0.7) [5%]	68.3(2.5)	5.6(1.0)	0.0(0.0)	0.0(0.0)
SOME EDUC AFTER H.S.	501	8.2(0.4) [5%]	84.4(2.0)	19.2(2.9)	0.2(0.0)	0.0(0.0)
GRADUATED COLLEGE	2428	36.0(1.0) [3%]	78.8(1.1)	17.6(1.2)	0.0(0.0)	0.0(0.0)
UNKNOWN	2327	35.1(1.0) [3%]	65.2(1.8)	5.7(0.6)	0.0(0.0)	0.0(0.0)
TYPE OF SCHOOL						
PUBLIC	5080	87.9(1.2) [1%]	70.0(1.3)	10.0(0.8)	0.0(0.0)	0.0(0.0)
PRIVATE	1387	12.1(1.2) [10%]	85.0(2.3)	17.7(2.0)	0.1(0.0)	0.0(0.0)
ABILITY OF STUDENTS IN CLASS						
HIGH ABILITY	467	7.1(1.1) [15%]	92.2(2.3)	39.8(4.9)	0.1(0.0)	0.0(0.0)
AVERAGE ABILITY	1616	24.0(1.4) [6%]	75.3(1.8)	10.1(1.1)	0.0(0.0)	0.0(0.0)
LOW ABILITY	645	9.0(1.1) [12%]	48.7(3.3)	4.1(1.4)	0.0(0.0)	0.0(0.0)
MIXED ABILITY	1918	30.8(2.2) [7%]	73.8(1.8)	10.0(1.0)	0.0(0.0)	0.0(0.0)

! INTERPRET WITH CAUTION: SAMPLING ERROR CANNOT BE ESTIMATED ACCURATELY SINCE COEFFICIENT OF VARIATION OF ESTIMATED NUMBER OF STUDENTS EXCEEDS 20%

GRADE 4 - OVERALL MATHEMATICS PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	215.8(0.7)	28.1(0.3)	168.4(1.1)	179.0(1.4)	197.1(1.2)	216.8(0.8)	235.1(0.6)	251.4(0.9)	260.8(0.9)
SEX									
MALE	216.7(0.8)	28.4(0.5)	167.9(1.6)	179.1(1.6)	197.8(1.1)	218.0(1.2)	236.2(0.9)	252.3(1.3)	261.3(1.4)
FEMALE	214.9(0.8)	27.6(0.5)	168.7(1.7)	179.0(1.4)	196.6(1.1)	215.3(0.8)	233.9(1.4)	250.3(1.1)	260.3(1.3)
RACE/ETHNICITY									
WHITE	222.7(0.7)	25.4(0.4)	180.2(1.9)	189.9(1.4)	205.7(1.3)	223.0(0.9)	239.9(0.9)	255.1(1.0)	263.7(1.6)
BLACK	194.1(1.3)	25.3(0.7)	152.1(2.1)	162.6(3.5)	177.1(1.7)	194.5(1.3)	211.0(1.0)	226.2(1.4)	235.4(1.8)
HISPANIC	200.5(1.4)	27.4(0.9)	154.4(3.7)	165.5(1.6)	182.2(2.2)	201.2(1.5)	219.2(1.9)	236.0(1.7)	245.4(3.2)
ASIAN/PACIFIC ISLANDER	228.2(2.8)	27.4(1.6)	180.8(4.7)	191.2(5.1)	210.0(7.3)	229.3(6.2)	247.8(4.0)	263.2(3.7)	269.5(2.4)
AMER IND/ALASKAN NATV	210.5(2.5)	23.8(1.5)	171.1(4.7)	179.4(3.6)	193.2(2.5)	211.0(4.1)	228.8(2.4)	239.6(1.5)	245.8(7.7)
REGION									
NORTHEAST	219.2(1.7)	28.1(0.9)	171.5(5.0)	182.2(3.1)	200.8(1.9)	220.6(1.3)	238.0(1.9)	254.7(2.0)	263.9(1.8)
SOUTHEAST	208.7(1.6)	28.1(0.6)	163.4(2.3)	173.1(2.9)	189.6(2.7)	209.0(2.0)	228.4(1.6)	244.8(1.4)	254.2(2.7)
CENTRAL	217.5(1.3)	26.9(0.8)	170.4(3.3)	182.1(4.1)	200.7(2.0)	218.7(1.1)	236.0(1.3)	250.7(2.0)	259.5(1.8)
WEST	217.8(1.8)	28.1(0.7)	170.9(2.1)	181.2(2.4)	198.9(2.4)	218.2(2.3)	237.2(1.6)	254.1(1.6)	263.4(3.1)
AGE									
BELOW MODAL AGE	212.9(5.0)	25.8(4.3)	164.6(12.8)	175.4(9.4)	196.2(5.6)	212.0(7.2)	236.2(34.3)	241.1(10.0)	248.4(8.3)
AT MODAL AGE	220.2(0.7)	26.9(0.5)	174.4(1.7)	185.5(1.6)	202.3(1.0)	220.9(1.0)	238.6(0.7)	254.3(0.8)	263.3(1.1)
ABOVE MODAL AGE	209.4(1.1)	28.5(0.6)	162.9(1.4)	172.7(1.1)	189.4(1.6)	210.3(1.2)	229.0(1.3)	245.8(1.5)	256.0(1.9)
TYPE OF COMMUNITY									
EXTREME RURAL	217.9(2.3)	24.2(1.1)	175.5(2.9)	186.1(3.9)	202.5(1.8)	219.5(3.7)	233.5(1.7)	248.1(4.1)	256.2(3.1)
DISADVANTAGED URBAN	200.0(2.7)	28.2(1.1)	153.6(3.5)	164.2(2.5)	181.0(3.4)	199.8(2.3)	219.3(3.7)	236.4(2.8)	245.8(1.9)
ADVANTAGED URBAN	231.0(2.2)	25.2(1.2)	186.8(4.8)	198.0(3.3)	215.4(2.7)	232.0(1.9)	248.6(1.9)	261.8(2.4)	269.7(2.7)
OTHER	215.1(0.9)	27.8(0.4)	169.0(1.2)	178.9(1.5)	196.6(1.1)	215.6(0.8)	234.2(1.1)	250.4(1.3)	260.3(1.0)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	205.2(2.0)	25.6(1.1)	162.0(4.5)	172.8(3.3)	187.7(3.9)	205.7(2.1)	223.0(2.1)	237.3(3.2)	244.8(2.[illegible])
GRADUATED H.S.	211.3(1.2)	25.4(0.8)	167.8(1.9)	178.8(2.2)	194.8(1.7)	212.9(2.2)	228.3(1.6)	242.9(2.3)	251.9(3.0)
SOME EDUC AFTER H.S.	226.5(1.6)	27.2(1.0)	179.4(2.4)	192.5(3.6)	209.0(2.0)	227.9(1.2)	245.2(1.5)	259.7(2.5)	269.0(4.0)
GRADUATED COLLEGE	222.9(0.9)	28.6(0.4)	172.8(2.0)	184.3(1.6)	204.0(1.2)	224.5(1.2)	243.3(1.4)	258.7(0.9)	267.2(2.0)
UNKNOWN	209.7(0.9)	26.6(0.5)	165.0(1.7)	175.1(1.4)	191.9(1.9)	210.7(1.3)	228.3(0.9)	242.7(1.5)	251.6(2.6)
TYPE OF SCHOOL									
PUBLIC	214.4(0.9)	28.1(0.4)	167.1(1.3)	177.6(1.2)	195.6(1.0)	215.3(0.9)	233.6(0.7)	250.0(1.2)	259.7(1.7)
PRIVATE	226.5(1.8)	25.5(0.8)	183.0(2.9)	193.1(2.8)	209.8(2.1)	227.0(1.8)	244.3(1.2)	258.7(1.9)	267.0(2.4)
ABILITY STUDENTS IN CLASS									
HIGH ABILITY	240.4(3.0)	26.0(1.1)	193.7(5.6)	204.9(4.6)	223.3(2.7)	242.1(4.6)	259.7(2.6)	271.1(2.7)	279.2(10.8)
AVERAGE ABILITY	217.0(1.1)	26.3(0.8)	172.8(3.1)	182.8(2.5)	200.3(1.3)	218.2(1.8)	234.5(0.9)	250.0(1.2)	258.6(1.9)
LOW ABILITY	200.5(1.9)	27.5(1.3)	157.3(2.3)	166.4(2.3)	182.0(2.0)	199.2(1.6)	218.5(3.4)	236.4(1.7)	247.1(3.1)
MIXED ABILITY	216.7(1.3)	26.6(0.7)	171.0(2.0)	181.1(2.6)	199.1(1.4)	218.0(1.8)	235.2(1.6)	250.0(1.8)	259.7(1.7)

GRADE 4 - NUMBERS AND OPERATIONS PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	212.9(0.8)	33.2(0.4)	157.5(1.5)	169.7(1.5)	190.7(1.3)	214.1(0.9)	235.7(0.8)	254.6(1.0)	265.9(1.1)
SEX									
MALE	213.3(1.0)	33.6(0.7)	156.4(2.5)	169.2(2.3)	190.8(1.4)	214.8(1.2)	236.4(1.6)	255.0(1.2)	266.7(1.2)
FEMALE	212.5(0.9)	32.7(0.7)	158.5(2.5)	170.3(2.0)	190.6(1.3)	213.2(0.8)	234.7(1.2)	254.2(2.0)	265.1(1.1)
RACE/ETHNICITY									
WHITE	219.6(0.9)	31.0(0.5)	167.5(2.0)	179.6(1.4)	199.0(1.7)	220.0(1.0)	240.9(1.0)	258.9(1.2)	269.7(1.1)
BLACK	192.1(1.6)	31.2(0.9)	140.8(4.1)	152.4(3.2)	171.4(2.6)	191.5(2.0)	213.8(1.8)	232.1(1.3)	243.7(5.2)
HISPANIC	197.5(1.5)	32.7(1.1)	142.5(2.9)	155.8(4.1)	176.0(2.0)	197.1(1.5)	220.2(2.8)	239.4(2.0)	249.3(3.2)
ASIAN/PACIFIC ISLANDER	225.9(3.1)	32.1(1.9)	171.8(6.4)	183.2(3.6)	205.7(3.7)	226.7(3.8)	248.2(3.3)	267.3(5.2)	277.0(5.5)
AMER IND/ALASKAN NATV	206.2(3.2)	29.2(2.1)	160.8(9.9)	168.9(10.4)	185.6(4.3)	206.1(2.2)	227.7(3.9)	243.4(3.0)	251.8(4.0)
REGION									
NORTHEAST	216.5(1.8)	32.5(1.0)	161.2(4.2)	173.9(2.5)	195.6(3.0)	217.0(2.6)	239.0(2.5)	257.5(1.4)	268.6(1.6)
SOUTHEAST	206.3(1.8)	33.6(0.8)	151.1(3.0)	163.7(2.0)	182.8(2.2)	206.4(3.3)	229.9(1.8)	250.2(1.7)	260.1(2.3)
CENTRAL	214.1(1.6)	31.9(0.8)	159.2(2.9)	172.1(5.3)	194.0(2.9)	215.5(2.6)	236.2(2.0)	253.4(3.3)	264.2(2.6)
WEST	214.7(2.0)	33.6(0.7)	159.0(2.8)	171.5(3.2)	191.7(2.0)	215.5(2.9)	237.6(2.1)	257.7(3.0)	270.3(2.1)
AGE									
BELOW MODAL AGE	211.7(7.0)	33.2(4.2)	145.3(14.6)	165.7(6.4)	194.2(29.3)	215.0(6.6)	239.7(31.1)	251.9(8.0)	255.0(4.9)
AT MODAL AGE	217.7(0.9)	32.0(0.6)	163.8(2.2)	176.7(1.3)	196.6(1.2)	218.2(1.5)	239.7(0.9)	258.1(1.2)	269.2(1.0)
ABOVE MODAL AGE	205.8(1.2)	33.6(0.8)	151.0(2.7)	162.5(1.8)	182.6(1.9)	206.1(2.3)	229.4(1.9)	248.2(1.4)	259.8(2.2)
TYPE OF COMMUNITY									
EXTREME RURAL	214.6(2.4)	30.0(1.4)	163.5(2.7)	174.5(3.4)	195.0(1.9)	216.3(1.8)	235.4(2.5)	252.2(2.3)	261.4(2.8)
DISADVANTAGED URBAN	198.5(2.7)	32.9(1.2)	144.6(5.6)	155.7(2.7)	176.6(2.8)	198.5(3.1)	221.3(3.7)	241.3(3.0)	250.9(2.1)
ADVANTAGED URBAN	228.4(2.1)	30.8(1.0)	175.7(7.5)	188.7(4.0)	209.1(4.2)	229.1(1.9)	248.9(2.0)	267.5(2.2)	278.3(4.7)
OTHER	212.0(1.0)	33.0(0.5)	157.3(2.5)	169.4(2.6)	190.0(1.8)	212.7(1.3)	234.5(0.8)	253.7(1.1)	265.1(0.9)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	201.6(2.2)	30.9(1.4)	151.0(5.3)	161.9(3.3)	180.2(4.2)	201.5(2.5)	223.4(2.4)	242.4(6.6)	251.5(2.6)
GRADUATED H.S.	208.2(1.6)	30.4(1.1)	157.6(11.6)	168.6(1.9)	188.1(3.1)	209.6(3.7)	229.0(2.1)	246.2(3.1)	257.1(2.7)
SOME EDUC AFTER H.S.	225.1(1.8)	32.0(1.2)	172.6(4.6)	182.9(3.1)	204.1(3.4)	226.7(2.7)	246.4(2.1)	265.1(2.9)	276.5(4.1)
GRADUATED COLLEGE	220.4(1.0)	33.8(0.6)	161.8(2.3)	175.7(1.2)	198.0(2.0)	222.1(1.0)	244.3(1.2)	262.4(1.6)	273.1(1.3)
UNKNOWN	206.2(1.1)	31.7(0.7)	153.3(1.8)	164.7(1.7)	185.4(1.6)	207.2(1.6)	227.9(1.3)	246.0(1.5)	256.3(1.0)
TYPE OF SCHOOL									
PUBLIC	211.4(1.0)	33.2(0.5)	156.1(1.4)	168.2(1.4)	189.2(1.6)	212.4(1.5)	234.0(0.9)	253.1(1.1)	264.4(1.2)
PRIVATE	223.9(1.8)	31.0(1.1)	171.8(4.3)	183.9(2.3)	203.4(2.6)	224.5(1.8)	245.3(2.0)	262.7(2.1)	273.1(2.4)
ABILITY STUDENTS IN CLASS									
HIGH ABILITY	238.2(3.6)	31.4(1.4)	181.3(9.6)	195.9(9.8)	217.9(2.9)	240.9(3.9)	260.7(3.7)	277.1(5.2)	286.0(4.5)
AVERAGE ABILITY	213.8(1.3)	31.6(0.8)	161.3(2.0)	173.3(3.1)	193.2(2.2)	214.8(1.6)	234.9(1.4)	253.3(1.1)	263.8(2.1)
LOW ABILITY	197.5(2.3)	32.6(1.5)	145.1(4.5)	157.5(3.3)	176.5(2.2)	196.5(1.7)	219.3(3.8)	239.6(5.1)	251.7(3.3)
MIXED ABILITY	213.7(1.5)	32.1(0.9)	159.7(3.5)	171.3(3.6)	192.5(1.9)	214.7(1.6)	236.4(1.8)	254.0(1.7)	265.3(3.2)

GRADE 4 - MEASUREMENT PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	221.5(0.8)	33.8(0.4)	164.6(1.7)	177.3(1.2)	199.4(0.7)	222.4(1.3)	244.4(1.2)	264.3(1.8)	276.3(1.1)
SEX									
MALE	224.6(0.9)	33.8(0.6)	166.9(1.5)	180.2(1.6)	202.4(1.1)	225.8(1.5)	247.4(1.3)	267.6(1.3)	279.7(1.9)
FEMALE	218.3(1.1)	33.4(0.5)	162.1(1.9)	174.4(1.4)	196.4(1.1)	218.9(1.2)	241.0(1.0)	260.2(1.7)	272.3(2.6)
RACE/ETHNICITY									
WHITE	229.3(0.9)	30.7(0.4)	177.8(2.2)	189.9(1.1)	208.9(1.1)	229.6(1.1)	250.0(1.1)	269.1(1.4)	280.6(2.3)
BLACK	195.4(1.8)	31.3(1.0)	144.0(3.4)	155.5(4.0)	175.1(2.1)	195.3(2.3)	216.5(2.9)	235.2(2.7)	246.2(2.6)
HISPANIC	206.1(1.7)	32.8(1.1)	150.7(2.1)	162.9(2.9)	183.7(1.6)	206.8(2.6)	228.7(2.3)	247.6(3.3)	259.7(2.7)
ASIAN/PACIFIC ISLANDER	234.0(4.3)	32.2(3.0)	178.5(4.1)	191.3(11.9)	212.0(7.0)	235.2(5.0)	256.6(2.6)	275.6(2.7)	282.6(3.7)
AMER IND/ALASKAN NATV	216.7(3.4)	29.5(2.3)	166.5(6.1)	175.5(7.8)	195.2(7.3)	217.8(5.8)	239.8(6.1)	253.1(4.5)	261.1(6.2)
REGION									
NORTHEAST	223.5(1.6)	34.4(0.9)	165.2(5.1)	178.0(4.3)	200.6(2.3)	224.5(2.1)	246.7(1.3)	267.3(1.8)	279.5(4.1)
SOUTHEAST	213.1(1.7)	33.6(1.0)	157.5(3.3)	169.9(3.0)	190.6(4.1)	213.8(1.8)	235.7(1.1)	255.5(2.1)	267.5(2.4)
CENTRAL	224.9(1.5)	33.3(0.9)	167.7(4.7)	181.5(2.7)	203.6(2.2)	226.6(2.0)	247.6(2.3)	266.4(2.5)	277.5(2.1)
WEST	224.3(2.1)	32.6(0.8)	169.2(2.2)	181.7(2.2)	202.5(3.3)	224.8(2.4)	246.4(2.5)	265.9(3.4)	278.0(2.1)
AGE									
BELOW MODAL AGE	212.2(7.4)	28.4(5.3)	174.6(15.4)	179.7(12.8)	193.2(8.8)	209.3(13.7)	229.8(18.9)	249.1(28.8)	267.3(9.7)
AT MODAL AGE	225.4(1.0)	32.8(0.5)	169.9(1.7)	182.0(1.7)	203.9(1.1)	226.5(1.5)	247.6(1.1)	267.0(1.4)	278.1(1.1)
ABOVE MODAL AGE	215.9(1.3)	34.4(0.7)	158.5(1.7)	171.0(2.7)	193.1(1.9)	216.4(1.6)	239.1(1.1)	259.8(1.9)	272.4(2.6)
TYPE OF COMMUNITY									
EXTREME RURAL	225.4(2.7)	29.9(1.2)	174.7(5.8)	186.8(3.6)	206.1(3.0)	225.4(2.1)	245.2(4.7)	263.4(2.4)	274.4(7.7)
DISADVANTAGED URBAN	203.5(3.1)	34.9(1.1)	146.4(3.5)	158.4(3.9)	180.0(3.5)	203.5(4.4)	227.6(5.2)	247.2(2.2)	260.5(8.3)
ADVANTAGED URBAN	238.1(2.7)	30.4(1.2)	188.5(4.6)	198.6(3.8)	217.5(2.7)	238.2(5.9)	259.2(2.6)	277.5(3.1)	286.5(4.0)
OTHER	220.6(1.1)	33.3(0.6)	164.7(1.9)	177.0(2.0)	198.6(1.1)	221.3(1.4)	243.4(0.9)	262.8(1.2)	275.1(1.8)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	210.4(2.6)	31.7(1.2)	155.9(5.2)	169.4(4.2)	189.4(3.8)	211.2(1.7)	231.8(2.3)	250.0(4.9)	259.9(12.2)
GRADUATED H.S.	217.4(1.5)	31.5(1.5)	163.8(5.1)	176.3(3.1)	196.8(2.5)	218.1(3.4)	238.6(2.1)	256.0(5.1)	268.3(3.8)
SOME EDUC AFTER H.S.	232.3(1.9)	33.0(1.3)	173.5(5.4)	189.6(5.7)	212.0(5.3)	234.9(2.1)	254.1(3.2)	272.5(3.7)	284.0(4.5)
GRADUATED COLLEGE	228.3(1.1)	34.1(0.7)	170.8(2.3)	183.7(1.7)	205.7(1.6)	229.0(1.7)	252.0(1.0)	272.2(2.1)	283.5(2.4)
UNKNOWN	215.5(1.0)	32.9(0.6)	159.4(2.3)	172.3(1.4)	193.6(1.0)	216.6(1.5)	238.3(1.2)	256.7(1.5)	267.5(2.5)
TYPE OF SCHOOL									
PUBLIC	219.9(1.0)	33.8(0.5)	163.0(1.9)	175.6(1.2)	197.6(1.1)	220.7(1.6)	242.9(1.0)	262.9(1.7)	275.1(1.4)
PRIVATE	233.1(1.9)	30.9(0.9)	180.4(5.4)	192.8(2.6)	213.1(3.1)	233.7(2.0)	254.3(1.9)	272.9(3.4)	283.6(2.3)
ABILITY STUDENTS IN CLASS									
HIGH ABILITY	246.2(2.8)	31.2(1.4)	191.8(5.3)	204.3(4.7)	226.0(4.9)	247.2(4.3)	268.1(2.9)	284.7(4.2)	294.4(4.3)
AVERAGE ABILITY	223.4(1.5)	31.9(0.9)	169.4(2.0)	181.6(2.2)	203.0(2.6)	224.3(1.9)	244.9(1.7)	263.6(2.3)	275.3(2.2)
LOW ABILITY	205.1(2.3)	34.1(1.5)	150.2(4.1)	161.6(6.8)	181.9(2.6)	203.9(3.0)	228.1(1.8)	249.7(6.8)	264.1(7.1)
MIXED ABILITY	222.7(1.5)	32.2(0.7)	167.9(1.4)	180.4(2.8)	201.7(1.3)	223.5(2.5)	244.3(2.2)	263.5(1.6)	274.6(1.5)

GRADE 4 - GEOMETRY PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	217.1(0.8)	30.9(0.4)	165.7(1.6)	177.0(1.2)	196.5(0.8)	217.8(0.9)	238.0(0.9)	256.4(1.3)	267.0(1.1)
SEX									
MALE	217.2(1.0)	31.2(0.5)	165.1(2.0)	176.6(1.3)	196.3(1.2)	218.1(0.9)	238.5(1.2)	256.9(1.2)	267.4(1.9)
FEMALE	217.0(0.9)	30.6(0.6)	166.1(2.0)	177.4(2.0)	196.8(1.1)	217.5(1.0)	237.5(1.2)	256.0(1.4)	266.5(1.9)
RACE/ETHNICITY									
WHITE	223.4(0.9)	28.8(0.5)	175.8(1.9)	186.4(1.8)	203.9(1.3)	223.8(1.0)	243.0(0.9)	259.9(1.0)	270.5(2.4)
BLACK	197.3(1.6)	29.0(0.8)	149.6(3.1)	160.5(3.6)	177.7(2.5)	197.1(1.3)	216.8(1.8)	234.7(2.5)	244.5(5.9)
HISPANIC	202.9(1.6)	30.9(1.4)	151.7(3.3)	163.3(3.3)	181.8(2.3)	203.6(0.9)	224.3(2.1)	241.6(2.1)	253.2(4.1)
ASIAN/PACIFIC ISLANDER	227.1(2.7)	31.4(2.1)	173.5(7.3)	187.8(3.7)	204.9(3.1)	227.4(4.9)	248.1(5.6)	267.3(4.5)	279.1(8.2)
AMER IND/ALASKAN NATV	213.1(2.6)	26.3(2.1)	168.2(7.6)	180.9(5.3)	196.2(2.0)	213.7(3.3)	230.2(6.0)	245.9(5.4)	254.5(5.0)
REGION									
NORTHEAST	221.3(2.0)	31.6(0.9)	168.8(4.5)	180.4(4.1)	200.0(3.5)	221.8(2.2)	242.9(3.0)	260.9(1.6)	272.6(3.4)
SOUTHEAST	210.5(1.8)	30.4(0.9)	160.1(3.9)	171.3(3.9)	190.2(1.0)	210.9(1.4)	231.6(1.2)	248.8(2.5)	260.0(3.6)
CENTRAL	217.6(1.3)	30.2(1.0)	167.5(3.4)	177.9(3.1)	197.4(2.0)	218.9(1.9)	238.1(1.9)	255.3(2.9)	264.3(3.3)
WEST	219.2(1.8)	30.6(0.8)	167.8(2.6)	179.4(3.0)	199.3(2.4)	219.8(2.1)	239.7(1.8)	258.2(2.6)	269.7(2.9)
AGE									
BELOW MODAL AGE	215.4(7.9)	30.2(5.5)	166.6(15.3)	172.7(11.4)	196.5(24.4)	211.2(11.1)	238.6(16.1)	255.4(12.9)	259.6(7.9)
AT MODAL AGE	220.5(0.8)	30.2(0.6)	170.5(1.5)	181.6(1.8)	200.2(0.9)	220.9(1.0)	240.9(1.1)	258.9(1.4)	269.6(2.2)
ABOVE MODAL AGE	212.1(1.1)	31.4(0.7)	160.0(3.2)	171.5(1.9)	190.7(1.5)	212.7(1.1)	233.8(1.5)	251.8(1.9)	262.4(1.0)
TYPE OF COMMUNITY									
EXTREME RURAL	218.4(2.5)	26.8(1.4)	174.1(5.1)	182.7(4.8)	199.9(3.2)	219.5(3.9)	236.4(2.0)	252.0(1.3)	260.5(3.8)
DISADVANTAGED URBAN	200.0(2.8)	32.3(1.2)	148.1(7.0)	159.6(4.0)	177.2(2.1)	199.3(2.0)	222.1(4.1)	241.8(2.5)	255.0(4.9)
ADVANTAGED URBAN	230.5(2.5)	28.5(1.3)	183.5(6.2)	194.2(3.1)	211.6(3.5)	230.7(2.9)	249.6(2.2)	266.9(1.9)	276.8(3.4)
OTHER	217.0(1.0)	30.6(0.5)	166.7(2.6)	177.7(2.0)	196.6(1.0)	217.3(1.1)	237.7(1.0)	255.9(1.7)	266.7(1.4)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	208.6(2.6)	28.8(2.1)	161.1(8.0)	170.8(8.9)	189.4(3.4)	209.4(2.3)	229.5(2.2)	245.7(2.8)	254.9(5.3)
GRADUATED H.S.	213.9(1.5)	29.5(0.9)	164.0(6.8)	176.0(3.9)	194.7(1.8)	214.1(1.8)	233.8(1.6)	252.4(4.3)	261.6(1.8)
SOME EDUC AFTER H.S.	226.2(2.2)	31.1(1.4)	174.0(4.1)	186.1(5.7)	205.6(2.9)	226.7(2.7)	246.8(2.5)	265.6(4.1)	276.5(7.8)
GRADUATED COLLEGE	223.6(1.0)	31.0(0.7)	170.3(2.0)	182.4(2.1)	203.2(2.2)	224.9(1.0)	244.8(1.2)	262.4(1.2)	273.6(2.2)
UNKNOWN	211.1(1.1)	29.9(0.6)	161.1(2.6)	173.2(1.7)	191.2(1.1)	211.5(1.1)	231.5(0.9)	248.6(1.8)	259.1(1.9)
TYPE OF SCHOOL									
PUBLIC	215.8(0.9)	31.0(0.5)	164.3(2.4)	175.8(1.3)	195.2(0.8)	216.4(1.0)	236.8(1.2)	255.2(1.6)	265.7(1.6)
PRIVATE	226.5(1.9)	28.7(0.9)	178.2(3.6)	189.6(2.4)	207.7(3.0)	226.3(1.8)	245.8(1.7)	262.8(2.3)	273.2(2.8)
ABILITY OF STUD IN CLASS									
HIGH ABILITY	240.4(3.0)	29.5(2.0)	190.7(4.9)	201.0(8.4)	220.9(3.9)	240.8(3.1)	260.9(2.3)	278.1(5.7)	288.2(11.7)
AVERAGE ABILITY	217.9(1.3)	29.3(1.0)	168.9(3.2)	180.1(1.7)	198.6(2.3)	218.5(1.3)	237.1(1.8)	254.6(4.6)	265.5(2.3)
LOW ABILITY	201.9(2.0)	29.9(1.4)	152.5(9.2)	163.7(4.9)	181.4(2.3)	201.6(2.4)	222.8(3.7)	240.8(2.9)	250.5(3.8)
MIXED ABILITY	218.1(1.5)	29.9(0.7)	168.5(2.9)	178.8(2.3)	198.1(2.3)	218.8(2.1)	238.6(2.3)	255.6(1.8)	265.7(2.5)

GRADE 4 - ALGEBRA AND FUNCTIONS PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	215.6(0.7)	31.5(0.4)	163.1(1.7)	174.9(1.3)	194.8(0.9)	216.0(0.7)	237.2(0.9)	255.6(0.9)	266.3(1.8)
SEX									
MALE	215.4(0.9)	31.8(0.6)	162.2(2.1)	174.7(1.4)	194.6(0.9)	215.6(1.2)	236.9(1.4)	255.8(1.4)	267.1(2.4)
FEMALE	215.9(0.8)	31.2(0.6)	163.6(1.8)	175.2(1.4)	195.2(1.1)	216.5(1.0)	237.5(1.1)	255.3(1.3)	265.6(1.4)
RACE/ETHNICITY									
WHITE	222.2(0.8)	29.3(0.6)	173.9(1.5)	184.8(0.7)	202.8(0.8)	222.4(1.0)	242.1(1.1)	259.8(1.6)	269.7(2.1)
BLACK	195.4(1.7)	29.2(0.7)	147.2(4.2)	158.9(3.2)	175.3(3.1)	195.6(2.5)	215.3(1.2)	233.2(3.1)	242.8(1.8)
HISPANIC	199.6(1.5)	31.0(1.0)	148.4(3.8)	160.9(3.0)	178.7(2.4)	200.1(1.7)	221.2(3.4)	239.3(2.5)	249.7(2.9)
ASIAN/PACIFIC ISLANDER	228.6(3.0)	30.1(2.5)	174.0(4.5)	191.3(5.0)	208.7(6.2)	230.0(4.3)	250.1(3.9)	264.0(6.2)	274.5(8.0)
AMER IND/ALASKAN NATV	213.8(3.2)	28.0(2.2)	169.4(10.1)	178.4(6.1)	194.7(7.6)	214.4(6.7)	232.9(2.0)	249.9(6.3)	263.0(8.6)
REGION									
NORTHEAST	219.7(2.1)	32.0(0.9)	166.8(2.7)	178.5(2.0)	198.1(2.8)	220.1(3.0)	241.8(2.0)	261.0(3.6)	271.5(3.6)
SOUTHEAST	208.2(1.3)	31.2(1.1)	156.4(3.3)	168.0(2.1)	187.7(1.2)	208.6(1.6)	229.1(1.8)	248.0(2.2)	259.8(3.3)
CENTRAL	218.0(1.3)	30.2(1.0)	167.6(4.1)	179.2(2.0)	198.7(1.9)	218.7(1.3)	238.3(2.0)	254.8(2.2)	265.9(3.0)
WEST	217.0(1.8)	31.6(0.8)	163.2(2.1)	175.7(2.1)	196.0(2.9)	217.6(1.9)	238.9(1.9)	257.2(2.4)	266.9(4.4)
AGE									
BELOW MODAL AGE	215.6(6.4)	28.2(6.8)	171.0(29.8)	175.6(25.8)	191.9(10.0)	219.4(9.7)	237.8(30.8)	246.2(5.1)	257.5(25.4)
AT MODAL AGE	220.2(0.8)	30.5(0.6)	169.3(1.5)	180.8(1.2)	199.9(1.2)	220.5(1.5)	241.0(0.7)	259.2(1.5)	269.5(1.4)
ABOVE MODAL AGE	208.9(1.1)	31.8(0.6)	155.3(2.5)	168.2(1.8)	187.9(1.5)	209.2(1.2)	230.7(1.1)	249.1(1.4)	260.0(1.5)
TYPE OF COMMUNITY									
EXTREME RURAL	216.8(2.2)	28.4(1.2)	167.6(8.2)	180.7(3.2)	199.4(4.0)	216.8(2.7)	236.0(1.8)	252.5(2.9)	263.4(5.1)
DISADVANTAGED URBAN	200.0(2.6)	32.0(1.4)	146.8(5.7)	159.6(3.9)	178.3(3.5)	200.1(2.5)	222.7(2.2)	240.1(3.0)	251.6(5.7)
ADVANTAGED URBAN	229.0(3.0)	29.6(1.4)	179.0(3.1)	190.8(4.6)	209.6(4.0)	229.8(2.4)	249.2(3.1)	265.6(2.9)	275.3(4.0)
OTHER	215.4(0.8)	31.2(0.5)	163.8(2.0)	175.2(1.5)	194.6(1.0)	215.5(1.1)	236.7(1.1)	255.0(1.0)	266.2(1.8)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	205.4(1.9)	29.9(2.3)	157.6(10.6)	167.0(4.6)	186.0(7.0)	205.8(2.0)	225.5(5.0)	244.3(4.6)	254.8(4.9)
GRADUATED H.S.	209.5(1.3)	29.3(0.9)	160.7(2.2)	172.4(3.1)	190.2(2.0)	209.9(2.7)	229.9(2.6)	246.5(4.3)	256.0(3.9)
SOME EDUC AFTER H.S.	221.5(2.1)	31.0(1.3)	169.0(3.7)	182.2(2.4)	201.3(2.3)	222.0(2.7)	242.8(3.6)	259.8(4.3)	269.6(5.8)
GRADUATED COLLEGE	222.3(1.0)	31.8(0.7)	168.7(2.3)	180.6(1.1)	201.5(1.4)	223.4(1.7)	244.4(1.7)	262.6(2.1)	272.2(2.9)
UNKNOWN	211.7(0.9)	30.9(0.6)	160.2(2.7)	171.8(3.0)	191.4(1.8)	212.0(1.4)	232.9(1.1)	250.4(1.6)	261.8(2.2)
TYPE OF SCHOOL									
PUBLIC	214.4(0.8)	31.6(0.5)	161.5(2.4)	173.7(1.3)	193.5(1.1)	214.7(1.0)	235.9(0.9)	254.3(1.0)	265.2(1.6)
PRIVATE	225.0(2.0)	29.1(1.2)	176.5(4.5)	188.4(3.6)	206.0(2.3)	225.0(2.0)	244.6(2.9)	262.1(2.4)	271.0(2.8)
ABILITY STUDENTS IN CLASS									
HIGH ABILITY	238.2(2.7)	28.6(1.1)	190.1(3.7)	200.7(2.7)	220.1(3.1)	238.7(2.7)	257.8(4.6)	273.9(2.9)	283.9(4.8)
AVERAGE ABILITY	217.1(1.4)	30.7(1.1)	164.4(3.6)	177.6(2.8)	197.6(1.8)	217.6(2.5)	237.6(1.6)	255.7(1.6)	266.3(2.7)
LOW ABILITY	202.3(2.2)	31.7(1.3)	150.3(7.6)	162.4(3.9)	181.4(3.4)	201.8(2.1)	223.3(3.8)	243.8(5.6)	255.1(6.8)
MIXED ABILITY	216.6(1.1)	30.3(0.8)	166.5(2.4)	177.6(2.6)	196.6(1.2)	217.3(1.3)	237.3(2.2)	254.9(2.2)	264.7(3.1)

GRADE 4 - MEAN PERCENTAGE CORRECT BY CONTENT AREA

CONTENT AREA (NUMBER OF ITEMS)	NUM & OPER (52)	MEASURMENT (20)	GEOMETRY (14)	DATA ANALYS (9)	ALGEBRA (14)	TOTAL (109)	ESTIMATION (20)	PROBLEM SOLVING (14)
-- TOTAL --	52.7(0.3)	49.6(0.5)	43.5(0.4)	58.7(0.6)	55.4(0.3)	51.8(0.3)	55.7(0.3)	42.9(0.7)
SEX								
MALE	53.2(0.5)	51.4(0.6)	43.7(0.6)	58.7(0.7)	55.4(0.5)	52.4(0.4)	56.7(0.4)	43.6(0.9)
FEMALE	52.2(0.4)	47.7(0.5)	43.3(0.5)	58.7(0.7)	55.3(0.4)	51.2(0.4)	54.7(0.5)	42.2(0.8)
RACE/ETHNICITY								
WHITE	55.7(0.4)	53.5(0.5)	46.6(0.5)	63.2(0.6)	58.5(0.5)	55.1(0.4)	58.1(0.4)	47.9(0.9)
BLACK	42.8(0.6)	36.4(0.7)	33.3(0.7)	44.8(1.0)	45.3(0.7)	40.9(0.6)	48.5(0.4)	26.9(0.9)
HISPANIC	45.7(0.7)	41.2(1.1)	36.5(1.0)	48.4(1.2)	47.7(0.8)	44.2(0.8)	51.2(0.7)	33.5(1.0)
ASIAN/PACIFIC ISLANDER	58.3(1.1)	56.0(1.7)	48.2(2.0)	64.3(2.3)	61.5(1.2)	57.5(1.2)	57.0(2.3)	48.7(4.5)
AMER IND/ALASKAN NATV	50.1(1.3)	46.4(1.4)	39.2(1.9)	51.3(2.1)	54.6(1.7)	48.7(1.2)	50.8(1.4)	36.5(1.9)
REGION								
NORTHEAST	54.5(0.7)	50.6(0.8)	46.1(0.7)	60.5(1.3)	57.6(0.9)	53.6(0.7)	58.8(0.9)	48.4(2.2)
SOUTHEAST	49.8(0.8)	45.8(1.0)	40.3(1.0)	55.1(1.1)	51.8(0.8)	48.5(0.8)	53.3(0.5)	36.5(0.8)
CENTRAL	53.0(0.8)	50.9(1.1)	43.5(0.9)	60.6(1.0)	56.6(0.7)	52.5(0.7)	56.5(0.9)	44.8(1.5)
WEST	53.6(0.8)	51.0(1.2)	44.3(0.9)	58.6(1.4)	55.7(0.7)	52.6(0.9)	54.9(0.7)	43.0(1.6)
AGE								
BELOW MODAL AGE	52.8(3.5)	40.8(4.4)	46.3(3.9)	70.2(5.7)	62.2(4.5)	52.4(3.3)	47.3(4.5)	38.3(9.3)
AT MODAL AGE	54.8(0.4)	51.8(0.5)	45.2(0.4)	60.8(0.6)	57.5(0.4)	53.9(0.4)	56.4(0.4)	44.9(0.8)
ABOVE MODAL AGE	49.5(0.5)	46.3(0.7)	40.9(0.7)	55.4(0.9)	52.1(0.6)	48.6(0.6)	54.7(0.5)	40.0(0.8)
TYPE OF COMMUNITY								
EXTREME RURAL	52.6(1.2)	51.3(1.7)	42.4(1.9)	59.3(2.4)	54.6(1.7)	51.9(1.4)	56.4(0.8)	42.7(2.0)
DISADVANTAGED URBAN	46.4(1.2)	41.8(1.5)	36.8(1.4)	47.6(1.6)	48.3(1.4)	44.7(1.2)	51.8(0.8)	34.6(1.9)
ADVANTAGED URBAN	60.5(1.0)	59.2(1.3)	49.0(1.3)	67.9(1.3)	61.4(1.5)	59.5(1.0)	62.8(1.1)	55.8(2.2)
OTHER	52.3(0.4)	48.8(0.6)	43.7(0.6)	58.5(0.7)	55.5(0.4)	51.5(0.4)	55.3(0.4)	42.7(0.9)
PARENTS' EDUCATION LEVEL								
LESS THAN H.S.	46.6(1.4)	41.5(1.6)	37.7(1.3)	50.8(2.0)	49.1(1.1)	45.2(1.2)	50.9(1.3)	34.4(1.5)
GRADUATED H.S.	50.3(0.7)	48.0(0.8)	41.8(0.6)	55.1(0.7)	52.4(0.6)	49.5(0.5)	55.5(0.6)	40.2(1.1)
SOME EDUC AFTER H.S.	58.6(1.0)	56.1(1.2)	48.2(1.5)	63.5(1.5)	58.8(1.0)	57.2(0.9)	57.2(0.9)	47.6(1.7)
GRADUATED COLLEGE	56.4(0.5)	53.6(0.6)	46.6(0.6)	64.0(0.8)	58.7(0.5)	55.5(0.5)	58.5(0.6)	47.4(1.1)
UNKNOWN	49.4(0.5)	45.8(0.6)	40.8(0.6)	54.6(0.7)	53.4(0.5)	48.6(0.4)	53.4(0.5)	39.9(0.8)
TYPE OF SCHOOL								
PUBLIC	52.0(0.4)	48.7(0.6)	42.9(0.5)	57.8(0.7)	54.8(0.4)	51.1(0.4)	55.3(0.4)	42.6(0.7)
PRIVATE	57.8(0.9)	55.8(1.2)	47.5(1.2)	64.6(1.2)	59.5(0.9)	56.9(0.9)	59.6(1.3)	46.2(2.6)
ABILITY OF STUDENTS IN CLASS								
HIGH ABILITY	64.8(1.8)	62.7(2.3)	54.8(2.0)	72.3(2.4)	66.5(1.9)	64.0(1.9)	62.2(1.6)	53.8(2.5)
AVERAGE ABILITY	52.6(0.6)	50.1(0.8)	43.1(0.8)	58.5(0.9)	55.9(0.7)	51.8(0.6)	56.4(0.6)	44.5(1.3)
LOW ABILITY	45.4(0.9)	41.3(1.3)	35.8(1.2)	50.4(1.4)	48.7(1.0)	44.3(0.9)	51.2(1.4)	33.1(2.2)
MIXED ABILITY	52.6(0.7)	49.6(0.9)	43.4(0.9)	59.2(1.1)	55.1(0.7)	51.7(0.7)	54.4(0.8)	40.0(1.7)

GRADE 4 - MEAN PERCENTAGE CORR... BY CONTENT AREA
ONLY MULTIPLE-CHOICE QUESTIONS

CONTENT AREA (NUMBER OF ITEMS)	NUM & OPER (43)	MEASURMENT (15)	GEOMETRY (7)	DATA ANALYS (8)	ALGEBRA (8)	TOTAL (81)	ESTIMATION (20)	PROBLEM SOLVING (1)
-- TOTAL --	50.9(0.4)	53.4(0.5)	51.9(0.5)	59.7(0.5)	55.1(0.4)	52.7(0.4)	55.7(0.3)	32.1(1.6)
SEX								
MALE	51.6(0.5)	55.8(0.6)	52.5(0.7)	60.1(0.7)	54.9(0.5)	53.6(0.5)	56.7(0.4)	36.8(2.0)
FEMALE	50.3(0.4)	50.9(0.5)	51.2(0.5)	59.3(0.7)	55.3(0.6)	51.9(0.4)	54.7(0.5)	27.3(1.8)
RACE/ETHNICITY								
WHITE	53.8(0.4)	56.8(0.5)	54.5(0.5)	63.8(0.6)	58.0(0.5)	55.8(0.4)	58.1(0.4)	35.6(2.0)
BLACK	41.3(0.6)	42.1(0.7)	43.6(1.0)	47.2(0.9)	46.0(0.9)	42.7(0.6)	48.5(0.4)	20.4(2.3)
HISPANIC	44.2(0.7)	45.7(1.1)	45.7(1.1)	49.8(1.3)	48.0(0.9)	45.5(0.7)	51.2(0.7)	26.3(2.3)
ASIAN/PACIFIC AMERICAN	55.9(1.1)	59.9(1.6)	54.8(1.6)	64.7(2.2)	61.0(1.6)	57.9(1.0)	57.0(2.3)	30.7(5.3)
AMER IND/ALASKAN NATV	48.1(1.4)	49.8(1.6)	49.4(2.0)	53.5(1.9)	53.4(2.7)	49.6(1.3)	50.8(1.4)	30.2(7.9)
REGION								
NORTHEAST	52.7(0.6)	53.9(0.7)	54.6(0.6)	61.4(1.[illegible]	56.8(0.9)	54.4(0.6)	58.8(0.9)	36.1(3.1)
SOUTHEAST	48.4(0.8)	50.1(0.9)	49.3(1.4)	56.3(1.1)	52.8(1.0)	50.0(0.9)	53.3(0.5)	25.6(2.0)
CENTRAL	50.9(0.8)	54.4(1.1)	51.4(0.9)	61.2(0.9)	55.8(0.8)	53.1(0.7)	56.5(0.9)	38.6(4.5)
WEST	51.9(0.9)	55.0(1.1)	52.6(1.0)	59.9(1.4)	55.1(0.7)	53.6(0.9)	54.9(0.7)	29.1(2.7)
AGE								
BELOW MODAL AGE	50.5(3.3)	48.8(5.3)	58.2(5.5)	72.0(5.9)	61.7(5.1)	54.1(3.4)	47.3(4.5)	5.8(5.3)
AT MODAL AGE	53.0(0.4)	55.5(0.5)	53.6(0.5)	61.7(0.6)	57.1(0.5)	54.8(0.4)	56.4(0.4)	33.6(1.5)
ABOVE MODAL AGE	47.8(0.5)	50.2(0.7)	49.3(0.8)	56.6(0.8)	52.1(0.6)	49.7(0.5)	54.7(0.5)	30.2(2.7)
TYPE OF COMMUNITY								
EXTREME RURAL	50.6(1.3)	54.8(1.6)	50.0(2.2)	60.1(2.2)	55.7(1.7)	52.8(1.4)	56.4(0.8)	39.5(7.5)
DISADVANTAGED URBAN	44.6(1.2)	46.5(1.4)	46.7(1.6)	49.3(1.6)	48.6(1.4)	46.0(1.2)	51.8(0.8)	27.5(3.5)
ADVANTAGED URBAN	59.1(1.0)	62.0(1.1)	58.0(1.2)	69.1(1.3)	60.9(1.5)	60.7(1.0)	62.8(1.1)	44.0(5.0)
OTHER	50.5(0.5)	52.7(0.6)	51.9(0.6)	59.4(0.7)	55.0(0.4)	52.3(0.4)	55.3(0.4)	29.9(1.4)
PARENTS' EDUCATION LEVEL								
LESS THAN H.S.	44.8(1.5)	45.2(1.6)	47.8(1.5)	52.1(2.3)	48.3(1.5)	46.2(1.2)	50.9(1.3)	24.0(4.3)
GRADUATED H.S.	48.6(0.6)	52.7(0.9)	49.3(0.9)	56.3(0.7)	52.8(0.7)	50.6(0.5)	55.5(0.6)	32.6(3.8)
SOME EDUC AFTER H.S.	56.6(1.0)	59.2(1.2)	56.7(1.5)	64.2(1.6)	59.2(1.1)	58.1(0.9)	57.2(0.9)	43.6(4.8)
GRADUATED COLLEGE	54.8(0.5)	57.3(0.6)	54.6(0.6)	65.1(0.8)	58.3(0.6)	56.6(0.5)	58.5(0.6)	36.3(2.4)
UNKNOWN	47.5(0.5)	49.4(0.7)	49.7(0.8)	55.5(0.7)	52.9(0.5)	49.4(0.5)	53.4(0.5)	26.2(1.9)
TYPE OF SCHOOL								
PUBLIC	50.3(0.4)	52.6(0.6)	51.5(0.6)	58.9(0.6)	54.6(0.4)	52.1(0.4)	55.3(0.4)	31.4(1.8)
PRIVATE	55.7(0.9)	58.8(1.0)	54.5(1.0)	65.5(1.1)	58.7(1.0)	57.4(0.9)	59.6(1.3)	38.5(5.4)
ABILITY OF STUDENTS IN CLASS								
HIGH ABILITY	63.2(2.0)	64.7(2.2)	61.6(2.1)	73.0(2.3)	65.1(1.9)	64.5(1.9)	62.2(1.6)	46.2(4.3)
AVERAGE ABILITY	50.5(0.7)	54.1(0.8)	51.6(0.9)	59.6(0.9)	55.7(0.7)	52.7(0.6)	56.4(0.6)	28.7(2.0)
LOW ABILITY	43.9(0.9)	46.6(1.2)	46.2(1.3)	52.0(1.5)	49.6(1.1)	45.9(0.9)	51.2(1.4)	27.8(5.1)
MIXED ABILITY	50.9(0.7)	53.6(0.9)	51.8(0.9)	60.1(1.0)	54.5(0.6)	52.7(0.7)	54.4(0.8)	32.4(3.2)

GRADE 4 - MEAN PERCENTAGE CORRECT BY CONTENT AREA
ONLY CONSTRUCTED-RESPONSE QUESTIONS

CONTENT AREA (NUMBER OF ITEMS)	NUM & OPER (9)	MEASURMENT (5)	GEOMETRY (7)	DATA ANALYS (1)	ALGEBRA (6)	TOTAL (28)	PROBLEM SOLVING (13)
-- TOTAL --	61.2(0.5)	38.2(0.7)	35.1(0.5)	50.7(1.4)	55.8(0.5)	49.0(0.4)	43.8(0.7)
SEX							
MALE	60.9(0.6)	38.4(0.9)	34.8(0.7)	47.8(1.6)	56.1(0.6)	48.9(0.5)	44.2(0.9)
FEMALE	61.4(0.7)	38.0(0.8)	35.5(0.7)	53.9(1.9)	55.4(0.5)	49.2(0.5)	43.3(0.9)
RACE/ETHNICITY							
WHITE	64.6(0.6)	43.5(0.8)	38.8(0.7)	58.3(1.6)	59.2(0.6)	53.0(0.5)	48.8(0.9)
BLACK	50.1(1.1)	19.2(1.5)	22.9(0.9)	25.6(3.0)	44.4(0.9)	35.7(0.7)	27.4(1.0)
HISPANIC	52.8(1.2)	27.7(1.7)	27.3(1.3)	37.4(2.7)	47.4(1.1)	40.2(1.1)	34.1(1.0)
ASIAN/PACIFIC AMERICAN	69.7(1.6)	44.3(3.3)	41.7(3.5)	61.2(5.0)	62.1(1.4)	56.2(1.8)	50.1(4.7)
AMER IND/ALASKAN NATV	59.9(2.0)	36.4(3.0)	29.0(2.9)	34.4(7.3)	56.1(1.7)	46.3(1.6)	36.9(2.0)
REGION							
NORTHEAST	62.8(1.1)	40.5(1.3)	37.6(1.1)	53.9(3.0)	58.6(1.3)	51.3(1.0)	49.4(2.2)
SOUTHEAST	56.9(1.5)	32.9(1.6)	31.3(1.0)	45.1(2.2)	50.3(0.9)	44.4(1.0)	37.3(0.8)
CENTRAL	63.2(0.6)	40.5(1.2)	35.7(1.3)	55.8(3.5)	57.8(1.0)	50.9(0.7)	45.2(1.6)
WEST	61.8(0.8)	39.1(1.7)	35.9(1.1)	48.5(2.7)	56.4(1.0)	49.7(0.9)	44.1(1.6)
AGE							
BELOW MODAL AGE	64.1(6.3)	16.9(5.0)	34.3(4.8)	56.0(15.9)	62.8(7.4)	47.6(3.8)	40.8(10.0)
AT MODAL AGE	63.6(0.6)	40.7(1.0)	36.8(0.6)	54.0(1.5)	58.2(0.5)	51.3(0.4)	45.8(0.8)
ABOVE MODAL AGE	57.6(0.9)	34.6(1.2)	32.5(1.0)	45.8(2.1)	52.1(1.0)	45.6(0.9)	40.8(0.8)
TYPE OF COMMUNITY							
EXTREME RURAL	62.0(1.8)	40.8(2.5)	34.8(2.1)	52.8(4.7)	53.0(1.9)	49.2(1.8)	43.0(2.0)
DISADVANTAGED URBAN	55.2(1.8)	27.6(2.4)	26.9(1.6)	34.0(3.3)	47.9(1.6)	40.9(1.6)	35.1(2.0)
ADVANTAGED URBAN	66.9(1.2)	50.6(2.4)	39.9(1.7)	58.6(3.2)	61.9(1.9)	55.9(1.4)	56.7(2.1)
OTHER	60.9(0.6)	37.0(0.8)	35.4(0.7)	51.3(1.9)	56.2(0.7)	48.9(0.6)	43.7(0.9)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	54.9(1.7)	30.5(3.2)	27.7(1.8)	40.6(4.4)	50.0(2.0)	42.2(1.5)	35.2(1.6)
GRADUATED H.S.	58.5(1.5)	33.6(1.5)	34.3(1.0)	45.9(2.6)	51.9(1.0)	46.1(0.9)	40.8(1.1)
SOME EDUC AFTER H.S.	67.9(1.2)	46.9(2.2)	39.8(1.9)	58.2(3.4)	58.2(1.7)	54.7(1.3)	47.9(1.7)
GRADUATED COLLEGE	64.0(0.6)	42.6(1.2)	38.6(0.9)	55.6(1.7)	59.2(0.7)	52.5(0.6)	48.2(1.1)
UNKNOWN	58.8(0.7)	34.8(0.9)	31.8(0.7)	47.8(2.3)	54.1(0.8)	46.4(0.6)	41.0(0.8)
TYPE OF SCHOOL							
PUBLIC	60.3(0.6)	37.1(0.9)	34.4(0.6)	49.7(1.5)	55.1(0.6)	48.2(0.5)	43.4(0.8)
PRIVATE	67.7(1.0)	46.6(1.8)	40.4(1.7)	57.8(2.5)	60.6(1.2)	55.2(1.2)	46.8(2.5)
ABILITY OF STUDENTS IN CLASS							
HIGH ABILITY	72.2(1.5)	56.7(3.0)	48.1(2.7)	66.7(4.4)	68.3(2.4)	62.4(1.9)	54.3(2.6)
AVERAGE ABILITY	62.2(0.9)	38.1(1.3)	34.6(1.0)	50.0(1.9)	56.1(1.0)	49.3(0.8)	45.7(1.3)
LOW ABILITY	52.8(1.3)	25.3(2.3)	25.3(1.3)	37.3(3.5)	47.6(1.5)	39.3(1.1)	33.5(2.3)
MIXED ABILITY	60.9(1.0)	37.6(1.4)	35.0(1.2)	52.0(2.8)	55.8(1.0)	48.9(0.9)	40.6(1.6)

GRADE 4 - PERCENTAGE OF STUDENTS RESPONDING CORRECTLY TO THE 1990 MATHEMATICS ITEMS

SHORT TEXT	TOTAL	MALE	FEMALE	WHITE	BLACK	HISPANIC	ASIAN	CONTENT AREA	ITEM TYPE
SOLVE STORY PROBLEM (ADDITION)	88.8(0.8)	86.9(1.0)	90.9(1.2)	90.6(1.0)	83.3(1.8)	85.6(2.0)	89.7(5.2)	1	1
APPLY CONCEPT OF AREA	31.0(1.4)	31.3(1.7)	30.7(1.7)	33.6(1.7)	20.0(2.2)	29.3(3.3)	44.8(5.1)	2	1
FIND GREATEST MONETARY VALUE	81.3(1.1)	83.2(1.2)	79.2(1.4)	85.2(1.1)	71.0(2.5)	72.2(2.4)	86.5(5.2)	2	1
SOLVE NUMBER SENTENCE (ADDITION)	94.0(0.5)	92.5(0.8)	95.5(0.5)	95.3(0.6)	90.3(1.7)	89.0(2.0)	98.0(1.2)	5	2
REPRESENT PLACE VALUE	67.3(1.1)	68.6(1.4)	65.9(1.7)	71.4(1.2)	56.4(2.7)	55.4(2.4)	76.2(3.9)	1	1
DETERMINE GREATEST METRIC UNIT	50.9(1.4)	57.3(1.7)	44.1(1.8)	53.4(1.7)	41.7(2.4)	49.1(2.7)	57.2(5.9)	2	1
APPLY PROPERTIES OF A SQUARE	56.6(1.1)	56.3(1.4)	56.9(1.7)	61.0(1.5)	43.6(2.5)	46.1(3.1)	63.0(4.9)	3	2
DETERMINE LARGEST NUMBER	80.8(0.9)	81.3(1.0)	80.2(1.5)	83.5(1.1)	72.0(1.9)	75.5(1.9)	84.8(3.2)	1	1
READ DATA ON BAR GRAPH	79.7(0.7)	78.3(1.3)	81.2(1.0)	83.5(0.8)	67.6(2.1)	74.0(2.6)	83.6(3.8)	4	1
INTERPRET BAR GRAPH DATA	41.6(1.3)	42.3(1.8)	40.9(1.8)	46.9(1.5)	26.6(3.0)	29.0(2.8)	49.9(6.9)	4	1
SUBTRACT WHOLE NUMBERS	82.0(1.0)	80.5(1.2)	83.7(1.3)	85.9(0.9)	69.1(2.6)	74.8(3.1)	94.1(1.9)	1	2
SUBTRACT WHOLE NUMBERS	61.7(1.1)	61.5(1.3)	62.0(1.7)	65.1(1.2)	49.7(3.7)	54.9(2.8)	77.8(3.8)	1	2
SOLVE MULTI-STEP STORY PROBLEM	45.3(1.0)	45.4(1.4)	45.1(1.6)	49.5(1.2)	30.1(2.4)	37.7(2.8)	56.8(4.9)	1	1
WRITE NUMBER SENTENCE (MULTIPLICATION)	79.9(1.0)	78.6(1.5)	81.3(1.2)	83.0(1.1)	69.9(2.4)	73.0(2.5)	90.0(2.8)	1	2
USE PART-WHOLE RELATIONSHIP	36.3(1.6)	40.1(1.9)	32.2(2.0)	39.4(1.9)	28.5(2.8)	25.5(2.6)	40.4(6.2)	1	1
SOLVE NUMBER SENTENCE (ADDITION)	69.1(0.9)	67.3(1.1)	71.0(1.3)	71.9(1.2)	60.9(2.0)	60.3(3.1)	78.1(4.1)	5	2
FIND PERIMETER OF A RECTANGLE	22.6(1.1)	24.5(1.6)	20.6(1.5)	25.4(1.3)	12.6(2.0)	18.6(2.0)	30.1(4.7)	2	1
APPLY TRANSITIVE PROPERTY	61.7(1.2)	63.8(1.7)	59.4(1.5)	64.0(1.5)	52.5(3.4)	57.1(2.9)	76.0(4.3)	2	1
ESTIMATE BY INSPECTION	64.1(1.1)	65.4(1.7)	62.8(1.7)	67.7(1.3)	51.2(2.4)	58.2(3.3)	76.8(4.9)	1	1
ADD WHOLE NUMBERS	88.3(0.6)	86.2(0.8)	90.6(0.6)	89.6(0.7)	83.6(1.4)	86.4(1.3)	93.0(2.0)	1	1
COMPARE WEIGHTS	78.1(0.7)	80.7(0.9)	75.3(1.1)	82.9(0.9)	64.8(1.6)	65.5(2.0)	86.0(2.4)	2	1
APPLY TRANSFORMATIONAL GEOMETRY	69.4(0.7)	66.4(1.3)	72.7(1.1)	70.6(0.9)	66.8(2.1)	65.0(1.7)	74.7(3.7)	3	1
IDENTIFY SOLUTION PROCEDURE	49.3(0.9)	48.8(1.1)	49.8(1.2)	53.8(1.0)	35.8(1.8)	40.1(1.8)	49.8(4.1)	1	1
INTERPRET PIE CHART DATA	43.3(1.0)	41.9(1.1)	44.9(1.3)	47.3(1.2)	31.4(1.6)	34.9(2.0)	54.4(6.0)	4	1
SOLVE MULTI-STEP STORY PROBLEM	34.9(0.7)	37.5(1.1)	32.3(1.0)	40.0(0.9)	19.8(1.3)	25.3(1.6)	36.3(3.3)	1	1
APPLY PROPERTIES OF A CUBE	35.6(0.9)	37.7(1.3)	33.4(0.9)	37.8(1.1)	28.8(1.6)	30.0(1.7)	43.0(3.8)	3	1
APPLY CONCEPT OF PERIMETER	37.8(0.9)	40.5(1.3)	34.9(1.0)	40.8(1.1)	30.3(1.6)	27.7(1.7)	46.3(3.5)	2	1
SOLVE MULTI-STEP STORY PROBLEM	27.4(0.9)	24.0(1.1)	31.2(1.1)	29.6(1.0)	20.6(1.7)	21.8(1.4)	38.8(3.8)	1	1
APPLY CONCEPT OF EQUALITY	30.6(1.1)	32.6(1.2)	28.4(1.4)	35.8(1.3)	16.0(1.3)	19.0(1.5)	36.1(3.2)	5	1
SOLVE STORY PROBLEM (DIVISION)	42.[illegible](0.9)	42.2(1.2)	42.9(1.2)	46.1(1.1)	32.0(1.7)	34.9(1.8)	48.8(4.6)	1	1
SOLVE STORY PROBLEM (FRACTIONS)	24.3(0.7)	26.0(0.9)	22.8(1.0)	24.8(0.9)	23.3(1.5)	22.0(1.3)	32.6(7.2)	1	1
READ A SCALE DIAGRAM	21.2(0.5)	24.5(1.1)	17.6(0.9)	22.6(0.8)	15.6(1.5)	19.9(1.7)	24.7(3.2)	1	1
SOLVE AN INEQUALITY	17.4(0.7)	17.6(0.9)	17.1(1.0)	18.0(0.9)	13.6(1.3)	17.3(1.6)	19.1(5.5)	5	1
SOLVE A NUMBER SENTENCE	52.1(1.2)	58.2(1.7)	45.2(1.6)	57.0(1.4)	34.4(3.6)	42.7(2.3)	63.5(7.4)	5	2
DRAW AN OBTUSE ANGLE	8.8(0.7)	9.0(1.0)	8.5(0.9)	9.1(1.0)	6.5(1.3)	7.3(1.3)	17.7(6.2)	3	2
VISUALIZE A GEOMETRIC FIGURE	62.0(0.8)	58.5(1.2)	66.1(1.6)	67.5(1.1)	47.3(2.6)	50.9(2.9)	56.6(4.3)	3	2
APPLY PLACE VALUE	50.2(1.0)	50.6(1.8)	49.8(1.5)	56.9(1.4)	31.2(2.3)	33.1(2.2)	60.7(5.8)	1	2
APPLY PART-WHOLE RELATIONSHIP	18.4(0.9)	21.0(1.4)	15.5(1.1)	21.9(1.3)	7.5(1.1)	11.5(1.8)	28.2(4.4)	1	2
COMPLETE A BAR GRAPH	50.7(1.4)	47.8(1.6)	53.9(1.9)	58.3(1.6)	25.6(3.0)	37.4(2.7)	61.2(5.0)	4	2
READ A RULER	23.5(1.0)	25.7(1.4)	20.9(1.0)	28.6(1.3)	4.9(1.1)	17.1(2.0)	25.6(2.8)	2	2
COMPLETE A LETTER PATTERN	34.0(0.9)	32.0(1.3)	36.3(1.5)	40.0(1.2)	13.0(1.8)	24.0(1.9)	36.5(5.0)	5	2
USE A NUMBER LINE GRAPH	25.1(1.1)	25.0(1.6)	25.2(1.3)	29.6(1.4)	11.2(1.5)	14.3(1.4)	29.3(4.7)	1	2
SUBTRACT WHOLE NUMBERS	76.5(0.9)	77.5(1.4)	75.5(1.4)	78.7(1.2)	68.2(3.0)	71.4(2.4)	84.9(7.4)	1	2
DRAW A GEOMETRIC FIGURE	28.5(1.3)	28.8(2.1)	28.1(1.9)	30.9(1.6)	15.1(1.9)	23.6(2.5)	49.4(3.6)	3	2
SOLVE STORY PROBLEM (MONEY)	62.0(1.0)	61.7(1.5)	62.3(1.5)	68.4(1.2)	42.5(2.4)	49.4(2.3)	65.2(5.6)	1	1
ESTIMATE DISTANCE ON MAP	23.9(1.1)	24.6(1.3)	23.1(1.6)	25.4(1.4)	19.0(2.2)	20.8(1.6)	29.5(4.8)	1	1
COMPLETE A GEOMETRIC PATTERN	88.7(0.7)	88.7(0.9)	88.8(0.8)	91.2(0.8)	80.0(2.0)	83.1(1.9)	92.8(2.6)	5	1
DRAW GEOMETRIC FIGURE	29.6(1.2)	30.9(1.7)	28.2(1.7)	34.7(1.5)	10.8(1.7)	23.0(2.4)	32.6(5.3)	3	2
SOLVE STORY PROBLEM (REASONING)	65.9(1.0)	63.8(1.6)	68.1(1.4)	68.8(1.3)	55.9(1.9)	62.9(2.7)	64.5(5.0)	1	1
REPRESENT WORDS WITH SYMBOLS	50.1(1.3)	50.3(1.6)	49.9(1.8)	53.7(1.5)	38.5(2.7)	41.9(3.0)	59.5(4.9)	5	1

GRADE 4 - PERCENTAGE OF STUDENTS RESPONDING CORRECTLY TO THE 1990 MATHEMATICS ITEMS

SHORT TEXT	TOTAL	MALE	FEMALE	WHITE	BLACK	HISPANIC	ASIAN	CONTENT AREA	ITEM TYPE
DRAW A GEOMETRIC FIGURE	16.7(1.0)	18.0(1.5)	15.2(1.4)	20.3(1.3)	3.6(1.0)	11.9(1.9)	21.7(5.8)	3	2
COMPARE WEIGHTS	43.9(1.0)	45.7(1.3)	41.9(1.3)	46.5(1.3)	36.3(2.2)	37.8(2.3)	38.0(5.8)	2	1
UNDERSTAND WHEN TO ESTIMATE	41.3(1.1)	41.1(1.6)	41.5(1.6)	44.3(1.5)	36.1(2.6)	30.6(1.9)	40.2(5.2)	1	1
USE A RULER	45.7(1.1)	46.4(1.4)	45.1(1.6)	51.9(1.2)	22.2(2.1)	33.8(2.3)	59.6(6.1)	2	2
USE A RULER	55.7(1.1)	54.9(1.7)	56.5(1.7)	61.7(1.2)	33.6(2.6)	45.7(2.6)	57.7(5.4)	2	2
APPLY PLACE VALUE	37.2(1.4)	37.9(1.7)	36.5(2.0)	39.1(1.8)	30.5(2.7)	32.6(2.1)	36.6(4.5)	1	1
SOLVE STORY PROBLEM (REMAINDER)	33.3(1.2)	36.1(1.6)	30.4(1.7)	35.6(1.5)	23.9(2.0)	29.9(3.0)	47.8(5.7)	1	1
VISUALIZE A CUBE	24.2(0.9)	23.3(1.5)	25.2(1.2)	26.2(1.1)	15.7(2.3)	21.0(2.4)	35.3(5.8)	3	1
EXTEND A NUMBER PATTERN	31.4(1.3)	31.4(2.1)	31.4(1.8)	33.0(1.6)	25.8(2.5)	27.9(2.9)	41.1(6.3)	5	1
SOLVE A PROBABILITY PROBLEM	29.0(1.4)	30.5(1.8)	27.3(1.8)	32.0(1.6)	20.6(2.2)	19.5(2.4)	33.8(4.9)	4	1
FIND AREA OF A RECTANGLE	22.2(1.3)	22.4(1.8)	22.1(1.6)	24.0(1.6)	15.9(2.2)	15.5(2.0)	33.5(6.1)	2	1
LOCATE OBJECT ON A GRID	89.9(0.7)	88.7(0.9)	91.0(1.1)	92.7(0.7)	82.2(2.4)	82.2(2.1)	89.7(5.4)	5	1
READ A BAR GRAPH	86.1(0.8)	88.0(1.1)	84.2(1.1)	89.5(0.8)	76.2(2.6)	76.6(2.2)	90.0(6.4)	4	1
ESTIMATE DISTANCE GIVEN TIME	80.3(0.9)	84.0(1.2)	76.7(1.3)	85.5(1.0)	61.5(2.9)	72.9(2.0)	78.3(7.4)	2	1
APPLY CONCEPT OF PROBABILITY	78.3(1.0)	78.6(1.1)	78.0(1.5)	81.4(1.1)	69.3(2.5)	71.2(2.5)	77.1(5.5)	4	1
READ A WEIGHT SCALE	76.2(1.0)	78.9(1.2)	73.5(1.5)	81.3(1.1)	59.1(3.2)	64.1(2.5)	80.6(3.0)	2	1
FIND GREATEST DISTANCE BETWEEN POINTS	60.1(1.2)	61.6(1.6)	58.6(1.5)	65.8(1.5)	43.4(2.5)	44.5(3.1)	63.8(4.3)	2	1
ANALYZE VOLUME RELATIONSHIPS	73.0(0.8)	73.6(1.1)	72.5(1.1)	77.3(0.9)	60.7(2.9)	62.9(2.5)	77.2(4.1)	2	1
IDENTIFY PARALLEL LINES	49.3(1.3)	51.8(1.9)	46.8(1.4)	54.6(1.5)	35.5(2.9)	37.1(2.6)	39.9(5.2)	3	1
IDENTIFY EXAMPLE OF CYLINDER	64.7(1.1)	65.9(1.4)	63.5(1.5)	68.5(1.3)	52.0(2.6)	54.9(2.0)	66.9(3.9)	3	1
SOLVE STORY PROBLEM (MULTIPLICATION)	56.2(1.3)	55.3(1.9)	57.1(1.8)	59.6(1.6)	43.0(2.8)	48.2(2.9)	67.7(***)	1	1
APPLY PLACE VALUE	61.4(1.1)	65.0(1.6)	57.7(1.6)	64.1(1.3)	52.4(3.1)	53.8(2.4)	68.0(8.7)	1	1
IDENTIFY AN EVEN NUMBER	41.9(1.2)	45.5(1.7)	38.3(1.6)	45.3(1.4)	30.9(3.1)	31.0(2.1)	53.1(5.0)	1	1
SOLVE MULTI-STEP STORY PROBLEM	47.1(1.4)	48.0(1.4)	46.2(1.9)	51.5(1.8)	32.3(2.5)	35.9(2.4)	48.1(6.1)	1	1
READ A GRAPH	63.3(1.2)	64.3(1.5)	62.2(1.6)	68.0(1.5)	45.0(2.7)	52.9(3.0)	75.4(4.2)	4	1
IDENTIFY CORRECT EXPLANATION	37.0(1.1)	38.1(1.2)	35.9(1.8)	38.2(1.3)	31.5(2.9)	35.1(2.7)	28.5(7.2)	1	1
SOLVE STORY PROBLEM (DIVISION)	36.7(1.3)	40.4(1.5)	33.1(1.7)	39.6(1.8)	25.3(2.5)	31.3(2.5)	35.0(4.3)	1	1
IDENTIFY A NUMBER RELATIONSHIP	52.4(1.1)	53.6(1.7)	51.3(1.4)	55.8(1.5)	45.5(2.3)	39.0(3.4)	53.7(6.5)	1	1
INTERPRET DECIMAL REPRESENTATION	61.4(1.3)	61.9(2.3)	60.9(1.9)	62.8(1.6)	54.1(3.4)	60.0(2.3)	70.1(6.3)	1	1
APPLY CONCEPT OF SYMMETRY	91.9(0.6)	91.4(0.8)	92.5(0.9)	94.2(0.6)	86.6(1.9)	84.2(2.1)	90.5(3.0)	3	1
USE ORDER OF OPERATIONS	82.1(0.9)	81.0(1.2)	83.4(1.2)	85.0(1.0)	73.7(1.8)	76.5(2.6)	84.1(4.9)	1	1
DIVIDE WHOLE NUMBERS	76.9(1.1)	75.0(1.4)	79.0(1.4)	80.5(1.3)	67.4(2.1)	66.7(2.4)	78.7(5.8)	1	1
FIND SUM USING NUMBER LINE	56.4(1.0)	55.8(1.3)	57.1(1.4)	59.2(1.2)	48.2(2.3)	47.0(2.3)	65.1(4.8)	5	1
SOLVE RATIO PROBLEM	56.0(1.3)	58.1(1.8)	53.6(1.5)	58.3(1.6)	48.0(2.4)	50.7(2.6)	61.6(5.3)	1	1
SOLVE MULTI-STEP STORY PROBLEM	32.4(0.8)	33.1(1.4)	31.7(1.3)	34.8(1.1)	26.6(1.9)	24.5(2.1)	33.0(4.9)	1	1
MULTIPLY DECIMALS	74.4(1.0)	72.3(1.7)	76.6(1.2)	77.2(1.3)	66.9(2.4)	64.5(2.6)	74.7(3.6)	1	2
INTERPRET READING ON A GAUGE	46.0(1.2)	51.7(1.4)	39.9(2.0)	48.4(1.4)	39.1(2.9)	37.4(2.7)	60.5(4.7)	2	1
SOLVE STORY PROBLEM (MULTIPLICATION)	52.4(1.3)	53.5(1.5)	51.2(1.8)	57.7(1.3)	35.8(2.9)	39.7(3.6)	54.6(4.6)	1	1
FIND DIFFERENCE IN TIMES	35.6(1.0)	37.3(1.6)	33.8(1.3)	38.6(1.3)	23.1(2.2)	31.1(2.3)	39.6(4.2)	2	1
APPLY CONCEPT OF PROBABILITY	56.0(1.2)	56.4(1.8)	55.6(1.5)	61.4(1.2)	40.8(2.3)	39.9(2.4)	53.8(6.5)	4	1
INTERPRET REPRESENTATION OF FRACTION	74.2(1.2)	72.2(1.7)	76.5(1.6)	75.7(1.3)	69.8(2.9)	68.6(2.7)	81.8(8.6)	1	1
SOLVE STORY PROBLEM (MULTIPLICATION)	61.8(1.3)	62.0(1.8)	61.7(1.5)	65.4(1.5)	47.8(3.0)	53.3(2.8)	74.0(3.7)	1	1
RECOGNIZE CORRECT OPERATION	45.0(1.0)	45.9(1.5)	44.0(1.5)	49.7(1.4)	26.8(2.2)	32.2(2.3)	61.1(6.7)	1	1
VISUALIZE WRITTEN STATEMENT	28.1(1.3)	31.4(1.7)	24.6(1.6)	29.5(1.6)	20.0(2.2)	27.5(3.2)	33.6(8.5)	3	1
MULTIPLY WHOLE NUMBERS	82.2(0.9)	81.7(1.2)	82.7(1.3)	83.6(1.2)	77.4(2.3)	77.6(2.2)	87.6(2.7)	1	2
FIND RELATIVE SIZE OF NUMBERS	72.3(1.2)	74.5(1.2)	70.0(2.0)	76.0(1.4)	59.4(2.9)	63.9(2.8)	77.0(4.3)	1	1
EXTEND GEOMETRIC PATTERN	76.3(0.9)	73.7(1.3)	78.9(1.1)	80.3(1.0)	63.8(2.9)	65.6(3.2)	84.7(2.9)	5	1
SOLVE NUMBER SENTENCE	70.7(1.0)	72.0(1.4)	69.2(1.4)	73.3(1.2)	63.1(2.3)	61.5(2.5)	77.9(3.4)	5	2
ADD WHOLE NUMBERS	60.0(1.0)	62.6(1.5)	57.3(1.5)	63.9(1.4)	44.5(2.0)	55.1(2.0)	59.0(4.6)	1	1
ADD AND DIVIDE WHOLE NUMBERS	51.0(1.1)	51.2(1.7)	50.7(1.3)	54.2(1.3)	41.7(2.0)	39.8(2.1)	59.8(5.9)	1	1

GRADE 4 - PERCENTAGE OF STUDENTS RESPONDING CORRECTLY TO THE 1990 MATHEMATICS ITEMS

SHORT TEXT	TOTAL	MALE	FEMALE	WHITE	BLACK	HISPANIC	ASIAN	CONTENT AREA	ITEM TYPE
SOLVE MULTI-STEP STORY PROBLEM	48.6(1.1)	44.7(1.7)	52.6(1.4)	52.5(1.3)	34.7(2.8)	39.5(2.7)	65.8(4.7)	1	1
APPLY CONCEPT OF FRACTION	46.4(1.4)	45.9(1.7)	46.9(1.9)	47.3(1.7)	43.0(2.7)	45.9(3.0)	43.6(3.8)	1	1
DETERMINE MISSING FACT	60.6(1.2)	62.0(1.5)	59.1(1.6)	64.0(1.6)	49.8(2.7)	50.7(3.2)	66.3(6.4)	1	1
CONVERT INCHES TO FEET	32.5(1.2)	35.9(1.8)	29.0(1.7)	37.0(1.5)	15.2(2.5)	19.8(2.7)	43.3(4.7)	2	2
MANIPULATE NUMBERS	19.7(0.9)	22.2(1.1)	17.2(1.3)	19.5(1.1)	17.7(2.6)	21.6(2.5)	20.9(4.4)	1	1
USE A RULE TO COMPLETE A CHART	14.7(1.0)	14.5(1.3)	14.9(1.2)	17.7(1.2)	4.5(1.2)	6.6(1.7)	18.8(4.5)	5	2
DIVIDE WITH A 3-DIGIT DIVISOR	22.2(1.1)	23.1(1.6)	21.2(1.6)	23.8(1.5)	14.9(2.4)	21.9(2.7)	26.1(3.3)	1	1
FIND PERIMETER OF RECTANGLE	33.9(1.7)	29.3(2.0)	38.5(1.9)	38.1(1.9)	20.0(3.6)	21.8(3.1)	35.1(5.0)	2	2
DRAW AXIS OF SYMMETRY	43.5(1.7)	41.7(2.0)	45.2(2.2)	47.7(2.1)	33.2(3.5)	28.3(3.3)	50.6(8.6)	3	2
ESTIMATE LENGTH IN INCHES	44.5(1.6)	46.5(2.1)	42.5(1.7)	50.8(2.0)	22.5(2.0)	35.5(3.0)	57.8(8.6)	6	1
ESTIMATE LENGTH IN CENTIMETERS	52.2(1.4)	52.9(1.8)	51.5(2.1)	51.8(1.7)	57.3(3.5)	48.1(2.3)	49.3(4.6)	6	1
ESTIMATE TREND ON LINE GRAPH	55.7(1.4)	57.7(1.7)	53.6(1.9)	58.9(1.6)	44.0(2.5)	52.3(2.7)	50.1(5.8)	6	1
ESTIMATE RELATIVE HEIGHT	45.7(1.2)	50.5(2.1)	40.9(1.4)	49.5(1.7)	33.0(2.0)	40.4(2.6)	38.7(4.7)	6	1
ESTIMATE A SUM OF MONEY	39.6(1.3)	39.0(1.5)	40.2(1.7)	42.4(1.6)	30.4(2.6)	36.0(1.8)	39.9(6.5)	6	1
ESTIMATE A PRODUCT	33.7(1.3)	38.4(2.0)	28.9(1.6)	35.6(1.5)	26.8(2.8)	29.1(2.8)	48.8(6.5)	6	1
ESTIMATE USING FRACTIONS	45.7(1.3)	45.0(1.4)	46.4(1.8)	48.1(1.6)	38.7(2.7)	41.9(2.9)	48.8(4.6)	6	1
ESTIMATE AN AREA ON A GRID	74.1(1.1)	73.9(1.3)	74.3(1.6)	76.6(1.4)	68.3(2.5)	70.2(2.2)	58.9(8.7)	6	1
ESTIMATE A SUM OF MIXED NUMBERS	47.6(1.3)	46.2(1.7)	49.0(1.6)	43.9(1.6)	62.8(2.7)	51.2(1.9)	41.4(5.3)	6	1
ESTIMATE PROPORTION	24.2(1.2)	24.8(1.5)	23.5(1.6)	25.8(1.5)	18.2(2.6)	21.7(2.3)	27.8(5.3)	6	1
ESTIMATE MIXED OPERATIONS	87.6(0.9)	87.5(1.3)	87.6(1.0)	90.3(1.1)	80.4(2.6)	80.3(2.1)	92.9(4.5)	6	1
ESTIMATE A SUM	66.7(1.2)	66.0(1.8)	67.5(1.6)	67.5(1.4)	66.1(3.5)	62.6(2.6)	64.8(9.1)	6	1
ESTIMATE A DIFFERENCE	87.4(0.7)	90.3(1.0)	84.5(1.0)	89.5(0.8)	80.8(2.2)	82.6(2.0)	97.5(1.7)	6	1
ESTIMATE SUM ON BAR GRAPH	48.6(1.2)	47.1(1.7)	50.1(1.6)	51.8(1.6)	38.1(3.2)	39.4(2.5)	58.2(***)	6	1
ESTIMATE DIFFERENCE ON BAR GRAPH	36.2(1.1)	36.9(1.7)	35.4(1.6)	41.3(1.4)	21.3(2.0)	25.5(2.0)	38.0(5.5)	6	1
ESTIMATE TIME IN DAYS	52.8(1.2)	57.0(1.7)	48.7(1.8)	56.3(1.6)	37.5(2.8)	51.9(2.4)	66.2(4.0)	6	1
ESTIMATE COIN VALUE	72.8(1.1)	74.0(1.3)	71.7(1.9)	74.8(1.3)	64.3(2.7)	72.8(2.1)	65.8(6.7)	6	1
ESTIMATE WEIGHT	83.0(0.9)	83.8(1.4)	82.1(1.3)	86.4(0.8)	71.2(3.3)	78.8(1.9)	84.6(4.8)	6	1
ESTIMATE READING ON THERMOMETER	53.9(1.5)	56.0(1.6)	51.8(1.9)	57.7(1.7)	45.0(3.1)	45.8(2.9)	47.5(7.4)	6	1
ESTIMATE PRODUCT	62.0(1.3)	60.2(1.6)	63.9(1.9)	62.5(1.6)	62.9(2.2)	56.9(2.3)	63.0(5.7)	6	1
VISUALIZE GEOMETRIC SHAPE	71.6(1.0)	72.7(1.3)	70.4(1.7)	77.8(1.1)	49.5(3.1)	62.3(2.1)	78.2(6.1)	7	2
APPLY PLACE VALUE	65.9(1.2)	67.7(1.6)	64.0(1.5)	72.3(1.4)	46.1(3.6)	53.6(2.7)	73.4(7.9)	7	2
USE SYMBOLS TO REPRESENT NUMBERS	63.8(1.4)	65.7(1.8)	61.8(2.1)	70.2(1.7)	42.5(3.6)	52.8(2.5)	71.2(7.8)	7	2
LOCATE ROUTE ON MAP	91.6(0.6)	91.4(0.9)	91.7(0.8)	93.9(0.6)	85.4(2.3)	86.7(1.5)	91.5(4.3)	7	2
COUNT POSSIBLE OUTCOMES	30.4(1.6)	30.4(1.8)	30.3(2.1)	32.7(2.0)	22.0(2.8)	24.4(2.0)	34.2(6.2)	7	2
APPLY SCALE MEASURE	68.5(1.2)	71.1(1.7)	65.8(1.6)	73.8(1.6)	46.7(2.9)	63.6(2.6)	73.3(5.7)	7	2
REPRESENT CONDITIONS ON A GRID	14.1(0.8)	13.8(1.5)	14.3(0.9)	17.4(1.2)	2.7(0.8)	8.6(1.4)	22.0(6.4)	7	2
APPLY DECIMAL ADDITION	36.6(1.2)	33.1(1.5)	40.1(1.8)	40.1(1.4)	26.7(2.6)	27.9(2.8)	49.3(9.1)	7	2
LIST POSSIBLE OUTCOMES	25.4(1.6)	26.4(2.1)	24.3(1.9)	31.6(2.1)	5.7(1.2)	11.9(2.2)	36.6(6.6)	7	2
APPLY CONCEPT OF EVEN NUMBER	6.1(0.6)	6.2(0.9)	5.9(0.8)	7.9(0.9)	0.2(0.2)	1.1(0.4)	9.5(3.7)	7	2
APPLY PLACE VALUE	32.1(1.6)	36.8(2.0)	27.3(1.8)	35.6(2.0)	20.4(2.3)	26.3(2.3)	30.7(5.3)	7	1
LIST SAMPLE SPACE	39.2(1.9)	36.3(2.1)	42.2(2.3)	48.5(2.3)	9.5(1.7)	20.8(2.9)	48.9(6.3)	7	2
USE VENN DIAGRAM	18.0(1.3)	18.6(1.7)	17.4(1.4)	22.8(1.7)	5.0(1.2)	6.7(1.5)	16.8(6.6)	7	2
MAKE SCALE DRAWING	38.0(1.6)	40.8(2.0)	35.0(1.9)	45.5(1.9)	13.5(1.7)	22.7(2.2)	46.6(8.0)	7	2

CONTENT AREAS
1 = Numbers and Operations
2 = Measurement
3 = Geometry
4 = Data Analysis, Statistics, and Probability
5 = Algebra and Functions
6 = Estimation
7 = Problem Solving

ITEM TYPES
1 = Multiple Choice
2 = Constructed Response

GRADE 8 - OVERALL MATHEMATICS PROFICIENCY
PERCENTAGE OF STUDENTS AT OR ABOVE ANCHOR POINTS

	N	WEIGHTED PCT [CV]	200	250	300	350
-- TOTAL --	6473	100.0(0.0) [0%]	97.7(0.4)	67.4(1.2)	14.2(1.1)	0.2(0.1)
SEX						
MALE	3218	50.0(0.7) [1%]	97.8(0.5)	66.7(1.5)	15.9(1.3)	0.3(0.2)
FEMALE	3255	50.0(0.7) [1%]	97.6(0.5)	68.2(1.4)	12.5(1.3)	0.1(0.1)
RACE/ETHNICITY						
WHITE	4220	70.6(0.2) [0%]	99.3(0.3)	76.8(1.2)	17.6(1.4)	0.2(0.1)
BLACK	944	15.1(0.1) [1%]	91.9(1.6)	36.0(2.5)	2.7(0.8)	0.0(0.0)
HISPANIC	920	10.0(0.1) [2%]	94.9(1.1)	46.5(3.2)	4.1(1.2)	0.0(0.0)
ASIAN/PACIFIC ISLANDER	267	2.7(0.4) [13%]	98.8(1.1)	85.9(3.1)	32.4(4.9)	1.9(2.1)
AMER IND/ALASKAN NATV	100	1.4(0.4) [28%]!	96.9(5.0)	47.3(8.5)	3.6(1.9)	0.0(0.0)
REGION						
NORTHEAST	1583	21.0(1.0) [5%]	98.7(0.4)	73.2(3.2)	17.5(2.1)	0.4(0.3)
SOUTHEAST	1564	24.3(0.9) [4%]	95.5(1.4)	56.7(2.6)	8.9(1.1)	0.0(0.0)
CENTRAL	1403	25.2(0.7) [3%]	98.8(0.6)	72.9(1.8)	15.2(1.8)	0.2(0.2)
WEST	1923	29.5(0.7) [2%]	97.7(0.6)	67.5(2.6)	15.4(3.4)	0.3(0.2)
AGE						
BELOW MODAL AGE	45	0.6(0.1) [18%]	100.0(0.0)	69.6(13.2)	18.8(4.9)	1.6(3.4)
AT MODAL AGE	4040	58.3(0.9) [2%]	99.0(0.3)	77.6(1.2)	18.6(1.4)	0.3(0.1)
ABOVE MODAL AGE	2388	41.1(1.0) [2%]	95.8(0.9)	53.0(1.6)	7.9(1.0)	0.1(0.1)
TYPE OF COMMUNITY						
EXTREME RURAL	605	11.4(2.2) [19%]	97.5(1.5)	62.4(3.7)	10.7(1.7)	0.0(0.0)
DISADVANTAGED URBAN	834	10.1(1.8) [18%]	95.6(0.9)	50.9(3.7)	7.8(1.1)	0.1(0.2)
ADVANTAGED URBAN	814	10.9(2.2) [21%]!	99.7(0.4)	86.0(3.0)	28.9(6.8)	0.8(0.6)
OTHER	4220	67.7(3.0) [4%]	97.7(0.6)	67.8(1.6)	13.4(0.9)	0.2(0.1)
PARENTS' EDUCATION LEVEL						
LESS THAN H.S.	542	8.9(0.6) [7%]	95.9(1.6)	41.0(2.6)	3.0(1.2)	0.0(0.0)
GRADUATED H.S.	1516	24.5(0.9) [4%]	97.2(0.5)	57.4(1.7)	6.0(1.0)	0.0(0.0)
SOME EDUC AFTER H.S.	1149	17.9(0.6) [3%]	98.9(0.5)	76.7(1.5)	14.5(1.1)	0.1(0.2)
GRADUATED COLLEGE	2690	40.3(1.5) [4%]	99.0(0.4)	81.0(1.5)	23.9(1.9)	0.4(0.2)
UNKNOWN	557	8.1(0.4) [5%]	92.4(1.5)	39.5(2.5)	2.2(1.0)	0.0(0.0)
TYPE OF SCHOOL						
PUBLIC	5198	88.9(1.3) [2%]	97.4(0.5)	65.5(1.3)	13.4(1.3)	0.2(0.1)
PRIVATE	1275	11.1(1.3) [12%]	99.8(0.2)	82.5(2.0)	20.7(2.4)	0.1(0.1)
ABILITY STUDENTS IN CLASS						
HIGH ABILITY	1310	20.0(1.3) [7%]	99.7(0.2)	91.2(1.8)	38.4(3.4)	0.9(0.4)
AVERAGE ABILITY	1787	28.4(1.6) [6%]	98.6(0.5)	70.8(1.8)	7.9(1.2)	0.0(0.1)
LOW ABILITY	827	12.7(1.1) [9%]	93.5(1.8)	34.8(2.9)	2.4(0.8)	0.0(0.0)
MIXED ABILITY	925	15.9(1.9) [12%]	98.9(0.6)	63.5(4.1)	7.2(2.4)	0.0(0.0)

! INTERPRET WITH CAUTION: SAMPLING ERROR CANNOT BE ESTIMATED ACCURATELY SINCE COEFFICIENT OF VARIATION OF ESTIMATED NUMBER OF STUDENTS EXCEEDS 20%

GRADE 8 - OVERALL MATHEMATICS PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	265.0(1.0)	32.4(0.6)	211.1(1.7)	222.8(1.0)	242.4(1.0)	265.8(1.1)	287.7(1.5)	306.5(1.2)	317.1(1.7)
SEX									
MALE	265.5(1.3)	33.4(0.6)	211.3(2.0)	222.5(0.9)	241.8(1.7)	265.3(1.3)	289.5(2.4)	309.4(1.9)	320.4(2.8)
FEMALE	264.4(1.1)	31.3(0.7)	210.8(1.9)	223.0(1.2)	243.1(1.2)	266.2(1.2)	286.2(1.3)	303.7(1.6)	314.4(2.2)
RACE/ETHNICITY									
WHITE	272.1(1.2)	29.5(0.5)	222.8(1.2)	233.8(1.1)	251.8(1.5)	272.7(1.1)	292.4(1.3)	310.6(1.4)	320.3(2.1)
BLACK	240.8(1.6)	29.6(1.0)	192.3(2.9)	203.8(2.1)	221.1(2.6)	239.3(1.6)	259.7(1.5)	281.0(1.7)	293.2(5.0)
HISPANIC	247.9(1.6)	29.6(0.8)	199.5(2.3)	210.1(2.5)	227.4(2.1)	247.9(2.[illegible])	268.1(1.4)	287.5(2.6)	297.8(3.4)
ASIAN/PACIFIC ISLANDER	284.8(4.1)	33.4(2.6)	227.3(8.9)	241.1(3.8)	263.9(4.6)	285.6(7.0)	307.3(2.8)	328.0(5.6)	339.5(8.7)
AMER IND/ALASKAN NATV	247.9(3.4)	28.9(3.0)	202.9(16.3)	210.6(6.8)	225.5(4.3)	247.5(7.4)	268.4(2.1)	286.7(5.5)	294.8(9.6)
REGION									
NORTHEAST	270.1(2.6)	31.3(0.9)	218.2(3.2)	230.2(3.1)	248.5(2.7)	270.7(2.6)	291.8(2.8)	310.0(4.2)	320.8(3.6)
SOUTHEAST	256.2(1.7)	32.5(0.9)	201.9(5.0)	214.3(3.1)	233.8(2.6)	255.8(2.5)	280.0(2.5)	298.4(1.5)	309.4(3.9)
CENTRAL	268.8(1.6)	30.5(0.9)	217.7(4.7)	229.1(3.1)	248.2(2.4)	269.7(1.4)	289.6(1.9)	307.6(3.6)	318.5(2.8)
WEST	265.3(2.7)	33.1(1.3)	210.1(3.7)	221.4(2.3)	242.2(2.5)	266.0(2.0)	289.0(4.7)	308.5(3.4)	319.1(4.7)
AGE									
BELOW MODAL AGE	269.1(6.1)	32.7(4.5)	220.3(12.8)	227.4(16.3)	247.8(8.1)	263.7(19.4)	290.3(18.8)	314.0(9.3)	332.2(11.4)
AT MODAL AGE	272.9(1.1)	30.1(0.5)	222.0(2.0)	233.3(1.1)	252.7(1.2)	274.1(1.2)	293.9(1.4)	310.9(1.2)	320.5(2.1)
ABOVE MODAL AGE	253.7(1.2)	32.1(0.9)	202.4(2.3)	213.4(1.9)	231.6(1.3)	252.5(1.4)	275.3(1.8)	295.6(3.0)	308.9(4.1)
TYPE OF COMMUNITY									
EXTREME RURAL	261.1(2.6)	30.7(1.3)	210.8(7.7)	221.9(3.1)	239.4(2.7)	261.0(4.2)	283.2(2.8)	301.2(3.4)	311.4(2.3)
DISADVANTAGED URBAN	251.7(2.5)	32.0(1.1)	201.3(2.0)	211.4(2.9)	229.4(2.8)	250.6(2.1)	273.4(4.4)	295.2(2.8)	306.6(1.7)
ADVANTAGED URBAN	283.2(4.0)	29.4(0.8)	23[illegible](5.5)	243.9(2.8)	264.5(3.1)	284.6(4.5)	303.5(4.7)	320.5(5.5)	330.0(4.1)
OTHER	264.7(1.2)	31.9(0.7)	211.1(2.8)	223.0(1.8)	242.7(1.4)	265.6(1.1)	286.9(1.3)	305.5(0.9)	315.9(1.5)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	245.8(1.4)	27.3(1.2)	202.5(1.7)	213.3(3.7)	228.0(1.6)	244.1(2.2)	263.2(2.2)	281.5(3.4)	293.3(12.6)
GRADUATED H.S.	255.5(0.9)	29.1(0.6)	207.2(1.2)	218.2(2.8)	236.0(1.2)	255.5(1.3)	275.4(0.8)	292.6(2.3)	302.9(2.3)
SOME EDUC AFTER H.S.	270.2(1.0)	28.9(0.7)	219.9(2.4)	231.8(4.3)	251.7(1.2)	271.6(1.6)	289.9(1.5)	305.9(1.0)	315.9(2.6)
GRADUATED COLLEGE	277.2(1.5)	30.9(0.5)	223.3(1.5)	236.1(1.9)	256.9(2.1)	278.8(1.4)	298.9(2.0)	315.9(1.8)	325.4(2.5)
UNKNOWN	242.6(1.9)	29.6(1.1)	193.5(4.4)	205.4(2.2)	222.3(3.3)	242.1(2.3)	263.1(4.0)	282.6(2.6)	293.5(2.8)
TYPE OF SCHOOL									
PUBLIC	263.5(1.2)	32.6(0.6)	209.5(1.7)	221.2(1.4)	240.7(1.4)	264.0(0.9)	286.4(1.6)	305.6(1.4)	316.6(2.2)
PRIVATE	276.8(1.8)	27.7(1.0)	230.0(3.8)	240.4(3.2)	258.0(1.7)	277.9(1.9)	296.3(1.8)	311.8(1.6)	321.1(3.5)
ABILITY STUDENTS IN CLASS									
HIGH ABILITY	290.3(2.2)	28.3(1.2)	240.4(6.1)	253.0(3.7)	273.0(1.9)	292.1(2.2)	310.3(2.7)	325.4(3.2)	332.9(3.7)
AVERAGE ABILITY	263.8(1.3)	27.1(0.7)	216.2(2.5)	228.2(2.0)	246.2(1.6)	265.4(1.2)	282.5(1.5)	296.5(2.5)	305.6(1.1)
LOW ABILITY	241.1(1.9)	27.6(1.4)	196.0(3.0)	206.6(2.7)	223.3(1.9)	24[illegible].5(2.4)	258.5(2.0)	276.9(4.7)	288.3(6.0)
MIXED ABILITY	260.1(2.8)	27.4(1.0)	214.8(8.4)	223.8(3.3)	240.0(4.2)	260.6(2.9)	279.8(3.7)	296.1(4.6)	304.7(2.1)

GRADE 8 - NUMBERS AND OPERATIONS PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	268.6(1.0)	34.8(0.5)	209.8(1.3)	223.0(2.2)	245.0(1.1)	269.6(1.0)	292.8(1.1)	313.0(1.4)	325.0(1.7)
SEX									
MALE	268.4(1.4)	36.4(0.7)	208.2(1.6)	221.1(1.7)	242.7(1.6)	268.6(1.5)	294.3(2.8)	315.7(2.1)	327.6(2.6)
FEMALE	268 9(1.0)	33.2(0.6)	211.5(1.5)	225.6(2.1)	246.9(1.0)	270.5(1.3)	291.6(0.9)	310.0(2.4)	321.9(2.0)
RACE/ETHNICITY									
WHITE	274.9(1.2)	32.8(0.5)	219.1(2.3)	231.9(1.2)	253.0(1.4)	275.9(1.2)	297.4(1.2)	316.6(1.3)	327.9(1.8)
BLACK	248.1(1.8)	32.7(1.2)	193.0(2.6)	205.5(1.9)	226.1(2.4)	248.1(1.8)	269.8(2.0)	289.9(3.1)	302.4(3.8)
HISPANIC	252.6(1.6)	32.7(1.1)	198.7(4.6)	210.9(2.4)	230.1(2.1)	252.2(2.4)	275.2(2.1)	295.1(4.1)	307.0(4.6)
ASIAN/PACIFIC ISLANDER	288.3(4.3)	36.6(2.5)	225.0(13.3)	240.5(9.5)	266.3(3.9)	288.7(5.2)	311.7(7.7)	335.7(7.3)	350.2(14.4)
AMER IND/ALASKAN NATV	249.7(4.4)	30.4(3.1)	197.6(18.4)	209.0(8.8)	227.0(7.1)	250.5(7.1)	272.8(4.0)	287.2(7.3)	295.5(5.5)
REGION									
NORTHEAST	272.4(2.4)	34.1(1.0)	215.9(2.6)	228.7(2.3)	249.2(3.0)	272.8(3.1)	295.0(2.8)	316.8(4.8)	329.7(2.8)
SOUTHEAST	261.1(1.9)	34.9(0.8)	202.3(1.8)	216.5(2.9)	237.3(2.4)	261.7(2.1)	285.7(2.6)	305.8(2.2)	317.2(2.6)
CENTRAL	273.1(1.6)	33.0(0.9)	217.1(3.8)	230.1(2.2)	251.5(1.7)	273.9(2.0)	295.6(2.9)	315.3(1.8)	326.1(3.3)
WEST	268.3(2.6)	35.8(1.0)	207.3(1.3)	220.9(3.1)	244.1(2.6)	269.6(2.9)	293.5(3.4)	314.3(3.6)	325.6(3.3)
AGE									
BELOW MODAL AGE	275.7(5.4)	32.2(5.6)	232.5(16.5)	238.8(8.1)	253.9(6.4)	270.0(9.8)	295.9(29.9)	321.4(24.8)	336.4(17.9)
AT MODAL AGE	276.1(1.1)	32.8(0.6)	219.6(2.4)	232.6(1.1)	254.7(1.4)	277.4(1.4)	298.5(1.4)	317.4(1.8)	328.6(1.6)
ABOVE MODAL AGE	257.9(1.3)	34.9(0.9)	200.8(1.5)	213.2(1.7)	234.1(1.4)	257.5(1.6)	281.1(1.4)	303.3(2.6)	316.9(2.5)
TYPE OF COMMUNITY									
EXTREME RURAL	264.1(2.8)	33.9(1.4)	208.5(4.4)	220.8(5.6)	240.4(2.2)	264.6(4.9)	288.1(2.5)	308.1(3.0)	319.8(5.0)
DISADVANTAGED URBAN	256.8(2.2)	34.3(1.2)	201.4(3.9)	212.6(3.2)	232.5(2.4)	256.8(3.0)	279.8(2.7)	300.8(4.2)	314.9(4.7)
ADVANTAGED URBAN	286.0(3.6)	32.3(0.8)	229.0(2.8)	243.7(6.3)	265.1(6.5)	288.1(3.6)	307.7(5.0)	326.7(3.5)	336.8(3.5)
OTHER	268.4(1.2)	34.4(0.7)	209.8(2.0)	223.1(3.3)	245.4(1.7)	269.3(1.2)	292.2(1.1)	312.2(1.9)	323.7(1.9)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	250.3(1.6)	31.0(1.5)	197.7(7.9)	210.3(1.6)	230.4(2.0)	250.0(3.0)	270.9(2.0)	289.7(3.1)	301.6(2.7)
GRADUATED H.S.	259.9(1.0)	31.9(0.7)	206.6(3.0)	219.3(2.2)	238.2(1.4)	260.8(1.3)	281.1(1.2)	300.5(1.7)	311.9(1.6)
SOME EDUC AFTER H.S.	274.1(1.0)	31.7(0.9)	219.9(1.7)	233.2(2.4)	252.9(1.7)	275.4(1.4)	295.1(1.6)	314.2(2.3)	325.4(1.8)
GRADUATED COLLEGE	280.3(1.5)	33.5(0.5)	221.6(1.2)	235.6(2.8)	258.7(2.7)	281.6(2.0)	303.6(2.0)	322.5(2.8)	332.9(1.6)
UNKNOWN	245.5(2.0)	32.6(1.2)	191.4(4.2)	203.6(4.7)	222.6(4.0)	245.5(3.6)	268.0(2.4)	288.3(4.5)	299.2(9.2)
TYPE OF SCHOOL									
PUBLIC	267.1(1.2)	35.0(0.6)	208.5(1.5)	221.3(1.2)	243.1(1.5)	268.0(1.3)	291.2(1.1)	311.9(2.4)	324.1(2.0)
PRIVATE	281.1(1.9)	30.9(1.0)	228.8(3.4)	241.3(2.2)	260.1(3.1)	281.5(2.6)	302.1(2.1)	320.3(2.1)	331.3(3.6)
ABILITY STUDENTS IN CLASS									
HIGH ABILITY	292.2(2.2)	30.8(0.9)	239.1(6.2)	251.9(4.7)	272.8(2.2)	293.5(1.8)	313.2(2.8)	330.6(2.6)	339.8(1.1)
AVERAGE ABILITY	268.1(1.2)	30.2(0.9)	215.7(3.4)	228.6(2.5)	248.5(3.3)	269.5(1.3)	288.4(1.2)	306.1(1.4)	317.2(2.9)
LOW ABILITY	244.8(1.9)	31.8(1.3)	193.3(6.8)	204.5(1.8)	224.0(2.6)	244.6(3.4)	265.0(3.0)	285.9(4.1)	298.3(11.8)
MIXED ABILITY	264.5(2.6)	30.2(1.1)	214.1(6.9)	225.1(2.8)	243.3(2.7)	265.1(4.9)	286.0(5.1)	303.6(4.1)	313.0(3.5)

GRADE 8 - MEASUREMENT PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	261.4(1.2)	42.9(0.9)	189.4(2.4)	205.3(1.5)	232.4(1.0)	262.3(1.2)	291.0(2.3)	315.6(2.0)	330.6(2.5)
SEX									
MALE	265.4(1.5)	43.4(1.0)	193.1(2.3)	209.0(1.8)	236.3(2.4)	265.7(1.7)	295.4(1.8)	321.0(3.4)	336.0(3.7)
FEMALE	257.3(1.4)	42.1(1.0)	186.1(2.5)	202.2(2.1)	228.8(1.8)	259.0(1.9)	286.7(2.0)	310.3(1.9)	324.6(2.1)
RACE/ETHNICITY									
WHITE	269.9(1.4)	40.0(0.8)	203.2(1.8)	218.1(1.5)	243.0(1.3)	270.3(1.6)	297.1(2.3)	321.0(2.6)	335.3(3.2)
BLACK	232.2(1.9)	40.0(1.5)	168.3(5.6)	180.5(6.6)	204.7(2.8)	231.1(3.9)	259.1(1.5)	284.9(2.8)	301.7(3.4)
HISPANIC	242.0(2.0)	40.8(1.3)	173.7(5.7)	189.1(3.1)	214.0(2.6)	242.6(3.5)	270.2(2.3)	293.6(2.0)	308.8(4.3)
ASIAN/PACIFIC ISLANDER	281.0(5.6)	43.2(3.7)	209.4(9.5)	225.5(11.3)	252.7(7.0)	281.5(6.2)	310.1(6.6)	337.2(12.2)	352.1(13.0)
AMER IND/ALASKAN NATV	247.4(6.5)	40.3(5.9)	176.0(30.7)	195.3(30.1)	221.7(14.9)	250.4(6.3)	271.9(10.9)	299.3(6.3)	312.9(15.4)
REGION									
NORTHEAST	266.9(3.4)	42.0(1.6)	196.1(3.1)	212.4(4.2)	239.4(3.0)	267.4(3.5)	295.0(4.2)	320.2(6.6)	336.3(5.1)
SOUTHEAST	250.2(1.9)	43.3(1.6)	178.3(5.3)	194.3(3.2)	220.2(2.0)	251.0(2.9)	280.9(2.4)	306.4(2.4)	319.8(2.4)
CENTRAL	266.4(2.1)	41.0(1.2)	197.8(6.0)	213.9(2.2)	239.2(3.0)	266.8(2.8)	294.1(3.3)	318.6(4.7)	334.1(6.5)
WEST	262.4(3.2)	43.3(1.4)	189.9(4.1)	205.9(3.0)	232.8(3.5)	263.4(3.5)	292.2(3.1)	317.0(5.2)	332.2(4.8)
AGE									
BELOW MODAL AGE	264.0(8.9)	44.4(5.4)	194.8(17.7)	208.4(14.6)	232.3(12.6)	259.4(12.2)	294.2(10.1)	323.1(22.6)	345.2(37.7)
AT MODAL AGE	270.1(1.4)	41.1(1.0)	200.9(2.5)	216.8(1.7)	242.8(1.3)	271.0(1.4)	297.9(2.1)	321.7(1.7)	336.4(3.3)
ABOVE MODAL AGE	248.9(1.5)	42.5(1.0)	179.1(5.6)	194.6(2.8)	219.9(1.8)	248.7(1.6)	277.8(1.6)	304.4(3.2)	319.1(6.1)
TYPE OF COMMUNITY									
EXTREME RURAL	259.5(3.3)	40.7(2.0)	191.9(9.2)	208.7(3.8)	232.7(4.9)	259.9(5.2)	287.9(3.1)	311.4(3.2)	324.4(7.3)
DISADVANTAGED URBAN	245.4(3.3)	42.9(1.5)	176.7(5.0)	190.6(6.0)	215.3(4.0)	244.9(4.6)	274.6(3.7)	300.0(3.5)	317.1(8.0)
ADVANTAGED URBAN	281.9(4.5)	40.2(1.3)	212.7(5.4)	228.1(5.6)	256.5(4.6)	283.2(5.5)	308.9(3.2)	331.4(5.3)	345.1(7.8)
OTHER	260.8(1.5)	42.5(1.2)	189.6(3.0)	205.5(2.5)	232.1(1.5)	261.6(1.3)	289.9(1.9)	314.5(2.1)	329.5(3.8)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	240.0(1.8)	39.4(2.0)	178.0(9.9)	191.3(7.8)	212.1(2.1)	[illegible](3.4)	265.9(1.4)	291.5(2.9)	306.3(4.9)
GRADUATED H.S.	250.2(1.3)	39.9(1.3)	183.6(2.8)	198.2(1.8)	223.6(1.9)	250.6(1.5)	277.1(2.8)	300.9(2.0)	315.2(3.9)
SOME EDUC AFTER H.S.	268.3(1.5)	39.5(1.2)	200.6(2.2)	215.7(4.9)	242.6(2.7)	269.4(2.0)	295.5(2.1)	317.5(2.7)	331.0(4.8)
GRADUATED COLLEGE	274.9(1.8)	41.4(1.1)	204.4(3.9)	220.5(1.7)	248.3(2.3)	276.3(2.4)	303.4(2.0)	326.6(2.6)	340.9(3.9)
UNKNOWN	236.6(2.7)	39.7(1.7)	171.5(6.7)	186.5(4.8)	209.5(6.1)	236.2(3.4)	264.6(3.3)	288.6(3.8)	301.9(2.4)
TYPE OF SCHOOL									
PUBLIC	259.9(1.4)	43.2(1.0)	187.7(2.1)	203.6(1.6)	230.5(1.6)	260.7(1.5)	289.7(1.9)	314.5(2.3)	329.9(3.2)
PRIVATE	273.1(2.3)	38.5(1.3)	208.3(2.4)	223.4(6.2)	247.6(2.1)	273.3(3.5)	300.0(3.3)	322.6(3.8)	334.7(3.3)
ABILITY STUDENTS IN CLASS									
HIGH ABILITY	287.2(2.7)	40.2(1.8)	217.5(7.5)	234.6(4.4)	261.2(2.3)	289.1(2.9)	314.2(3.1)	337.8(3.7)	349.6(7.3)
AVERAGE ABILITY	260.9(1.5)	39.6(0.8)	192.7(1.5)	208.9(2.2)	234.6(2.2)	262.7(1.3)	288.4(1.5)	310.4(3.1)	323.5(3.7)
LOW ABILITY	236.4(2.5)	38.7(1.8)	172.5(7.0)	186.2(6.2)	210.9(4.0)	237.0(3.4)	261.2(2.4)	286.0(2.1)	301.2(5.8)
MIXED ABILITY	258.0(3.5)	38.8(1.4)	194.0(2.4)	207.7(6.0)	231.3(3.6)	258.5(3.9)	285.3(5.2)	307.3(3.1)	320.6(6.3)

GRADE 8 - GEOMETRY PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	261.8(1.0)	35.0(0.7)	204.0(2.0)	216.5(1.4)	238.5(1.0)	261.9(0.9)	285.5(1.2)	306.4(1.6)	319.1(1.6)
SEX									
MALE	262.6(1.2)	35.7(0.7)	204.0(2.5)	216.9(2.0)	238.8(1.9)	262.0(1.1)	286.5(1.9)	308.7(2.2)	321.2(1.6)
FEMALE	261.0(1.1)	34.4(0.8)	204.2(2.2)	216.0(1.6)	238.2(1.4)	261.7(1.1)	284.5(1.7)	304.3(2.3)	316.7(2.9)
RACE/ETHNICITY									
WHITE	268.5(1.2)	32.8(0.6)	214.6(1.7)	226.5(2.2)	246.9(1.6)	268.1(1.4)	290.5(1.3)	310.3(1.8)	322.6(2.4)
BLACK	238.3(1.7)	33.2(1.2)	184.0(3.0)	196.3(2.9)	215.6(3.4)	238.2(2.5)	25[illegible].3(2.1)	281.4(2.6)	294.9(5.0)
HISPANIC	246.9(1.8)	32.2(1.1)	193.6(2.4)	206.1(4.0)	225.0(1.7)	247.1(2.2)	269.2(3.6)	287.0(3.8)	299.4(2.1)
ASIAN/PACIFIC ISLANDER	281.1(3.6)	34.0(2.7)	226.9(8.4)	238.9(3.9)	258.0(9.4)	281.3(3.9)	303.4(7.6)	325.6(7.3)	336.7(13.3)
AMER IND/ALASKAN NATV	250.2(4.4)	33.4(2.8)	196.5(7.1)	208.0(7.7)	224.8(8.8)	249.2(4.2)	274.9(5.6)	295.0(6.3)	308.3(8.6)
REGION									
NORTHEAST	267.4(2.6)	34.0(0.9)	211.9(1.8)	223.1(2.5)	244.7(2.8)	267.3(3.0)	290.2(2.0)	311.1(2.4)	323.5(3.0)
SOUTHEAST	252.1(1.8)	35.0(1.1)	194.2(3.0)	207.3(2.8)	228.4(2.3)	252.7(2.1)	276.5(2.6)	297.0(3.2)	308.7(3.1)
CENTRAL	265.4(1.6)	34.8(1.2)	208.2(2.4)	220.5(3.4)	242.2(2.9)	265.5(2.7)	288.5(2.0)	309.8(2.2)	322.2(4.6)
WEST	262.8(2.6)	34.4(1.1)	205.7(3.6)	218.6(2.1)	239.8(1.8)	262.7(2.5)	286.0(3.9)	306.7(4.5)	319.6(2.7)
AGE									
BELOW MODAL AGE	263.6(7.6)	36.8(4.5)	208.1(6.8)	216.1(24.9)	235.6(9.1)	265.7(10.5)	287.3(5.8)	314.2(15.1)	327.3(59.6)
AT MODAL AGE	268.4(1.1)	33.5(0.6)	212.7(1.7)	225.0(1.6)	246.5(1.7)	268.9(0.9)	290.8(1.2)	310.7(1.5)	322.6(2.9)
ABOVE MODAL AGE	252.4(1.3)	35.0(1.0)	195.4(3.3)	208.2(1.7)	228.8(1.6)	252.1(0.8)	275.3(1.9)	297.8(1.9)	311.2(1.3)
TYPE OF COMMUNITY									
EXTREME RURAL	258.0(2.8)	33.6(2.2)	201.9(7.9)	215.4(5.4)	234.8(4.2)	258.2(2.7)	281.0(3.1)	301.0(3.0)	312.1(6.2)
DISADVANTAGED URBAN	250.9(2.4)	34.4(1.4)	193.5(2.9)	207.3(4.2)	227.8(2.7)	250.6(3.2)	273.5(2.6)	295.8(3.9)	307.9(2.8)
ADVANTAGED URBAN	277.9(3.6)	32.9(1.3)	223.9(6.1)	235.3(3.9)	255.1(4.5)	278.1(3.4)	300.5(2.7)	320.5(3.7)	330.9(2.8)
OTHER	261.5(1.3)	34.8(0.7)	204.1(3.5)	216.2(2.0)	238.6(1.5)	261.6(1.1)	285.0(1.4)	305.4(1.5)	318.2(1.4)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	244.2(1.4)	31.0(1.5)	195.7(3.2)	206.2(4.0)	222.5(3.2)	243.6(1.8)	264.1(2.9)	284.6(4.5)	296.5(5.0)
GRADUATED H.S.	253.3(1.3)	32.8(0.8)	199.4(2.8)	210.7(2.3)	231.5(2.8)	253.9(1.5)	275.0(1.3)	294.7(2.7)	306.8(2.7)
SOME EDUC AFTER H.S.	265.4(1.3)	33.0(0.7)	209.6(3.7)	222.8(2.9)	244.7(1.3)	266.1(1.9)	287.2(1.8)	307.8(2.0)	319.2(2.7)
GRADUATED COLLEGE	272.6(1.4)	34.4(0.7)	215.0(2.1)	228.0(2.3)	250.1(1.9)	273.6(1.4)	295.9(1.9)	315.6(2.3)	327.6(2.6)
UNKNOWN	246.0(2.5)	32.3(1.3)	191.9(4.6)	205.7(4.6)	224.2(2.3)	246.4(2.1)	267.9(2.6)	287.5(6.2)	298.7(3.6)
TYPE OF SCHOOL									
PUBLIC	260.7(1.2)	35.2(0.7)	202.7(2.6)	215.2(2.5)	237.3(1.9)	260.8(1.2)	284.5(1.6)	305.6(1.8)	318.4(1.5)
PRIVATE	270.7(2.0)	32.4(1.1)	217.2(3.4)	229.0(4.2)	248.4(2.1)	270.7(3.1)	293.2(1.7)	312.1(2.8)	323.9(3.6)
ABILITY STUDENTS IN CLASS									
HIGH ABILITY	284.5(2.3)	32.5(1.1)	230.1(2.3)	243.1(3.9)	262.9(2.4)	285.2(4.1)	305.8(2.5)	325.1(5.0)	336.2(3.5)
AVERAGE ABILITY	260.7(1.5)	31.3(1.0)	207.8(2.8)	219.8(2.8)	240.4(1.3)	261.5(1.8)	281.6(1.7)	300.4(1.4)	310.5(1.6)
LOW ABILITY	241.6(2.2)	31.5(1.4)	189.6(3.1)	202.3(5.0)	220.3(2.4)	241.3(1.8)	262.5(2.5)	281.7(3.2)	293.4(3.8)
MIXED ABILITY	257.[illegible](2.8)	30.8(1.4)	206.9(6.3)	217.2(3.4)	236.6(6.5)	257.2(3.0)	278.0(2.5)	297.1(2.6)	307.8(3.3)

GRADE 8 - DATA ANALYSIS, STATISTICS, AND PROBABILITY PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	266.3(1.3)	41.1(0.7)	195.4(2.3)	211.6(1.5)	238.9(1.5)	268.3(1.6)	295.1(1.7)	317.9(1.7)	331.0(1.9)
SEX									
MALE	266.3(1.5)	41.9(0.7)	194.7(2.8)	211.1(1.7)	237.6(2.0)	267.9(1.8)	296.2(2.2)	319.6(2.5)	332.6(2.2)
FEMALE	266.3(1.5)	40.3(1.0)	196.3(4.3)	212.4(3.8)	240.3(1.6)	268.6(1.7)	294.2(1.8)	316.1(1.7)	329.1(3.1)
RACE/ETHNICITY									
WHITE	275.2(1.4)	37.3(0.7)	212.2(2.6)	226.2(2.4)	250.7(1.3)	276.0(1.8)	300.8(1.2)	322.4(2.5)	334.6(3.1)
BLACK	237.2(2.3)	39.9(1.3)	173.1(3.1)	186.0(5.5)	209.2(2.3)	236.4(2.3)	265.6(3.6)	290.4(4.6)	302.7(4.6)
HISPANIC	245.0(2.0)	39.4(1.1)	178.4(6.6)	193.4(4.4)	218.2(3.3)	246.0(4.2)	272.1(3.1)	295.6(2.1)	308.0(5.4)
ASIAN/PACIFIC ISLANDER	286.9(4.5)	40.6(2.8)	215.0(6.7)	234.3(12.7)	261.4(2.9)	288.0(6.8)	314.6(7.2)	337.3(7.3)	349.0(10.0)
AMER IND/ALASKAN NATV	245.7(4.6)	38.8(4.4)	184.2(11.8)	196.4(11.8)	219.7(7.0)	245.8(4.7)	271.5(7.4)	295.4(20.1)	312.0(7.4)
REGION									
NORTHEAST	274.4(2.9)	39.5(1.1)	207.3(3.2)	222.1(4.2)	248.6(3.6)	276.1(3.8)	301.8(3.0)	324.4(3.5)	336.5(2.5)
SOUTHEAST	255.4(2.0)	41.7(1.4)	184.5(3.2)	199.3(6.6)	227.6(3.2)	257.2(1.7)	285.0(2.8)	307.9(2.2)	321.5(3.2)
CENTRAL	269.7(1.9)	38.5(1.2)	204.5(4.9)	218.3(1.8)	243.9(2.1)	271.8(1.9)	297.0(2.4)	317.6(3.7)	329.4(3.6)
WEST	266.6(3.4)	42.0(1.6)	194.5(3.2)	211.1(2.3)	238.5(2.7)	267.7(3.6)	295.3(3.8)	320.0(5.1)	334.4(5.2)
AGE									
BELOW MODAL AGE	270.5(6.4)	41.5(5.4)	202.7(36.0)	213.0(36.2)	244.5(5.9)	276.1(13.9)	299.9(14.1)	322.2(10.2)	335.6(20.1)
AT MODAL AGE	275.9(1.5)	38.2(0.9)	210.3(2.5)	226.2(2.4)	251.3(1.4)	277.4(1.5)	302.2(1.2)	324.0(2.6)	335.9(2.9)
ABOVE MODAL AGE	252.6(1.4)	41.2(1.1)	184.2(4.0)	198.4(3.9)	224.0(1.8)	253.4(1.4)	281.1(1.8)	305.0(2.3)	319.6(3.1)
TYPE OF COMMUNITY									
EXTREME RURAL	262.1(3.1)	40.3(2.0)	194.4(5.8)	210.3(4.5)	235.1(6.8)	262.3(5.9)	291.1(1.7)	313.8(4.6)	325.2(5.3)
DISADVANTAGED URBAN	250.4(3.4)	41.1(1.6)	183.3(6.4)	198.0(5.3)	221.3(4.1)	250.1(4.9)	278.5(3.1)	303.9(4.1)	319.7(4.6)
ADVANTAGED URBAN	287.7(5.6)	36.9(1.2)	226.3(11.4)	240.8(8.0)	264.7(4.7)	287.5(4.6)	312.7(5.0)	334.2(7.8)	348.8(8.1)
OTHER	265.9(1.4)	40.5(0.9)	195.6(4.0)	212.0(3.1)	239.1(1.9)	268.1(1.6)	294.3(1.6)	316.3(1.8)	329.4(2.4)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	244.0(2.1)	37.0(1.8)	183.6(10.9)	196.4(4.8)	219.5(2.6)	243.7(2.1)	268.4(3.1)	292.4(3.2)	304.9(4.0)
GRADUATED H.S.	256.1(1.5)	38.4(0.9)	191.3(2.8)	206.3(1.6)	229.8(2.6)	257.2(2.6)	282.9(2.3)	305.2(2.0)	317.3(2.3)
SOME EDUC AFTER H.S.	273.5(1.4)	37.4(1.2)	209.5(4.3)	223.3(3.5)	249.2(2.2)	275.5(2.3)	299.1(1.8)	319.9(2.4)	333.0(7.8)
GRADUATED COLLEGE	279.9(1.9)	38.6(0.7)	212.8(3.4)	230.0(2.1)	255.9(2.2)	281.5(1.5)	306.0(1.7)	327.7(3.4)	339.9(3.3)
UNKNOWN	238.9(2.3)	40.4(1.9)	171.9(6.3)	186.0(6.2)	210.8(6.8)	239.1(4.9)	267.6(2.2)	291.1(8.6)	304.2(5.6)
TYPE OF SCHOOL									
PUBLIC	264.7(1.5)	41.4(0.8)	193.8(2.8)	210.0(1.5)	236.9(1.5)	266.6(1.9)	293.7(1.5)	316.6(2.2)	330.1(2.2)
PRIVATE	279.4(2.4)	36.3(1.4)	217.6(5.1)	231.8(3.1)	255.8(2.2)	281.0(2.8)	305.0(2.1)	325.3(4.5)	336.4(3.4)
ABILITY STUDENTS IN CLASS									
HIGH ABILITY	294.1(2.4)	35.6(1.3)	231.7(7.1)	247.8(4.6)	271.2(4.0)	295.3(3.0)	318.8(2.6)	338.0(2.7)	349.8(3.7)
AVERAGE ABILITY	265.1(1.7)	36.4(1.1)	203.8(3.9)	217.3(2.1)	241.6(1.8)	267.4(2.4)	290.6(1.6)	309.5(1.3)	320.5(1.6)
LOW ABILITY	239.1(2.7)	37.2(1.5)	178.7(3.1)	190.7(4.8)	213.3(3.0)	239.6(4.1)	264.8(3.2)	287.5(3.2)	300.1(4.6)
MIXED ABILITY	260.7(3.8)	37.5(1.5)	196.3(6.5)	210.0(4.3)	235.9(6.0)	261.9(3.4)	287.0(3.6)	307.6(3.3)	321.1(6.9)

GRADE 8 - ALGEBRA AND FUNCTIONS PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	264.3(1.0)	36.8(0.5)	204.6(1.2)	217.2(1.3)	239.0(1.1)	264.4(1.0)	289.2(1.4)	312.0(1.3)	325.3(2.1)
SEX									
MALE	263.8(1.4)	37.4(0.6)	204.1(1.4)	215.9(1.3)	237.8(2.1)	263.1(1.8)	288.8(1.9)	313.3(2.7)	326.9(3.6)
FEMALE	264.8(1.1)	36.2(0.6)	205.2(1.6)	218.3(1.5)	240.2(1.8)	265.5(1.0)	289.6(2.0)	311.0(1.6)	323.9(2.7)
RACE/ETHNICITY									
WHITE	271.1(1.2)	34.7(0.5)	214.1(3.1)	226.4(1.3)	247.2(1.2)	271.0(1.1)	294.4(1.4)	316.3(2.0)	328.8(3.4)
BLACK	241.4(1.6)	34.0(1.0)	187.8(2.8)	198.3(2.8)	218.4(2.1)	241.0(2.1)	264.2(2.1)	286.4(1.9)	298.9(3.7)
HISPANIC	248.3(1.9)	34.4(1.2)	191.5(3.2)	205.0(3.7)	225.2(2.2)	247.5(2.2)	271.3(2.0)	293.6(2.4)	306.3(1.9)
ASIAN/PACIFIC ISLANDER	284.5(4.1)	38.6(2.5)	221.9(3.2)	234.3(4.6)	259.6(10.[illegible])	284.6(4.6)	310.5(4.9)	336.6(8.7)	347.7(11.2)
AMER IND/ALASKAN NATV	245.0(3.7)	33.7(3.4)	190.1(29.8)	202.9(21.0)	223.9(6.5)	241.5(5.1)	268.1(12.3)	292.3(10.6)	305.4(14.2)
REGION									
N RTHEAST	268.6(2.5)	36.1(0.9)	208.8(6.1)	222.6(1.7)	244.3(3.2)	269.0(2.1)	292.8(3.4)	315.4(3.8)	327.8(2.3)
SOUTHEAST	258.1(2 0)	37.1(1.1)	197.2(4.9)	210.9(2.4)	231.7(2.1)	257.4(2.2)	284.6(3.4)	306.0(2.0)	318.7(3.0)
CENTRAL	266.7(1.6)	34.8(0.7)	210.1(4.1)	222.5(2.7)	242.6(1.3)	267.0(2.0)	289.8(2.6)	312.4(1.6)	324.6(2.7)
WEST	264.3(2.5)	38.0(1.3)	203.1(3.4)	215.8(2.2)	238.2(3.6)	263.7(2.2)	289.9(3.0)	314.1(4.3)	329.1(8.4)
AGE									
BELOW MODAL AGE	267.6(8.4)	39.0(7.1)	214.1(81.7)	218.7(25.2)	242.7(18.9)	265.0(6.7)	290.8(6.4)	320.7(15.5)	336.5(12.5)
AT MODAL AGE	272.3(1.1)	35.0(0.6)	214.3(2.6)	226.9(1.4)	248.5(1.1)	272.5(1.1)	296.0(1.4)	317.1(1.8)	329.5(3.3)
ABOVE MODAL AGE	253.0(1.3)	36.3(0.9)	195.7(2.1)	207.8(1.6)	228.0(2.1)	251.3(1.6)	276.8(2.5)	300.4(3.3)	316.1(3.5)
TYPE OF COMMUNITY									
EXTREME RURAL	260.2(2.7)	34.9(1.3)	204.7(3.6)	215.4(4.9)	236.1(5.5)	260.1(3.6)	284.0(2.2)	305.9(4.8)	319.0(6.5)
DISADVANTAGED URBAN	250.6(2.9)	37.0(1.3)	193.5(4.0)	204.7(2.5)	224.7(2.1)	248.9(3.1)	274.7(4.4)	300.3(4.7)	314.5(5.5)
ADVANTAGED URBAN	281.7(3.9)	34.7(1.2)	224.1(3.3)	236.1(6.8)	257.8(4.2)	282.0(3.9)	304.6(4.6)	326.6(7.4)	339.2(5.5)
OTHER	264.3(1.2)	36.4(0.7)	205.0(1.4)	217.6(2.0)	239.4(1.2)	264.4(1.5)	288.8(1.4)	311.2(0.9)	324.6(2.0)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	246.5(1.9)	31.0(1.3)	194.4(9.0)	208.2(3.2)	225.6(2.9)	246.6(1.9)	267.8(3.6)	285.4(4.2)	297.8(8.8)
GRADUATED H.S.	254.8(1.6)	33.8(0.7)	199.5(1.5)	212.0(1.9)	232.0(1.3)	254.3(2.1)	277.4(2.3)	298.0(2.3)	310.6(3.1)
SOME EDUC AFTER H.S.	268.1(1.3)	34.2(0.9)	211.3(2.0)	223.7(2.8)	245.7(1.9)	268.8(2.0)	289.8(2.3)	311.7(1.5)	325.2(1.5)
GRADUATED COLLEGE	276.9(1.4)	35.9(0.6)	216.4(1.8)	229.6(1.0)	252.1(2.0)	277.8(2.4)	302.1(2.3)	322.9(2.1)	335.0(1.8)
UNKNOWN	242.2(2.3)	34.1(1.4)	186.0(9.6)	198.9(3.4)	219.0(4.9)	241.9(2.1)	265.7(3.9)	286.5(2.7)	297.0(3.4)
TYPE OF SCHOOL									
PUBLIC	262.7(1.2)	37.0(0.6)	202.8(2.5)	215.4(1.1)	237.1(2.0)	262.4(1.4)	287.7(1.4)	310.9(1.6)	324.7(2.4)
PRIVATE	277.1(1.9)	32.2(1.1)	223.8(5.1)	235.1(2.5)	255.5(3.5)	277.9(2.0)	298.9(2.7)	318.4(2.3)	328.8(3.4)
ABILITY STUDENTS IN CLASS									
HIGH ABILITY	293.0(2.2)	33.0(1.2)	235.6(4.8)	249.2(2.8)	271.7(3.3)	294.0(2.1)	315.7(3.1)	334.8(2.0)	345.9(3.9)
AVERAGE ABILITY	261.5(1.4)	30.8(0.8)	209.6(3.6)	221.4(1.4)	241.4(1.9)	262.8(1.6)	282.5(1.7)	299.6(1.8)	310.3(2.9)
LOW ABILITY	240.2(1.9)	31.9(1.5)	188.7(4.0)	199.6(3.3)	219.3(3.6)	240.0(3.1)	260.0(2.2)	280.4(4.9)	294.1(4.7)
MIXED ABILITY	257.4(3.1)	32.3(1.0)	204.3(6.8)	215.2(2.8)	234.9(4.1)	257.2(2.5)	280.0(3.1)	299.3(3.0)	310.5(4.5)

GRADE 8 - MEAN PERCENTAGE CORRECT BY CONTENT AREA

CONTENT AREA (NUMBER OF ITEMS)	NUM & OPER (46)	MEASURMENT (21)	GEOMETRY (26)	DATA ANALYS (19)	ALGEBRA (25)	TOTAL (137)	ESTIMATION (46)	PROBLEM SOLVING (8)
-- TOTAL --	58.7(0.5)	60.6(0.5)	51.0(0.6)	52.9(0.6)	51.9(0.6)	55.5(0.5)	58.6(0.4)	52.7(0.8)
SEX								
MALE	58.5(0.7)	62.4(0.6)	51.2(0.7)	52.8(0.7)	51.4(0.7)	55.6(0.6)	59.2(0.5)	53.1(1.0)
FEMALE	59.0(0.5)	58.9(0.5)	50.7(0.6)	53.0(0.7)	52.4(0.6)	55.4(0.5)	58.0(0.5)	52.4(0.9)
RACE/ETHNICITY								
WHITE	61.9(0.6)	63.8(0.5)	54.5(0.7)	56.9(0.7)	55.3(0.7)	58.9(0.6)	61.3(0.4)	57.8(1.0)
BLACK	48.2(0.9)	49.6(0.9)	38.2(0.8)	39.7(1.0)	40.4(0.7)	43.9(0.7)	49.9(1.0)	35.3(2.0)
HISPANIC	50.5(0.7)	52.9(0.9)	42.4(0.9)	42.6(0.9)	43.1(0.6)	46.9(0.7)	52.4(0.8)	42.6(1.4)
ASIAN/PACIFIC ISLANDER	69.0(2.0)	69.0(2.4)	61.6(1.9)	61.2(1.9)	62.5(2.0)	65.4(1.9)	65.6(2.5)	65.2(2.8)
AMER IND/ALASKAN NATV	46.9(3.6)	53.1(2.0)	43.7(3.3)	40.2(3.5)	41.1(2.6)	45.3(2.8)	51.4(3.0)	39.6(6.3)
REGION								
NORTHEAST	60.5(1.2)	62.7(1.3)	53.7(1.4)	56.6(1.2)	54.3(1.3)	57.9(1.2)	61.3(1.0)	56.4(1.5)
SOUTHEAST	55.3(0.9)	56.7(0.8)	46.2(1.0)	48.4(0.7)	49.0(0.9)	51.7(0.8)	55.2(0.9)	46.6(1.7)
CENTRAL	60.9(0.9)	62.4(0.8)	52.4(1.2)	54.0(1.0)	52.9(0.8)	57.1(0.9)	60.0(0.8)	56.5(1.8)
WEST	58.4(1.3)	60.9(1.1)	51.7(1.2)	52.9(1.5)	51.7(1.4)	55.5(1.3)	58.5(0.8)	52.3(1.8)
AGE								
BELOW MODAL AGE	60.8(3.1)	62.7(4.0)	46.8(5.6)	56.8(3.5)	52.9(4.9)	56.4(3.5)	70.1(3.3)	73.4(4.6)
AT MODAL AGE	62.6(0.5)	64.1(0.5)	54.6(0.6)	57.2(0.6)	56.1(0.6)	59.4(0.5)	61.2(0.4)	57.2(0.9)
ABOVE MODAL AGE	53.2(0.6)	55.6(0.6)	45.7(0.7)	46.5(0.8)	45.9(0.6)	49.9(0.6)	54.4(0.7)	45.5(0.9)
TYPE OF COMMUNITY								
EXTREME RURAL	56.2(1.2)	60.3(1.3)	48.8(1.2)	50.7(1.0)	49.3(1.1)	53.4(1.1)	53.3(2.5)	44.9(4.0)
DISADVANTAGED URBAN	52.8(1.2)	55.5(1.2)	45.7(1.3)	46.3(1.2)	45.3(1.2)	49.6(1.1)	53.7(1.3)	46.2(2.5)
ADVANTAGED URBAN	67.5(1.9)	68.1(1.9)	58.9(1.8)	62.1(2.9)	60.7(2.7)	64.0(2.1)	66.2(1.2)	60.0(3.8)
OTHER	58.6(0.6)	60.3(0.7)	50.8(0.7)	52.7(0.7)	51.8(0.7)	55.3(0.6)	58.8(0.6)	53.5(1.2)
PARENTS' EDUCATION LEVEL								
LESS THAN H.S.	48.8(0.8)	52.0(0.7)	40.6(0.8)	41.2(1.0)	41.3(0.8)	45.3(0.6)	50.8(1.1)	40.3(2.0)
GRADUATED H.S.	53.9(0.5)	56.1(0.6)	46.5(0.6)	48.3(0.7)	46.2(0.6)	50.7(0.4)	54.1(0.5)	46.0(1.1)
SOME EDUC AFTER H.S.	61.3(0.6)	63.2(0.6)	52.8(0.7)	56.1(0.7)	53.9(0.8)	57.9(0.5)	60.1(0.7)	57.9(1.3)
GRADUATED COLLEGE	64.9(0.7)	66.2(0.7)	56.9(0.8)	59.1(0.8)	58.7(0.8)	61.6(0.7)	63.5(0.6)	59.0(1.3)
UNKNOWN	47.7(0.9)	50.7(1.3)	41.9(1.0)	40.5(1.0)	41.8(1.0)	45.0(0.9)	52.9(0.9)	42.6(2.0)
TYPE OF SCHOOL								
PUBLIC	57.9(0.6)	60.1(0.5)	50.4(0.6)	52.2(0.7)	51.1(0.7)	54.8(0.6)	58.2(0.4)	51.8(0.9)
PRIVATE	65.2(0.9)	65.2(0.9)	55.2(0.9)	58.4(1.0)	58.0(1.0)	61.0(0.8)	62.3(1.3)	60.2(2.2)
ABILITY STUDENTS IN CLASS								
HIGH ABILITY	71.0(1.2)	70.7(1.1)	63.3(1.3)	65.4(1.2)	66.9(1.2)	68.0(1.1)	67.4(1.2)	66.5(1.7)
AVERAGE ABILITY	57.9(0.7)	60.5(0.6)	49.9(0.8)	51.8(0.8)	49.7(0.8)	54.5(0.7)	57.5(0.8)	51.8(1.7)
LOW ABILITY	46.9(1.0)	50.4(1.0)	40.4(1.2)	40.4(1.2)	40.2(1.0)	44.1(1.0)	50.6(1.0)	41.0(1.8)
MIXED ABILITY	56.4(1.4)	58.9(1.4)	47.4(1.5)	49.7(1.7)	47.5(1.8)	52.5(1.4)	55.4(1.8)	44.3(3.1)

295-027 0 - 91 - 18 : QL3

GRADE 8 - MEAN PERCENTAGE CORRECT BY CONTENT AREA
ONLY CONSTRUCTED-RESPONSE QUESTIONS

CONTENT AREA (NUMBER OF ITEMS)	NUM & OPER (10)	MEASURMENT (4)	GEOMETRY (8)	DATA ANALYS (6)	ALGEBRA (7)	TOTAL (35)	PROBLEM SOLVING (7)
-- TOTAL --	52.3(0.7)	59.4(0.9)	52.9(0.7)	40.8(0.7)	48.0(0.8)	50.4(0.6)	51.6(0.8)
SEX							
MALE	52.3(0.9)	62.2(1.1)	53.4(0.9)	40.0(0.8)	47.4(1.0)	50.6(0.8)	51.4(1.0)
FEMALE	52.3(0.7)	56.6(1.0)	52.5(0.9)	41.6(0.8)	48.5(0.8)	50.2(0.7)	51.8(0.9)
RACE/ETHNICITY							
WHITE	55.9(0.8)	64.9(1.1)	57.8(0.9)	44.5(0.8)	52.3(0.9)	54.7(0.7)	56.9(1.0)
BLACK	40.7(0.9)	38.7(1.4)	35.1(1.3)	27.3(1.1)	33.0(1.2)	35.4(0.8)	33.2(1.9)
HISPANIC	42.3(1.0)	47.7(2.2)	42.0(1.5)	32.2(1.2)	37.8(1.2)	40.2(1.0)	41.3(1.4)
ASIAN/PACIFIC ISLANDER	64.1(2.7)	70.7(3.8)	64.0(3.4)	47.8(2.5)	58.1(2.6)	60.8(2.4)	63.6(2.8)
AMER IND/ALASKAN NATV	40.7(5.5)	59.0(4.9)	48.9(4.9)	33.1(4.0)	34.8(4.4)	42.2(3.9)	37.5(5.5)
REGION							
NORTHEAST	55.4(1.9)	62.0(2.1)	55.9(1.8)	44.2(1.1)	49.9(1.6)	53.2(1.5)	55.4(1.5)
SOUTHEAST	47.8(0.9)	52.6(1.3)	48.0(1.2)	36.0(0.7)	44.2(1.6)	45.6(0.8)	44.7(1.6)
CENTRAL	54.3(0.9)	64.2(1.6)	55.0(1.5)	42.2(1.2)	49.7(1.3)	52.6(1.0)	56.1(1.8)
WEST	52.1(1.6)	59.1(2.1)	53.2(1.8)	41.1(1.9)	48.2(1.7)	50.5(1.6)	51.0(1.8)
AGE							
BELOW MODAL AGE	51.2(4.3)	60.1(6.2)	43.7(10.8)	41.6(5.7)	46.0(6.1)	47.8(4.0)	73.3(4.8)
AT MODAL AGE	56.8(0.7)	64.4(1.0)	57.7(0.8)	44.7(0.8)	52.6(0.9)	55.0(0.7)	56.1(0.9)
ABOVE MODAL AGE	45.8(0.8)	52.3(1.2)	46.1(0.9)	35.1(0.9)	41.2(1.0)	43.9(0.7)	44.2(0.9)
TYPE OF COMMUNITY							
EXTREME RURAL	48.2(1.6)	60.4(2.4)	52.3(1.8)	38.7(1.5)	44.0(2.0)	48.1(1.5)	44.8(4.4)
DISADVANTAGED URBAN	46.3(1.5)	49.6(2.9)	46.7(2.8)	34.5(1.4)	41.5(1.5)	43.8(1.6)	44.9(2.6)
ADVANTAGED URBAN	63.2(2.2)	69.3(3.6)	60.6(2.9)	50.5(3.6)	58.0(3.6)	60.1(2.9)	58.7(3.5)
OTHER	52.1(0.7)	59.1(1.1)	52.7(0.9)	40.5(0.7)	47.9(0.9)	50.2(0.7)	52.3(1.2)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	39.5(1.2)	46.5(1.7)	41.6(1.5)	30.8(1.1)	35.9(1.3)	38.6(0.9)	38.8(2.1)
GRADUATED H.S.	46.3(0.7)	53.6(1.3)	48.4(1.2)	36.2(0.8)	41.1(1.0)	44.9(0.6)	44.7(1.1)
SOME EDUC AFTER H.S.	55.2(0.9)	62.9(1.4)	54.7(1.0)	43.8(1.1)	51.2(1.2)	53.2(0.7)	56.9(1.3)
GRADUATED COLLEGE	60.0(0.9)	67.3(1.3)	59.9(1.1)	46.7(1.0)	56.1(1.0)	57.7(0.9)	58.0(1.3)
UNKNOWN	40.1(1.7)	46.2(2.5)	41.2(1.7)	29.5(1.1)	33.8(1.6)	38.0(1.2)	41.5(2.1)
TYPE OF SCHOOL							
PUBLIC	51.5(0.8)	58.6(1.0)	52.2(0.8)	40.2(0.8)	47.2(0.9)	49.7(0.7)	50.6(0.8)
PRIVATE	59.1(1.6)	66.0(1.7)	58.7(1.3)	45.5(1.2)	54.2(1.3)	56.5(1.1)	59.4(2.2)
ABILITY STUDENTS IN CLASS							
HIGH ABILITY	67.9(1.4)	72.0(1.7)	68.0(1.7)	52.0(1.4)	64.6(1.4)	65.0(1.3)	65.3(1.8)
AVERAGE ABILITY	51.7(1.1)	60.6(1.4)	53.2(1.0)	39.4(0.9)	46.7(1.1)	49.9(0.9)	50.8(1.8)
LOW ABILITY	39.2(1.3)	45.6(1.9)	39.5(1.9)	28.9(1.5)	34.0(1.5)	37.2(1.3)	39.3(2.0)
MIXED ABILITY	48.3(1.8)	58.4(2.5)	49.3(2.2)	39.0(2.1)	43.1(2.3)	47.0(1.8)	43.1(3.1)

GRADE 8 - MEAN PERCENTAGE CORRECT BY CONTENT AREA
ONLY MULTIPLE-CHOICE QUESTIONS

CONTENT AREA (NUMBER OF ITEMS)	NUM & OPER (36)	MEASUREMENT (17)	GEOMETRY (18)	DATA ANAL. (13)	ALGEBRA (18)	TOTAL (102)	ESTIMATION (46)	PROBLEM SOLVING (1)
-- TOTAL --	60.5(0.5)	60.9(0.4)	50.1(0.6)	58.4(0.6)	53.4(0.5)	57.2(0.5)	58.6(0.4)	60.9(1.4)
SEX								
MALE	60.2(0.7)	62.5(0.6)	50.3(0.7)	58.6(0.7)	52.9(0.6)	57.3(0.6)	59.2(0.5)	64.7(1.7)
FEMALE	60.9(0.5)	59.4(0.4)	49.9(0.6)	58.2(0.7)	53.9(0.7)	57.1(0.5)	58.0(0.5)	57.0(1.8)
RACE/ETHNICITY								
WHITE	63.6(0.6)	63.6(0.5)	53.1(0.7)	62.6(0.6)	56.4(0.6)	60.3(0.6)	61.3(0.4)	64.2(1.7)
BLACK	50.2(1.0)	52.1(0.9)	39.6(0.8)	45.4(1.1)	43.3(0.7)	46.8(0.7)	49.9(1.0)	50.1(3.4)
HISPANIC	52.7(0.7)	54.1(0.8)	42.5(0.9)	47.3(1.0)	45.2(0.7)	49.1(0.6)	52.4(0.8)	51.1(2.4)
ASIAN/PACIFIC ISLANDER	70.4(1.9)	68.6(2.2)	60.6(1.5)	67.4(2.3)	64.2(2.0)	66.9(1.8)	65.6(2.5)	76.2(5.3)
AMER IND/ALASKAN NATV	48.6(3.3)	51.7(2.3)	41.5(2.9)	43.5(3.4)	43.6(2.4)	46.3(2.5)	51.4(3.0)	53.9(14.9)
REGION								
NORTHEAST	61.[illegible](1.0)	62.9(1.1)	52.7(1.2)	62.3(1.3)	56.1(1.4)	59.5(1.1)	61.3(1.0)	63.1(2.0)
SOUTHEAST	57.4(1.0)	57.7(0.8)	45.4(1.1)	54.1(0.8)	50.8(0.7)	53.7(0.8)	55.2(0.9)	59.6(3.7)
CENTRAL	62.7(1.0)	62.0(0.7)	51.2(1.2)	59.5(1.0)	54.1(0.7)	58.7(0.8)	60.0(0.8)	59.6(3.5)
WEST	60.2(1.2)	61.3(1.0)	51.0(1.1)	58.3(1.4)	53.0(1.4)	57.2(1.2)	58.5(0.8)	61.5(2.3)
AGE								
BELOW MODAL AGE	63.5(3.1)	63.4(4.6)	48.2(5.1)	63.9(3.6)	55.5(4.8)	59.4(3.6)	70.1(3.3)	74.3(8.2)
AT MODAL AGE	64.2(0.5)	64.1(0.5)	53.2(0.6)	63.0(0.6)	57.4(0.6)	60.9(0.5)	61.2(0.4)	64.8(1.4)
ABOVE MODAL AGE	55.3(0.6)	56.4(0.6)	45.5(0.7)	51.8(0.8)	47.7(0.6)	51.9(0.6)	54.4(0.7)	54.7(2.1)
TYPE OF COMMUNITY								
EXTREME RURAL	58.4(1.2)	60.2(1.3)	47.2(1.3)	56.2(0.9)	51.4(1.0)	55.2(1.0)	53.3(2.5)	45.6(3.5)
DISADVANTAGED URBAN	54.7(1.2)	56.9(1.0)	45.2(1.1)	51.7(1.1)	46.7(1.2)	51.6(1.0)	53.7(1.3)	55.9(2.6)
ADVANTAGED URBAN	68.7(1.9)	67.8(1.6)	58.2(1.4)	67.5(2.6)	61.8(2.4)	65.3(1.9)	66.2(1.2)	69.8(6.3)
OTHER	60.4(0.6)	60.5(0.6)	50.0(0.7)	58.3(0.7)	53.3(0.7)	57.1(0.6)	58.8(0.6)	62.0(1.8)
PARENTS' EDUCATION LEVEL								
LESS THAN H.S.	51.4(0.8)	53.3(0.7)	40.1(1.0)	46.0(1.1)	43.5(0.9)	47.6(0.6)	50.8(1.1)	51.5(3.8)
GRADUATED H.S.	56.0(0.5)	56.7(0.5)	45.6(0.6)	54.0(0.8)	48.2(0.6)	52.7(0.4)	54.1(0.5)	54.7(2.4)
SOME EDUC AFTER H.S.	63.0(0.6)	63.3(0.6)	51.9(0.8)	61.7(0.7)	55.0(0.8)	59.5(0.5)	60.1(0.7)	65.4(2.8)
GRADUATED COLLEGE	66.3(0.7)	65.9(0.6)	55.6(0.7)	64.8(0.8)	59.6(0.8)	63.0(0.6)	63.5(0.6)	66.4(1.9)
UNKNOWN	49.8(0.9)	51.8(1.2)	42.2(1.0)	45.6(1.4)	44.9(0.9)	47.4(0.9)	52.9(0.9)	50.4(4.7)
TYPE OF SCHOOL								
PUBLIC	59.7(0.6)	60.4(0.5)	49.6(0.6)	57.7(0.6)	52.7(0.6)	56.6(0.5)	58.2(0.4)	60.3(1.6)
PRIVATE	66.9(0.9)	65.0(0.8)	53.6(1.0)	64.4(1.1)	59.4(1.0)	62.6(0.8)	62.3(1.3)	65.6(2.8)
ABILITY STUDENTS IN CLASS								
HIGH ABILITY	71.8(1.2)	70.3(1.1)	61.3(1.3)	71.7(1.2)	67.8(1.2)	69.0(1.1)	67.4(1.2)	75.2(2.3)
AVERAGE ABILITY	59.7(0.6)	60.5(0.6)	48.5(0.9)	57.5(0.8)	50.9(0.8)	56.0(0.6)	57.5(0.8)	59.0(2.6)
LOW ABILITY	49.0(1.0)	51.6(0.9)	40.7(1.1)	45.8(1.2)	42.7(1.0)	46.4(0.9)	50.6(1.0)	52.7(3.6)
MIXED ABILITY	58.6(1.3)	59.1(1.3)	46.6(1.4)	54.7(1.8)	49.3(1.7)	54.4(1.3)	55.4(1.8)	53.2(4.5)

GRADE 8 - PERCENTAGE OF STUDENTS RESPONDING CORRECTLY TO THE 1990 MATHEMATICS ITEMS

SHORT TEXT	TOTAL	MALE	FEMALE	WHITE	BLACK	HISPANIC	ASIAN AM	CONTENT AREA	ITEM TYPE
ADD WHOLE NUMBERS	79.7(0.7)	78.5(1.1)	81.0(0.9)	79.6(0.8)	80.3(1.9)	79.0(2.1)	87.5(2.2)	1	2
SUBTRACT WHOLE NUMBERS	83.6(0.7)	82.3(1.2)	84.8(0.8)	84.1(0.8)	80.3(2.4)	82.0(2.1)	91.3(4.3)	1	2
READ A RULER	82.6(0.8)	84.9(0.8)	80.4(1.4)	84.5(0.9)	76.8(2.3)	76.3(2.2)	85.4(3.8)	2	1
READ DATA ON BAR GRAPH	89.1(0.7)	88.4(0.8)	89.8(1.1)	90.4(0.9)	86.2(1.6)	86.3(2.0)	92.8(2.1)	4	1
INTERPRET BAR GRAPH DATA	74.1(1.0)	76.7(1.5)	71.6(1.3)	78.5(1.0)	65.0(2.9)	61.2(2.4)	71.1(4.4)	4	1
RELATE EQUATION TO PROBLEM	76.9(0.9)	76.6(1.3)	77.2(1.1)	80.2(1.1)	65.3(2.5)	71.0(2.2)	86.0(3.3)	1	1
EVALUATE AN EXPRESSION	76.6(0.8)	75.1(1.2)	78.0(1.3)	81.3(0.9)	61.6(3.2)	68.7(3.2)	75.3(3.6)	5	2
APPLY CONCEPT OF PROBABILITY	83.0(0.9)	82.0(1.3)	84.1(1.1)	87.6(1.0)	71.6(2.5)	72.6(2.6)	77.6(3.9)	4	1
IDENTIFY UNIT OF LENGTH	90.5(0.8)	91.1(1.1)	89.9(0.8)	92.2(0.7)	85.9(2.2)	87.0(2.5)	91.3(3.1)	2	1
CONVERT DECIMAL TO PERCENT	78.5(1.0)	77.8(1.3)	79.2(1.4)	80.3(1.3)	74.4(2.8)	70.9(2.2)	81.7(4.1)	1	1
USE PERCENT GREATER THAN 100	55.1(1.4)	58.6(1.5)	51.6(1.9)	57.5(1.7)	48.4(2.9)	47.6(3.4)	64.8(5.9)	1	1
APPLY TRIANGLE INEQUALITY	68.0(1.1)	69.8(1.9)	66.2(1.4)	70.4(1.3)	59.3(3.2)	62.6(2.9)	77.4(5.5)	3	1
CONVERT FRACTION TO DECIMAL	50.3(1.2)	50.8(1.9)	49.8(1.4)	55.6(1.4)	33.8(2.7)	39.8(2.7)	55.4(7.9)	1	2
FIND A COMMON FACTOR	82.5(1.0)	81.7(1.4)	83.4(1.3)	83.9(1.1)	81.4(2.0)	75.7(2.5)	86.5(3.2)	1	1
IDENTIFY A PARALLELOGRAM	67.7(0.8)	68.1(1.2)	67.4(1.4)	72.4(0.9)	54.4(3.0)	53.8(2.6)	72.1(3.4)	3	1
CONVERT WITHIN METRIC SYSTEM	50.9(1.1)	55.0(1.6)	46.9(1.4)	53.0(1.2)	43.7(2.8)	46.6(2.9)	55.4(4.1)	2	1
FIND PERIMETER OF FIGURE	59.4(1.7)	62.7(1.8)	56.1(2.0)	62.9(1.9)	48.8(3.9)	51.4(3.8)	69.4(9.0)	2	1
ADD TWO INTEGERS	67.6(1.3)	68.9(1.6)	66.2(1.9)	72.9(1.4)	50.4(2.8)	57.2(3.4)	79.8(5.5)	1	1
FIND AN AVERAGE	61.4(1.1)	61.3(1.4)	61.5(1.6)	67.1(1.5)	47.7(2.5)	44.6(2.6)	71.1(4.1)	4	1
IDENTIFY ALGEBRAIC IDENTITY	44.0(1.3)	43.0(1.7)	45.0(1.8)	48.8(1.6)	30.1(2.5)	29.0(2.9)	61.3(5.7)	5	1
APPLY DECIMAL PLACE VALUE	53.8(1.5)	55.4(1.7)	52.3(1.8)	59.4(1.7)	34.0(2.6)	42.1(2.7)	68.6(4.6)	1	1
IDENTIFY PERPENDICULAR LINES	37.1(1.5)	38.0(1.8)	36.1(2.0)	41.1(1.9)	25.5(2.4)	26.1(1.9)	47.7(7.1)	3	1
ADD MONOMIALS	38.0(1.0)	36.8(1.4)	39.3(1.6)	42.3(1.2)	23.2(2.3)	27.7(2.8)	60.3(6.7)	5	1
ADD WHOLE NUMBERS	92.1(0.4)	90.4(0.6)	93.9(0.5)	92.5(0.5)	92.2(1.1)	88.9(1.3)	94.1(1.5)	1	1
COMPARE WEIGHTS	86.7(0.6)	87.8(0.8)	85.6(0.9)	89.1(0.8)	79.4(1.4)	81.4(1.7)	85.2(5.2)	2	1
APPLY TRANSFORMATIONAL GEOMETRY	80.3(0.7)	78.0(1.0)	82.7(0.8)	82.9(0.9)	74.2(1.6)	70.4(2.2)	86.8(3.1)	3	1
IDENTIFY SOLUTION PROCEDURE	78.4(0.7)	79.2(0.9)	77.6(1.0)	82.1(0.7)	68.0(2.1)	68.6(1.7)	87.4(2.5)	1	1
INTERPRET PIE CHART DATA	71.7(0.7)	71.7(0.9)	71.7(1.0)	77.0(0.8)	53.6(2.3)	60.0(1.8)	85.5(2.7)	4	1
SOLVE MULTI-STEP STORY PROBLEM	76.9(0.6)	77.5(1.1)	76.4(0.9)	81.7(0.8)	60.5(1.9)	68.4(1.7)	85.2(3.6)	1	1
APPLY PROPERTIES OF A CUBE	58.8(1.1)	58.8(1.4)	58.7(1.4)	61.3(1.3)	46.1(2.2)	56.6(2.6)	79.6(3.7)	3	1
APPLY CONCEPT OF PERIMETER	64.6(0.9)	66.3(1.2)	62.9(1.4)	68.4(1.0)	54.3(2.2)	54.3(1.9)	75.4(4.5)	2	1
SOLVE MULTI-STEP STORY PROBLEM	69.5(0.9)	64.3(1.1)	74.8(1.1)	72.7(1.1)	61.7(2.5)	58.5(2.1)	78.2(2.6)	1	1
APPLY CONCEPT OF EQUALITY	66.5(0.6)	69.3(1.1)	63.6(1.0)	71.9(0.7)	48.0(1.8)	54.4(2.1)	80.8(4.3)	5	1
SOLVE STORY PROBLEM (DIVISION)	81.7(0.6)	80.4(0.9)	82.9(0.7)	85.4(0.7)	71.4(1.7)	70.4(1.8)	91.5(2.1)	1	1
SOLVE STORY PROBLEM (FRACTIONS)	49.7(1.0)	48.9(1.0)	50.7(1.3)	53.4(1.0)	41.8(3.0)	34.8(2.2)	68.4(4.6)	1	1
READ A SCALE DIAGRAM	35.4(0.6)	38.6(1.0)	32.0(1.0)	38.2(0.8)	23.5(1.4)	31.2(1.9)	48.9(4.3)	1	1
SOLVE AN INEQUALITY	55.0(0.9)	55.1(1.2)	54.8(1.2)	60.1(1.0)	38.4(1.9)	42.6(2.0)	68.3(4.6)	5	1
IDENTIFY COORDINATES ON A GRID	44.4(0.9)	43.4(1.3)	45.5(1.2)	45.6(1.1)	40.2(1.6)	40.6(1.7)	56.2(3.2)	5	1
FIND A MEDIAN	19.9(0.6)	20.4(1.0)	19.4(0.9)	20.3(0.7)	18.0(1.4)	19.5(1.5)	23.8(4.3)	4	1
APPLY PROPERTIES OF A PARALLELOGRAM	42.1(0.8)	41.4(1.0)	42.8(1.3)	45.8(1.0)	29.3(1.6)	32.2(1.5)	59.5(4.6)	3	1
INTERPRET MEASUREMENT TOLERANCE	21.4(0.7)	23.8(0.7)	19.0(1.0)	23.0(0.8)	16.3(1.3)	17.3(1.9)	24.3(5.2)	2	1
FIND TOTAL SURFACE AREA	20.3(0.8)	21.3(1.1)	19.4(1.0)	21.8(1.1)	14.8(1.4)	17.0(1.4)	24.2(5.1)	2	1
FIT EQUATION TO DATA	29.9(0.9)	29.1(1.1)	30.8(1.1)	31.7(1.2)	21.9(1.5)	24.9(1.3)	48.7(4.5)	5	1
APPLY PYTHAGOREAN THEOREM	29.2(0.7)	32.7(1.0)	25.6(1.1)	31.4(0.8)	19.2(1.6)	25.9(1.9)	37.7(3.4)	3	1
SOLVE A NUMBER SENTENCE	76.9(1.1)	78.0(1.3)	75.9(1.5)	79.6(1.4)	69.5(2.8)	68.5(2.9)	84.2(5.3)	5	2
DRAW AN OBTUSE ANGLE	68.2(1.6)	68.2(1.9)	68.2(2.0)	74.5(1.9)	47.0(3.3)	53.0(2.7)	82.1(3.5)	3	2
VISUALIZE A GEOMETRIC FIGURE	78.4(1.0)	75.9(1.2)	80.9(1.4)	82.2(1.2)	67.1(2.5)	70.0(3.0)	82.8(4.8)	3	2
APPLY PLACE VALUE	55.0(1.3)	55.2(1.6)	54.7(1.6)	59.2(1.4)	46.0(3.1)	40.9(2.8)	57.5(6.8)	1	2
APPLY PART-WHOLE RELATIONSHIP	62.8(1.2)	66.0(1.5)	59.6(1.8)	70.3(1.4)	36.8(2.2)	48.9(3.2)	72.5(5.4)	1	2
COMPLETE A BAR GRAPH	85.6(0.6)	82.6(1.1)	88.5(0.6)	89.4(0.8)	74.2(2.0)	76.3(2.0)	93.6(2.8)	4	2

GRADE 8 - PERCENTAGE OF STUDENTS RESPONDING CORRECTLY TO THE 1990 MATHEMATICS ITEMS

SHORT TEXT	TOTAL	MALE	FEMALE	WHITE	BLACK	HISPANIC	ASIAN AM	CONTENT AREA	ITEM TYPE
READ A RULER	60.7(1.5)	65.4(1.6)	56.0(1.9)	70.2(1.7)	23.9(2.3)	45.8(4.0)	64.3(4.9)	2	2
COMPLETE A LETTER PATTERN	49.5(1.4)	47.3(1.7)	51.7(1.8)	56.0(1.6)	26.8(2.6)	35.6(2.5)	64.6(5.2)	5	2
USE A NUMBER LINE GRAPH	58.6(1.5)	62.0(1.9)	55.3(1.7)	64.6(1.8)	38.7(3.2)	47.4(3.4)	62.7(6.1)	1	2
LIST SAMPLE SPACE	10.9(0.7)	10.3(0.9)	11.6(1.1)	13.2(0.9)	2.9(0.8)	6.5(1.8)	15.1(3.3)	4	2
DRAW A LINE OF SYMMETRY	23.3(1.0)	22.8(1.3)	23.8(1.2)	25.7(1.3)	15.2(2.0)	16.8(2.0)	25.7(4.7)	3	2
USE SIMILAR TRIANGLES	42.5(1.5)	43.2(1.8)	41.8(1.8)	48.0(1.6)	23.9(3.5)	29.5(3.0)	55.0(7.3)	3	2
EXPLAIN SAMPLING BIAS	46.0(1.4)	46.1(1.8)	45.9(1.7)	53.0(1.8)	20.6(2.4)	34.4(2.9)	48.8(7.5)	4	2
GRAPH AN INEQUALITY	35.2(1.3)	36.0(1.8)	34.5(1.6)	41.4(1.6)	10.6(2.0)	24.0(2.9)	47.3(6.6)	5	2
USE TANGRAMS	46.0(1.4)	46.9(1.9)	45.0(1.6)	50.6(1.6)	24.8(3.2)	36.1(3.1)	64.1(6.3)	3	2
USE TANGRAMS	52.2(1.3)	51.0(1.8)	53.3(1.8)	56.6(1.5)	32.9(2.5)	42.1(3.8)	65.8(7.0)	3	2
SOLVE STORY PROBLEM (MONEY)	83.5(0.9)	82.5(1.2)	84.6(1.2)	88.2(0.9)	67.7(3.1)	76.0(2.9)	84.7(3.6)	1	1
ESTIMATE DISTANCE ON MAP	75.1(0.8)	73.4(1.4)	76.8(1.2)	79.3(1.0)	62.7(2.4)	62.8(2.9)	85.8(3.3)	1	1
COMPLETE A GEOMETRIC PATTERN	94.8(0.5)	94.8(0.7)	94.8(0.6)	96.5(0.5)	88.6(1.7)	91.8(1.4)	95.8(2.4)	5	1
DRAW GEOMETRIC FIGURE	57.1(0.9)	61.5(1.2)	52.6(1.3)	61.6(1.2)	38.1(2.5)	50.3(3.1)	71.3(4.9)	3	2
SOLVE STORY PROBLEM (REASONING)	90.7(0.7)	90.0(1.0)	91.4(1.0)	92.2(0.7)	87.6(1.7)	86.9(2.1)	89.9(3.0)	1	1
REPRESENT WORDS WITH SYMBOLS	79.1(0.8)	79.4(1.2)	78.8(1.0)	83.5(0.9)	65.4(2.6)	68.8(2.8)	87.9(3.4)	5	1
DRAW A GEOMETRIC FIGURE	55.8(1.2)	57.4(1.7)	54.0(1.6)	63.0(1.7)	31.8(2.1)	38.2(2.9)	64.8(5.0)	3	2
COMPARE WEIGHTS	55.0(1.4)	58.5(1.9)	51.4(1.5)	58.2(1.6)	43.4(2.6)	49.0(2.6)	69.0(4.8)	2	1
UNDERSTAND WHEN TO ESTIMATE	75.9(1.0)	72.0(1.3)	79.8(1.5)	80.1(1.2)	63.2(3.2)	65.7(2.8)	86.3(3.5)	1	1
USE A RULER	69.4(1.0)	72.6(1.4)	66.1(1.4)	75.1(1.2)	48.5(2.7)	57.4(3.2)	82.5(4.7)	2	2
USE A RULER	76.9(0.9)	77.4(1.2)	76.4(1.3)	81.0(1.1)	61.5(2.5)	67.3(3.0)	90.3(3.7)	2	2
APPLY PLACE VALUE	71.0(1.1)	68.4(1.7)	73.7(1.4)	75.3(1.5)	55.5(2.7)	65.2(2.8)	80.0(4.8)	1	1
SOLVE STORY PROBLEM (REMAINDER)	66.6(1.1)	66.4(1.5)	66.9(1.1)	71.6(1.4)	48.2(2.6)	57.7(2.9)	74.4(4.9)	1	1
VISUALIZE A CUBE	54.4(1.2)	54.0(1.6)	54.9(1.6)	60.5(1.3)	34.0(2.7)	40.4(3.0)	67.2(5.8)	3	1
EXTEND A NUMBER PATTERN	65.7(1.1)	64.3(1.8)	67.1(1.4)	70.5(1.4)	49.1(2.9)	53.1(2.0)	82.5(5.3)	5	1
SOLVE A PROBABILITY PROBLEM	75.2(0.9)	75.6(1.1)	74.9(1.2)	81.9(1.1)	51.9(2.0)	60.2(2.6)	86.5(5.1)	4	1
FIND AREA OF A RECTANGLE	63.9(1.2)	62.9(1.8)	65.0(1.6)	67.4(1.5)	51.7(3.2)	53.1(2.5)	83.8(3.6)	2	1
FIND EXPECTED VALUE	34.0(1.3)	36.3(1.8)	31.6(1.6)	38.3(1.7)	18.6(2.2)	20.4(2.8)	53.6(5.2)	4	1
INTERPRET A LINE GRAPH	62.1(1.2)	62.6(1.7)	61.7(1.5)	69.1(1.4)	36.7(3.4)	43.5(3.0)	76.5(4.8)	4	1
USE A PROTRACTOR	30.7(1.6)	33.5(2.0)	27.9(1.7)	33.3(1.8)	21.1(3.1)	20.1(2.3)	45.7(5.6)	2	2
ESTIMATE DECIMAL/FRACTION	47.9(1.4)	48.5(2.1)	47.2(1.4)	52.1(1.8)	28.0(3.7)	39.1(3.2)	59.1(6.4)	1	1
CONVERT UNITS OF TIME	59.3(1.1)	59.0(1.5)	59.6(1.5)	62.5(1.2)	47.9(3.0)	50.6(3.4)	76.0(6.4)	2	1
SOLVE A PROPORTION	49.4(1.4)	47.4(1.7)	51.4(2.1)	53.8(1.7)	34.4(3.2)	37.6(2.3)	66.5(5.8)	1	1
APPLY PROPERTIES OF GEOMETRIC SOLIDS	61.9(1.0)	62.5(1.3)	61.3(1.5)	63.2(1.1)	57.9(2.9)	59.2(3.1)	67.0(4.5)	3	1
READ A MEASURE ON A SCALE	91.8(0.7)	92.6(0.8)	90.9(1.0)	94.3(0.7)	83.9(2.3)	85.9(2.0)	95.0(2.5)	2	1
APPLY CONCEPT OF AVERAGE	47.9(1.3)	49.3(1.8)	46.4(1.8)	53.4(1.5)	32.6(3.2)	31.8(3.2)	52.0(7.3)	4	1
RELATE EQUATION TO FIGURE	43.2(1.2)	38.9(1.7)	47.5(1.7)	45.2(1.5)	36.2(2.3)	36.2(3.5)	58.3(5.7)	1	1
SOLVE AN INEQUALITY	45.5(1.6)	43.0(1.7)	48.0(1.9)	49.6(1.9)	31.6(2.8)	35.9(3.6)	53.1(5.2)	5	1
FIND PROBABILITY (VISUAL STIMULUS)	58.1(1.4)	56.2(1.7)	60.1(1.7)	62.2(1.5)	44.0(3.5)	44.7(3.1)	74.2(5.4)	4	1
APPLY CONCEPT OF VOLUME	43.6(1.1)	44.0(1.2)	43.2(1.5)	47.0(1.3)	30.4(2.5)	39.0(2.6)	41.5(6.2)	2	1
APPLY TRANSFORMATIONAL GEOMETRY	59.7(1.1)	54.0(1.2)	65.4(1.5)	63.3(1.2)	49.4(2.6)	47.3(3.6)	70.6(5.8)	3	1
USE CONCEPT OF MIDPOINT	29.9(1.1)	30.9(1.5)	28.8(1.5)	34.7(1.3)	14.0(1.7)	20.2(2.6)	23.8(5.1)	3	1
USE LEAST COMMON MULTIPLE	17.6(0.8)	17.0(1.3)	18.3(1.0)	19.1(1.0)	11.7(1.9)	16.0(2.3)	22.3(7.1)	1	1
APPLY PYTHAGOREAN THEOREM	25.3(1.1)	28.1(1.6)	22.5(1.3)	29.2(1.4)	11.3(1.8)	16.8(2.6)	35.1(4.8)	3	1
IDENTIFY PERPENDICULAR SEGMENTS	21.5(1.1)	22.1(1.5)	21.0(1.3)	22.2(1.4)	19.0(2.4)	19.9(2.6)	25.5(4.1)	3	1
WRITE ALGEBRAIC EXPRESSION	14.8(0.9)	16.0(1.1)	13.6(1.3)	16.4(1.1)	10.9(1.8)	8.6(1.5)	18.1(3.9)	5	1
RECOGNIZE GEOMETRIC PATTERN	34.0(1.2)	36.4(1.3)	31.5(1.8)	36.4(1.4)	24.1(2.6)	28.0(3.3)	39.1(6.4)	5	1
EXPLAIN GEOMETRIC PATTERN	14.8(1.0)	15.0(1.4)	14.5(1.0)	16.9(1.2)	7.7(1.8)	7.5(1.3)	20.3(3.8)	5	2
APPLY CONCEPT OF PROBABILITY	38.7(1.3)	35.4(1.5)	42.1(1.8)	40.9(1.4)	30.5(3.1)	32.1(2.0)	46.6(5.5)	4	1
USE ORDER OF OPERATIONS	94.1(0.5)	93.3(0.8)	94.9(0.7)	95.5(0.5)	91.5(1.4)	87.4(2.3)	99.2(0.9)	5	1

GRADE 8 - PERCENTAGE OF STUDENTS RESPONDING CORRECTLY TO THE 1990 MATHEMATICS ITEMS

SHORT TEXT	TOTAL	MALE	FEMALE	WHITE	BLACK	HISPANIC	ASIAN AM	CONTENT AREA	ITEM TYPE
APPLY MULTIPLICATION	84.7(0.7)	87.2(1.0)	82.3(1.1)	87.8(0.7)	74.6(2.2)	76.9(2.8)	90.5(2.9)	2	1
FIND CHECKBOOK BALANCE	60.3(0.9)	58.2(1.4)	62.4(1.0)	63.5(1.1)	51.5(3.1)	50.5(2.8)	68.2(6.7)	1	1
SOLVE TWO-STEP STORY PROBLEM	41.5(1.2)	40.1(1.6)	42.8(1.7)	45.1(1.5)	28.6(2.5)	34.8(3.0)	52.5(5.4)	1	1
INTERPRET CIRCLE GRAPH	44.1(1.2)	46.1(1.6)	42.1(1.7)	46.6(1.5)	33.2(2.7)	38.2(2.7)	64.6(6.9)	4	1
IDENTIFY TRIANGLE TYPE	37.4(1.2)	36.2(1.7)	38.6(1.7)	38.2(1.6)	34.4(2.7)	34.2(3.9)	48.5(6.0)	3	1
FIND ANGLE IN TRIANGLE	42.6(1.9)	44.7(2.2)	40.5(2.1)	46.0(2.3)	27.9(2.9)	36.1(2.5)	62.9(4.9)	3	1
INTERPRET A GIVEN RULE	36.3(1.2)	39.3(1.7)	33.4(1.4)	39.1(1.3)	25.3(2.2)	31.9(3.8)	47.9(6.4)	1	1
FIND AN AVERAGE	12.3(0.9)	12.4(0.9)	12.2(1.3)	13.7(1.1)	5.9(1.1)	9.7(2.3)	22.3(5.5)	4	2
FIND A PROBABILITY	17.4(0.9)	17.1(1.3)	17.6(1.3)	20.3(1.1)	7.4(1.5)	9.6(1.8)	24.8(3.9)	4	2
EXTRAPOLATE NUMBER PATTERN	18.6(0.9)	19.7(1.2)	17.5(1.2)	18.7(1.1)	16.5(2.2)	16.2(2.1)	33.7(4.8)	5	1
INTERPRET REPRESENTATION OF FRACTION	88.8(0.7)	86.9(1.0)	90.7(0.9)	90.9(0.8)	81.6(2.4)	85.0(2.6)	89.8(3.8)	1	1
SOLVE STORY PROBLEM (MULTIPLICATION)	81.7(1.0)	81.5(1.4)	81.8(1.2)	84.2(1.1)	70.7(2.9)	75.5(3.5)	92.8(2.9)	1	1
IDENTIFY MEASUREMENT INSTRUMENT	83.5(1.0)	83.5(1.5)	83.6(1.0)	87.0(1.0)	73.3(2.7)	72.9(2.8)	86.8(4.5)	2	1
APPLY DIVISION	53.0(1.0)	53.6(1.3)	52.4(1.6)	57.4(1.4)	35.9(2.8)	43.9(3.3)	58.3(6.3)	1	1
USE SCIENTIFIC NOTATION	23.8(1.2)	22.1(1.4)	25.4(1.7)	23.9(1.1)	26.4(2.9)	16.4(2.9)	36.7(7.4)	1	1
ORDER FRACTIONS	27.1(1.3)	33.1(2.1)	21.3(1.4)	29.9(1.5)	18.2(2.5)	14.9(2.4)	42.5(6.5)	1	1
CONVERT TEMPERATURES	27.8(1.3)	24.4(1.4)	31.1(2.0)	29.3(1.7)	22.3(3.0)	21.6(2.8)	33.3(5.0)	5	1
USE ORDER OF OPERATIONS	94.4(0.5)	93.2(0.8)	95.5(0.6)	95.1(0.6)	91.1(1.7)	92.8(1.8)	96.9(2.3)	1	1
SOLVE AN EQUATION	89.0(0.7)	88.8(0.9)	89.2(1.1)	91.8(0.9)	80.6(2.1)	81.0(2.4)	94.6(2.5)	5	1
IDENTIFY A DIAMETER	75.2(1.4)	74.1(1.6)	76.2(1.5)	77.4(1.7)	67.6(2.8)	68.7(2.5)	85.7(3.1)	3	1
APPLY CONCEPT OF EXPONENTS	35.7(1.3)	32.9(1.6)	38.5(1.7)	39.1(1.8)	25.6(2.4)	22.7(2.3)	57.5(4.3)	1	2
IDENTIFY 3-DIMENSIONAL SHAPE	69.4(0.9)	69.4(1.2)	69.3(1.4)	73.0(1.1)	54.5(3.2)	62.4(2.9)	87.2(3.3)	3	1
COMPLETE A NUMBER SENTENCE	70.5(1.2)	69.6(1.5)	71.5(1.7)	73.3(1.4)	59.9(2.5)	62.4(2.4)	84.6(4.0)	5	1
APPLY RATIO AND PROPORTION	58.7(1.3)	59.7(1.8)	57.7(1.8)	63.4(1.7)	42.5(2.2)	46.4(2.7)	69.8(5.1)	2	1
IDENTIFY A NUMBER PATTERN	49.7(1.3)	46.5(1.7)	52.7(1.5)	53.7(1.5)	36.6(2.4)	40.0(2.9)	58.6(4.3)	5	1
SOLVE STORY PROBLEM (MULTIPLICATION)	49.2(1.5)	50.1(1.9)	48.3(2.1)	54.4(1.8)	32.5(2.9)	32.2(2.8)	71.7(4.3)	1	2
USE A RULE TO COMPLETE A CHART	46.6(1.4)	46.4(1.6)	46.8(1.9)	51.9(1.8)	28.8(2.3)	35.1(2.7)	55.3(4.5)	5	2
SOLVE MULTI-STEP STORY PROBLEM	46.2(1.2)	42.7(1.7)	49.6(1.6)	49.3(1.4)	34.1(2.4)	36.4(3.0)	68.9(6.1)	1	1
FIND DIVISORS OF AN INTEGER	33.6(1.1)	29.3(1.4)	37.8(1.5)	35.4(1.2)	26.7(2.2)	25.5(2.5)	59.2(4.5)	1	2
SOLVE STORY PROBLEM (DECIMALS)	43.7(1.2)	44.1(1.9)	43.3(1.3)	47.8(1.4)	29.1(3.4)	31.1(2.3)	55.9(6.4)	1	1
FIND RATIO OF SIDE TO PERIM (TRIANGLE)	40.9(1.1)	41.8(1.9)	40.0(1.4)	42.4(1.2)	34.5(3.0)	32.6(3.0)	56.2(5.9)	3	1
LOCATE POINT ON GRAPH	36.2(1.6)	33.7(2.2)	38.6(2.0)	38.9(1.9)	25.9(3.1)	25.1(2.7)	59.6(6.3)	5	2
CONVERT CHART TO CIRCLE GRAPH	72.7(1.5)	71.7(1.7)	73.7(2.0)	77.7(1.5)	52.9(3.7)	56.9(3.4)	82.4(4.3)	4	2
SOLVE STORY PROBLEM (CONVERSION)	14.7(1.1)	16.1(1.6)	13.4(1.1)	17.0(1.3)	5.8(1.3)	4.9(1.7)	25.5(6.3)	1	2
FIND PERCENT INCREASE	17.9(1.3)	24.2(2.1)	11.9(1.2)	19.0(1.5)	9.5(1.7)	16.3(3.0)	33.1(5.2)	1	1
FIND WIDTH OF A RECTANGLE	19.0(1.1)	22.4(1.7)	15.8(1.3)	18.7(1.2)	18.3(3.0)	15.1(2.9)	43.3(5.0)	2	1
SOLVE A PROPORTION	45.5(1.4)	44.7(2.0)	46.2(1.8)	46.5(1.6)	38.5(3.7)	39.8(3.5)	63.2(6.8)	1	1
ESTIMATE LENGTH IN INCHES	64.3(1.2)	69.7(1.6)	58.7(1.6)	68.8(1.5)	45.7(2.4)	57.6(3.0)	73.8(5.9)	6	1
ESTIMATE LENGTH IN CENTIMETERS	42.0(1.5)	41.1(2.1)	42.9(1.6)	41.8(1.7)	45.6(2.3)	38.9(3.8)	41.2(4.6)	6	1
ESTIMATE TREND ON LINE GRAPH	85.9(1.0)	86.0(1.2)	85.7(1.6)	87.8(1.2)	79.8(2.4)	79.3(2.7)	93.2(3.2)	6	1
ESTIMATE RELATIVE HEIGHT	72.3(1.1)	74.7(1.6)	69.7(1.4)	75.2(1.3)	61.7(2.0)	66.6(2.7)	81.2(3.9)	6	1
ESTIMATE A SUM OF MONEY	65.4(1.1)	64.2(1.7)	66.6(1.3)	67.6(1.2)	59.7(2.6)	58.9(2.7)	71.7(6.6)	6	1
ESTIMATE A PRODUCT	65.8(1.3)	64.0(1.4)	67.6(1.8)	65.9(1.7)	66.3(2.8)	62.8(2.5)	71.0(5.3)	6	1
ESTIMATE USING FRACTIONS	69.6(1.0)	70.1(1.3)	69.0(1.5)	74.9(1.1)	53.1(3.5)	56.7(2.8)	80.6(5.6)	6	1
ESTIMATE AN AREA ON A GRID	87.2(0.8)	85.4(1.1)	88.9(0.9)	89.2(0.9)	81.7(2.1)	81.7(2.0)	91.4(2.6)	6	1
ESTIMATE A SUM OF MIXED NUMBERS	46.1(1.3)	46.2(1.5)	46.0(2.0)	49.8(1.6)	38.9(2.6)	31.9(2.5)	47.6(7.6)	6	1
ESTIMATE PROPORTION	62.6(1.0)	66.7(1.5)	58.4(1.5)	66.5(1.3)	52.8(3.0)	52.1(2.6)	67.7(7.8)	6	1
ESTIMATE POSITION ON LINE	37.6(1.2)	38.0(1.7)	37.2(1.5)	40.4(1.5)	30.4(2.4)	28.7(2.8)	48.4(7.6)	6	1
ESTIMATE PRODUCT	60.8(1.5)	60.3(1.8)	61.3(1.8)	61.7(1.8)	59.6(2.9)	59.0(2.3)	60.1(5.1)	6	1
ESTIMATE ANGLE MEASURE	73.4(1.0)	73.5(1.5)	73.2(1.3)	77.6(1.1)	58.2(3.1)	67.6(2.5)	76.5(6.5)	6	1

GRADE 8 - PERCENTAGE OF STUDENTS RESPONDING CORRECTLY TO THE 1990 MATHEMATICS ITEMS

SHORT TEXT	TOTAL	MALE	FEMALE	WHITE	BLACK	HISPANIC	ASIAN AM	CONTENT AREA	ITEM TYPE
ESTIMATE QUOTIENT	45.5(1.1)	41.8(1.3)	49.2(1.5)	48.4(1.4)	38.8(2.5)	32.9(2.9)	69.1(6.2)	6	1
ESTIMATE SCALE DISTANCE	58.0(1.2)	58.7(1.9)	57.3(1.4)	60.7(1.4)	52.7(2.7)	48.4(2.6)	50.6(5.0)	6	1
ESTIMATE TOTAL WEIGHT	63.5(1.0)	59.0(1.5)	68.1(1.5)	65.0(1.1)	57.3(2.8)	60.4(2.3)	77.6(5.1)	6	1
ESTIMATE DECIMAL QUOTIENT	28.5(1.0)	28.2(1.4)	28.9(1.3)	30.4(1.1)	22.6(2.8)	24.6(2.5)	34.3(5.8)	6	1
ESTIMATE YEARLY SALARY	37.6(1.1)	39.3(1.2)	35.8(1.9)	40.6(1.5)	28.5(3.1)	29.0(2.3)	42.5(5.9)	6	1
ESTIMATE VOLUME	58.1(1.0)	59.1(1.3)	56.9(1.5)	62.6(1.3)	44.7(3.3)	44.0(2.4)	70.0(6.8)	6	1
ESTIMATE TOTAL NUMBER	47.1(1.1)	49.9(1.5)	44.2(1.6)	47.8(1.3)	44.1(3.1)	46.8(2.9)	49.9(5.4)	6	1
ESTIMATE VOLUME	32.4(0.9)	32.8(1.4)	31.9(1.3)	32.5(0.9)	31.6(2.9)	31.1(3.0)	38.1(7.9)	6	1
ESTIMATE FUTURE PRODUCTION	25.5(1.0)	25.8(1.5)	25.1(1.5)	28.5(1.3)	17.0(2.4)	19.9(2.2)	26.2(4.3)	6	1
ESTIMATE SUM OF INTEGERS	73.7(1.0)	77.1(1.0)	70.2(1.5)	76.8(1.2)	63.1(3.0)	65.8(2.7)	82.1(5.4)	6	1
ESTIMATE SUM OF INTEGERS	70.9(0.8)	73.9(1.2)	67.7(1.3)	75.2(0.9)	55.2(3.6)	62.3(3.1)	77.0(5.8)	6	1
ESTIMATE SUM OF INTEGERS	67.1(1.1)	69.0(1.5)	65.0(1.3)	69.8(1.5)	59.4(3.0)	58.0(3.2)	76.1(6.1)	6	1
ESTIMATE SUM OF DECIMALS	67.8(1.0)	69.5(1.2)	66.0(1.6)	71.1(1.1)	59.0(3.2)	59.8(3.0)	68.4(7.2)	6	1
ESTIMATE SUM OF MONEY	81.3(1.0)	81.7(1.2)	80.9(1.2)	83.8(1.0)	74.5(3.6)	73.6(2.5)	91.9(2.8)	6	1
ESTIMATE PRODUCT OF DECIMALS	55.4(1.2)	49.6(1.4)	61.3(1.5)	57.7(1.4)	50.5(3.5)	49.4(2.6)	62.3(4.8)	6	1
ESTIMATE QUOTIENT	61.9(1.2)	61.4(1.3)	62.4(1.8)	64.7(1.3)	55.7(3.2)	53.3(2.5)	71.7(5.7)	6	1
ESTIMATE AVERAGE OF DECIMALS	74.8(1.0)	75.8(1.4)	73.7(1.4)	78.6(0.9)	59.5(3.7)	68.7(2.3)	82.7(5.0)	6	1
ESTIMATE VALUE ON NUMBER LINE	81.7(0.7)	83.3(1.0)	80.1(1.2)	85.5(0.8)	67.0(2.5)	76.2(2.5)	93.4(3.3)	6	1
ESTIMATE TIME IN HOURS	57.4(1.2)	56.3(1.2)	58.6(1.6)	59.2(1.2)	51.7(3.3)	49.7(3.2)	67.0(6.6)	6	1
ESTIMATE QUOTIENT OF MONEY	56.7(0.9)	56.7(1.3)	56.6(1.5)	58.7(1.0)	51.1(3.0)	51.9(2.3)	66.7(6.9)	6	1
ESTIMATE SIZE OF ANGLE	59.6(1.5)	58.9(1.9)	60.4(1.8)	64.4(1.8)	44.5(2.9)	52.4(2.8)	67.3(6.4)	6	1
ESTIMATE PERIMETER	65.2(1.1)	67.1(1.6)	63.2(1.5)	67.9(1.3)	57.0(2.5)	58.4(3.1)	71.0(7.0)	6	1
ESTIMATE LIQUID VOLUME	79.1(0.8)	80.9(0.9)	77.2(1.5)	82.3(1.1)	67.7(2.5)	72.8(1.8)	85.5(4.7)	6	1
ESTIMATE TIME	43.9(1.2)	43.9(1.7)	44.0(1.8)	46.3(1.3)	34.8(3.3)	39.2(2.5)	48.0(7.3)	6	1
ESTIMATE SUM OF MONEY	56.1(1.3)	58.6(1.6)	53.6(2.0)	55.6(1.4)	54.6(3.1)	59.5(2.9)	64.0(5.5)	6	1
ESTIMATE SQUARE ROOT	16.9(0.9)	18.8(1.2)	14.9(1.1)	19.4(1.0)	7.3(1.5)	11.6(1.9)	20.1(6.0)	6	1
ESTIMATE DIFFERENCE	59.3(1.4)	57.6(1.9)	61.0(1.6)	63.8(1.6)	45.1(3.3)	52.7(2.8)	63.7(8.0)	6	1
ESTIMATE DIAGONAL LENGTH	53.0(1.3)	57.3(1.5)	48.5(2.0)	57.1(1.7)	39.3(2.9)	45.0(2.8)	53.5(6.1)	6	1
ESTIMATE, USING RATIO	70.8(1.2)	71.6(1.3)	70.0(1.8)	74.2(1.5)	58.8(3.3)	62.7(2.7)	84.1(3.9)	6	1
ESTIMATE PRODUCT OF MONEY	55.5(1.1)	53.5(1.6)	57.6(1.5)	56.6(1.3)	47.8(3.5)	57.9(2.9)	67.4(5.3)	6	1
ESTIMATE SALES TAX	41.2(1.1)	43.7(1.6)	38.7(1.6)	43.8(1.4)	31.4(3.1)	37.5(3.0)	49.1(4.3)	6	[illegible]
ESTIMATE TREND ON LINE GRAPH	69.0(1.1)	71.5(1.4)	66.5(1.6)	72.7(1.2)	54.4(3.1)	62.2(3.7)	78.3(5.2)	6	1
ESTIMATE SUM ON BAR GRAPH	49.4(1.2)	51.8(1.8)	47.0(1.5)	51.9(1.4)	35.8(3.3)	49.1(2.5)	62.2(8.4)	6	1
APPLY DECIMAL ADDITION	66.4(1.3)	63.5(2.0)	69.3(1.5)	68.0(1.3)	60.9(4.0)	63.9(3.6)	79.7(3.9)	7	2
LIST POSSIBLE OUTCOMES	63.9(1.3)	65.1(1.7)	62.6(1.8)	71.8(1.6)	39.4(3.7)	46.9(2.7)	77.4(7.0)	7	2
APPLY CONCEPT OF EVEN NUMBER	23.5(1.1)	22.6(1.4)	24.4(1.4)	27.6(1.5)	10.4(1.9)	14.1(2.0)	32.1(8.2)	7	2
APPLY PLACE VALUE	60.9(1.4)	64.7(1.7)	57.0(1.8)	64.2(1.7)	50.1(3.4)	51.1(2.4)	76.2(5.3)	7	1
LIST SAMPLE SPACE	78.5(1.3)	77.6(1.6)	79.4(1.5)	85.7(1.6)	53.0(3.3)	66.9(3.0)	87.3(4.4)	7	2
USE VENN DIAGRAM	44.4(1.3)	44.3(1.6)	44.4(1.7)	49.3(1.6)	26.2(2.4)	35.3(3.1)	61.3(4.9)	7	2
MAKE SCALE DRAWING	67.3(1.3)	69.1(1.7)	65.4(1.5)	74.8(1.7)	37.4(3.0)	55.2(2.4)	79.2(4.8)	7	2
USE RATE TABLE TO FIND COST	17.2(0.8)	17.6(1.5)	16.7(1.1)	21.0(1.1)	5.3(1.2)	7.1(1.3)	28.5(6.6)	7	2

CONTENT AREAS
1 = Numbers and Operations
2 = Measurement
3 = Geometry
4 = Data Analysis, Statistics, and Probability
5 = Algebra and Functions
6 = Estimation
7 = Problem Solving

ITEM TYPES
1 = Multiple Choice
2 = Constructed Response

GRADE 12 - OVERALL MATHEMATICS PROFICIENCY
PERCENTAGE OF STUDENTS AT OR ABOVE ANCHOR POINTS

	N	WEIGHTED PCT [CV]	200	250	300	350
-- TOTAL --	6311	100.0(0.0) [1%]	99.9(0.1)	90.5(0.6)	45.4(1.4)	4.7(0.6)
SEX						
MALE	3065	48.8(0.7) [2%]	100.0(0.0)	91.7(0.8)	47.6(1.7)	6.3(0.9)
FEMALE	3246	51.2(0.7) [1%]	99.9(0.1)	89.4(0.7)	43.3(1.5)	3.2(0.4)
RACE/ETHNICITY						
WHITE	4492	73.9(0.4) [1%]	100.0(0.0)	94.6(0.6)	52.1(1.6)	5.6(0.6)
BLACK	913	14.0(0.3) [3%]	99.9(0.0)	73.7(2.0)	15.9(1.6)	0.2(0.3)
HISPANIC	611	7.9(0.3) [4%]	99.6(0.6)	78.9(2.9)	25.0(3.4)	1.3(0.5)
ASIAN/PACIFIC ISLANDER	245	3.4(0.2) [6%]	100.0(0.0)	97.3(1.6)	69.7(3.5)	13.3(4.0)
AMER IND/ALASKAN NATV	45	0.8(0.3) [37%]!	99.0(2.3)	92.0(4.7)	39.0(9.0)	0.0(0.0)
REGION						
NORTHEAST	1598	23.9(0.9) [4%]	100.0(0.0)	93.1(1.1)	53.5(2.7)	6.4(1.1)
SOUTHEAST	1804	20.7(0.7) [4%]	100.0(0.0)	84.3(1.5)	31.2(3.5)	1.7(0.4)
CENTRAL	1221	26.6(0.5) [2%]	100.0(0.1)	92.1(1.1)	48.0(2.6)	5.0(1.2)
WEST	1688	28.8(0.8) [3%]	99.9(0.2)	91.4(1.5)	46.5(2.7)	5.3(1.3)
AGE						
BELOW MODAL AGE	83	1.1(0.1) [14%]	100.0(0.0)	96.6(2.6)	57.0(6.2)	11 3(4.9)
AT MODAL AGE	4315	66.2(1.0) [1%]	100.0(0.0)	93.9(0.6)	51.3(1.5)	5.7(0.7)
ABOVE MODAL AGE	1913	32.7(1.0) [4%]	99.9(0.2)	83.5(1.1)	33.2(1.8)	2.6(0.5)
TYPE OF COMMUNITY						
EXTREME RURAL	673	12.0(3.1) [26%]!	100.0(0.0)	88.8(1.9)	39.3(4.1)	2.6(1.2)
DISADVANTAGED URBAN	833	12.0(2.4) [20%]	99.7(0.5)	81.7(4.2)	31.1(4.6)	3.0(1.2)
ADVANTAGED URBAN	772	9.1(2.2) [24%]!	100.0(0.0)	94.5(1.9)	62.5(4.3)	10.4(1.8)
OTHER	4033	66.7(3.7) [5%]	100.0(0.0)	91.9(0.8)	46.7(1.3)	4.7(0.7)
PARENTS' EDUCATION LEVEL						
LESS THAN H.S.	511	7.9(0.6) [8%]	100.0(0.0)	77.1(2.0)	16.4(2.3)	0.5(0.4)
GRADUATED H.S.	1420	23.5(1.0) [4%]	99.9(0.1)	84.9(1.5)	28.0(1.4)	1.0(0.4)
SOME EDUC AFTER H.S.	1591	25.3(0.8) [3%]	100.0(0.0)	93.4(0.8)	47.9(1.7)	3.1(0.6)
GRADUATED COLLEGE	2644	40.9(1.2) [3%]	100.0(0.0)	95.8(0.6)	61.4(2.0)	8.9(1.1)
UNKNOWN	126	2.1(0.2) [10%]	98.7(2.1)	70.7(4.6)	11.7(3.4)	1.4(1.0)
TYPE OF SCHOOL						
PUBLIC	4953	90.1(1.3) [2%]	99.9(0.1)	89.9(0.7)	44.6(1.4)	4.8(0.6)
PRIVATE	1358	9.9(1.3) [13%]	100.0(0.0)	96.2(0.8)	52.2(3.4)	3.8(0.9)
TYPE OF HIGH SCHOOL PROGRAM						
GENERAL	1996	33.7(1.3) [4%]	100.0(0.0)	83.2(1.3)	21.5(1.7)	0.8(0.3)
ACADEMIC/COLLEGE PREP	3797	57.6(1.3) [2%]	100.0(0.0)	96.8(0.4)	63.8(1.4)	7.7(0.9)
VOCATIONAL/TECHNICAL	453	7.7(0.6) [8%]	99.9(0.0)	77.7(2.7)	13.8(2.7)	0.2(0.5)

! INTERPRET WITH CAUTION: SAMPLING ERROR CANNOT BE ESTIMATED ACCURATELY SINCE COEFFICIENT OF VARIATION OF ESTIMATED NUMBER OF STUDENTS EXCEEDS 20%

GRADE 12 - OVERALL MATHEMATICS PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	295.3(1.1)	33.3(0.5)	241.0(1.5)	250.8(1.0)	270.8(1.2)	295.9(1.3)	319.6(1.2)	339.3(1.3)	349.2(1.4)
SEX									
MALE	297.7(1.3)	33.9(0.6)	243.3(2.0)	252.9(0.9)	272.0(1.6)	297.7(2.0)	323.0(1.7)	342.8(1.9)	353.6(2.6)
FEMALE	293.1(1.1)	32.6(0.5)	238.6(0.8)	248.9(1.5)	269.7(1.7)	294.5(1.5)	317.0(1.0)	33[illegible].1(1.4)	345.3(1.6)
RACE/ETHNICITY									
WHITE	301.1(1.2)	31.3(0.5)	249.0(1.5)	259.2(1.7)	278.5(1.6)	301.6(1.4)	323.7(1.2)	341.9(1.2)	351.6(2.2)
BLACK	270.2(1.3)	28.6(0.7)	226.0(1.8)	234.5(1.8)	248.9(1.3)	268.7(2.2)	289.6(3.2)	309.4(5.1)	320.2(2.9)
HISPANIC	277.6(2.4)	32.0(1.2)	228.5(5.9)	238.7(3.9)	254.0(2.5)	274.9(1.8)	300.3(4.2)	320.4(3.0)	332.2(7.0)
ASIAN/PACIFIC ISLANDER	315.0(4.0)	31.9(1.5)	257.3(4.2)	268.9(10.0)	293.8(11.5)	318.3(3.9)	337.9(10.4)	355.4(4.1)	365.0(6.5)
AMER IND/ALASKAN NATV	290.4(5.4)	31.3(3.9)	244.7(10.8)	254.0(7.7)	267.5(4.6)	290.3(6.5)	316.0(3.3)	331.9(5.4)	339.7(9.5)
REGION									
NORTHEAST	301.6(2.1)	33.4(0.6)	244.8(3.0)	256.0(2.0)	277.2(2.8)	303.1(2.5)	326.1(2.6)	344.3(2.0)	353.9(4.0)
SOUTHEAST	283.9(2.2)	31.8(0.8)	233.7(2.3)	242.2(2.2)	260.5(1.9)	283.1(2.8)	306.5(3.7)	326.6(2.2)	337.6(3.4)
CENTRAL	297.6(2.0)	32.4(0.9)	243.7(2.5)	254.3(2.7)	274.1(1.5)	297.9(2.4)	321.2(2.5)	340.0(2.0)	349.8(3.1)
WEST	296.4(2.2)	33.2(1.3)	242.6(2.2)	252.4(4.2)	271.8(2.1)	297.0(2.6)	320.2(2.1)	339.9(3.7)	350.9(3.9)
AGE									
BELOW MODAL AGE	306.9(4.7)	34.0(2.8)	259.9(25.1)	266.4(5.0)	279.7(3.5)	304.9(10.7)	334.6(11.6)	351.0(5.3)	359.4(12.6)
AT MODAL AGE	300.4(1.1)	31.9(0.6)	247.0(1.2)	257.8(2.0)	277.4(1.6)	301.0(1.3)	323.3(1.1)	341.9(1.0)	352.0(1.9)
ABOVE MODAL AGE	284.6(1.3)	33.6(0.7)	233.1(1.4)	242.1(1.3)	258.9(1.5)	282.8(1.4)	309.6(1.6)	330.5(2.5)	342.2(2.9)
TYPE OF COMMUNITY									
EXTREME RURAL	290.2(3.2)	31.8(1.0)	238.8(2.4)	247.9(2.8)	266.9(3.4)	289.9(3.4)	313.4(5.0)	332.8(4.1)	341.5(1.8)
DISADVANTAGED URBAN	282.6(4.4)	34.2(1.6)	231.1(4.9)	240.6(4.1)	256.6(4.4)	280.0(5.5)	307.4(5.0)	329.3(6.3)	343.0(7.0)
ADVANTAGED URBAN	308.4(3.2)	33.5(1.4)	249.2(8.8)	261.1(3.9)	285.5(5.8)	310.9(3.4)	333.5(3.8)	350.6(3.9)	359.5(3.8)
OTHER	296.7(1.1)	32.5(0.6)	243.0(1.5)	253.3(1.1)	273.1(1.2)	297.2(1.9)	320.2(1.0)	339.4(1.6)	349.1(2.1)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	272.4(1.4)	28.3(1.3)	228.4(3.7)	237.5(3.6)	251.8(1.3)	271.0(4.5)	290.0(3.1)	310.9(5.2)	322.7(4.1)
GRADUATED H.S.	282.2(1.2)	30.2(0.6)	233.8(3.6)	243.3(1.5)	260.5(1.1)	281.2(1.7)	303.4(1.3)	322.4(2.5)	333.7(2.9)
SOME EDUC AFTER H.S.	296.9(0.9)	29.8(0.5)	246.5(2.5)	255.9(1.7)	275.1(1.0)	298.4(1.7)	318.2(0.8)	335.6(1.5)	344.9(2.3)
GRADUATED COLLEGE	308.1(1.3)	31.9(0.6)	252.6(2.1)	263.5(2.4)	286.5(2.2)	309.7(1.4)	331.4(1.9)	348.2(1.8)	358.6(1.8)
UNKNOWN	268.0(3.5)	31.1(3.1)	220.0(7.9)	231.9(3.4)	247.2(3.7)	265.6(3.2)	286.2(10.2)	303.7(11.4)	326.8(21.7)
TYPE OF SCHOOL									
PUBLIC	294.7(1.1)	33.7(0.5)	240.2(1.7)	249.8(1.4)	269.5(1.4)	295.2(1.4)	319.3(1.3)	339.4(1.3)	349.5(1.5)
PRIVATE	301.1(2.1)	28.7(0.9)	254.0(2.9)	264.1(2.9)	280.9(2.6)	301.7(2.2)	321.4(2.5)	338.2(2.8)	346.6(2.9)
TYPE OF HIGH SCHOOL PROG									
GENERAL	277.9(1.2)	28.2(0.7)	234.6(1.8)	242.5(1.8)	257.5(1.0)	276.2(1.3)	296.4(1.7)	315.8(1.6)	327.0(1.7)
ACADEMIC/COLLEGE PREP	309.2(1.1)	29.8(0.6)	257.1(1.6)	269.4(1.2)	290.1(1.1)	310.5(1.1)	330.4(1.2)	346.5(1.2)	355.7(1.4)
VOCATIONAL/TECHNICAL	270.1(1.7)	26.1(1.2)	229.1(3.4)	238.2(1.9)	252.0(1.4)	267.9(1.7)	287.2(3.9)	305.8(2.6)	315.5(2.3)

GRADE 12 - NUMBERS AND OPERATIONS PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	293.8(1.0)	33.3(0.4)	239.3(1.2)	250.4(0.9)	270.3(1.0)	294.0(1.3)	317.0(1.0)	337.4(1.3)	348.6(1.3)
SEX									
MALE	296.2(1.2)	34.0(0.6)	240.8(1.2)	251.6(1.7)	271.8(1.0)	296.1(1.8)	320.4(2.3)	341.3(1.5)	352.7(2.0)
FEMALE	291.5(1.1)	32.5(0.5)	237.5(2.0)	249.3(1.3)	268.9(1.3)	292.1(1.5)	313.8(1.0)	333.6(1.5)	344.5(2.7)
RACE/ETHNICITY									
WHITE	298.8(1.1)	31.7(0.4)	246.6(1.7)	257.4(1.4)	276.6(1.3)	299.0(1.1)	320.9(1.4)	340.4(1.7)	351.1(2.1)
BLACK	272.7(1.4)	29.3(0.9)	225.8(3.4)	235.5(1.3)	251.7(1.3)	271.8(2.1)	292.5(2.2)	311.1(2.1)	320.9(3.4)
HISPANIC	276.8(2.4)	32.8(1.4)	225.1(4.2)	234.7(2.5)	253.7(2.2)	275.5(4.1)	298.9(5.7)	320.4(5.0)	334.0(4.2)
ASIAN/PACIFIC ISLANDER	311.8(3.4)	33.6(1.7)	252.5(5.1)	265.3(5.1)	289.4(6.3)	315.0(3.0)	334.2(6.3)	354.5(8.8)	364.0(6.1)
AMER IND/ALASKAN NATV	290.1(6.9)	31.8(3.9)	235.1(8.7)	245.4(7.4)	266.1(20.3)	294.7(4.9)	312.8(5.5)	329.8(9.7)	332.3(10.4)
REGION									
NORTHEAST	298.4(1.8)	33.1(0.5)	243.2(2.1)	254.2(1.8)	275.1(2.8)	299.3(1.4)	322.0(2.2)	341.0(1.5)	352.3(3.9)
SOUTHEAST	284.6(2.3)	31.9(0.6)	233.4(2.8)	243.9(2.4)	261.9(1.4)	283.6(2.2)	305.9(3.7)	326.8(3.1)	339.1(2.9)
CENTRAL	295.9(1.8)	32.9(0.9)	241.7(2.3)	253.1(2.8)	272.7(1.4)	296.5(2.1)	318.5(2.5)	338.4(2.8)	349.6(3.9)
WEST	294.8(2.0)	33.6(1.1)	239.3(3.6)	250.6(2.8)	271.0(1.9)	295.1(1.9)	318.1(3.0)	339.0(2.5)	350.0(3.3)
AGE									
BELOW MODAL AGE	306.2(4.8)	33.2(2.4)	256.9(6.8)	264.7(5.6)	282.3(3.0)	305.6(7.3)	330.7(15.8)	351.4(6.9)	357.2(23.3)
AT MODAL AGE	298.5(1.0)	32.1(0.5)	245.3(1.6)	256.4(1.6)	276.2(1.3)	298.7(1.3)	320.6(1.9)	340.3(1.4)	351.7(3.1)
ABOVE MODAL AGE	284.0(1.2)	33.5(0.7)	230.7(1.9)	241.5(1.5)	259.6(1.4)	282.7(1.4)	307.4(1.5)	329.3(1.5)	341.3(1.7)
TYPE OF COMMUNITY									
EXTREME RURAL	289.3(3.0)	32.5(0.8)	235.4(3.9)	246.3(2.3)	266.9(4.2)	289.8(3.5)	312.9(3.2)	331.1(4.3)	342.3(3.7)
DISADVANTAGED URBAN	282.5(3.8)	34.3(1.5)	227.9(9.2)	239.8(4.0)	258.1(5.1)	280.6(6.5)	306.2(4.3)	330.3(8.0)	341.7(3.0)
ADVANTAGED URBAN	305.9(2.9)	34.1(1.2)	247.3(3.9)	258.5(5.7)	282.4(6.4)	307.7(4.4)	331.2(4.8)	348.9(2.1)	358.7(5.2)
OTHER	295.0(1.0)	32.5(0.6)	241.6(1.4)	252.8(1.9)	272.2(0.8)	295.2(1.1)	317.2(1.3)	337.3(1.4)	348.7(1.7)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	274.4(1.6)	29.7(1.2)	227.1(2.1)	236.7(2.4)	253.6(1.9)	273.4(1.7)	294.1(3.0)	313.5(1.7)	323.0(1.8)
GRADUATED H.S.	282.3(1.3)	30.9(0.7)	231.8(3.9)	243.4(1.8)	260.7(1.2)	281.5(1.5)	302.7(1.3)	323.1(2.3)	336.1(2.0)
SOME EDUC AFTER H.S.	295.4(0.8)	30.4(0.6)	245.2(4.6)	255.9(1.4)	274.1(1.1)	295.7(0.7)	315.9(1.1)	334.3(1.7)	346.2(3.0)
GRADUATED COLLEGE	304.7(1.2)	32.5(0.6)	249.0(1.5)	261.2(1.6)	282.2(1.4)	306.2(1.5)	327.7(0.9)	346.1(1.6)	356.3(1.9)
UNKNOWN	268.6(3.4)	32.0(3.7)	221.8(6.3)	230.0(6.6)	246.9(4.2)	268.5(5.9)	286.8(2.1)	303.8(14.1)	325.1(17.3)
TYPE OF SCHOOL									
PUBLIC	293.3(1.0)	33.6(0.4)	238.6(1.5)	249.6(1.7)	269.5(0.8)	293.4(1.5)	316.6(0.9)	337.4(1.4)	348.7(1.4)
PRIVATE	298.4(2.1)	30.4(0.8)	248.8(1.9)	259.4(3.6)	277.0(2.1)	298.7(2.2)	319.8(2.2)	337.7(2.5)	348.4(2.1)
TYPE OF HIGH SCHOOL PROG									
GENERAL	278.2(1.2)	28.9(0.6)	231.9(2.3)	241.9(1.2)	258.2(2.6)	277.3(1.3)	297.3(1.1)	315.8(2.0)	327.6(1.1)
ACADEMIC/COLLEGE PREP	306.2(0.9)	30.7(0.5)	253.7(1.7)	265.8(1.1)	285.6(1.0)	307.0(1.4)	327.4(1.0)	345.4(1.2)	355.3(2.2)
VOCATIONAL/TECHNICAL	271.7(1.8)	28.0(1.2)	225.6(4.7)	235.6(2.5)	252.5(2.2)	270.7(2.5)	291.3(2.6)	307.1(2.6)	317.9(3.4)

GRADE 12 - MEASUREMENT
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	294.3(1.1)	37.1(0.5)	232.9(1.6)	245.9(1.6)	268.5(1.2)	294.3(1.5)	320.2(1.6)	342.4(1.3)	355.2(2.0)
SEX									
MALE	299.1(1.4)	36.8(0.8)	240.2(1.5)	251.5(2.1)	272.7(1.7)	298.7(1.6)	324.8(2.3)	347.4(1.3)	359.9(2.2)
FEMALE	289.8(1.2)	36.9(0.6)	227.2(1.9)	240.4(2.4)	264.7(1.1)	290.8(1.8)	315.5(1.2)	336.6(1.7)	350.3(2.2)
RACE/ETHNICITY									
WHITE	300.8(1.2)	34.5(0.5)	244.0(1.3)	256.1(1.3)	276.9(1.5)	300.8(1.5)	324.4(2.0)	345.9(2.2)	357.8(2.9)
BLACK	263.9(1.4)	32.5(1.0)	213.4(2.6)	222.3(2.9)	240.4(1.8)	262.9(2.6)	285.7(3.8)	308.2(3.7)	319.7(1.7)
HISPANIC	278.1(2.6)	35.1(1.5)	221.8(4.1)	234.0(5.1)	252.9(3.3)	276.7(3.0)	302.8(4.7)	324.2(4.6)	335.9(4.2)
ASIAN/PACIFIC ISLANDER	318.3(4.1)	35.6(2.3)	261.0(6.0)	271.1(5.4)	291.6(6.5)	319.4(4.9)	344.0(4.4)	364.1(8.1)	376.5(6.7)
AMER IND/ALASKAN NATV	289.7(5.8)	36.0(4.0)	225.2(36.2)	245.5(5.7)	263.8(5.3)	291.0(16.2)	317.4(3.7)	336.0(7.1)	340.8(20.6)
REGION									
NORTHEAST	300.8(2.4)	37.3(1.2)	237.0(3.1)	251.3(3.1)	275.2(6.3)	302.5(2.6)	326.6(3.8)	348.4(2.7)	361.6(4.4)
SOUTHEAST	279.5(2.0)	35.5(0.9)	221.4(3.3)	233.6(2.3)	254.3(2.0)	278.6(2.5)	304.2(2.9)	326.2(2.5)	338.4(2.5)
CENTRAL	297.3(2.0)	35.4(1.0)	238.9(2.9)	251.6(2.8)	272.9(2.0)	297.0(2.0)	322.0(3.7)	343.2(2.5)	355.0(3.0)
WEST	296.9(2.4)	36.9(1.3)	236.4(2.6)	249.4(3.8)	271.2(2.5)	296.8(2.7)	322.0(4.1)	345.4(5.7)	357.9(3.7)
AGE									
BELOW MODAL AGE	305.6(5.2)	39.9(4.6)	245.9(19.8)	256.6(21.3)	275.7(12.5)	303.6(9.5)	338.9(5.9)	354.9(15.3)	364.7(13.3)
AT MODAL AGE	298.7(1.1)	36.3(0.7)	238.4(2.2)	251.3(2.1)	273.7(1.5)	299.2(1.3)	323.6(1.6)	345.6(2.8)	358.4(2.3)
ABOVE MODAL AGE	285.0(1.5)	37.1(0.8)	224.3(2.4)	237.2(2.2)	259.0(1.9)	284.2(2.1)	311.5(2.2)	334.2(2.8)	346.8(2.3)
TYPE OF COMMUNITY									
EXTREME RURAL	290.0(3.8)	34.8(1.7)	231.6(11.2)	244.3(4.9)	266.0(4.0)	289.4(3.4)	314.6(5.4)	335.0(4.4)	346.9(5.6)
DISADVANTAGED URBAN	281.1(4.7)	38.2(1.8)	220.4(4.0)	232.3(3.7)	253.6(7.0)	279.8(5.7)	307.5(4.4)	332.4(5.8)	346.8(5.5)
ADVANTAGED URBAN	307.6(3.9)	37.3(2.2)	243.1(13.6)	258.8(9.4)	282.1(4.9)	310.3(4.8)	332.8(3.7)	354.8(6.1)	367.4(5.5)
OTHER	295.6(1.2)	36.5(0.7)	235.2(1.5)	248.3(1.6)	270.4(2.1)	296.0(1.7)	320.9(2.1)	343.0(1.7)	355.4(1.7)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	272.0(1.8)	32.9(1.4)	219.2(3.2)	230.7(2.0)	249.3(2.7)	270.6(2.0)	292.4(1.8)	315.4(6.3)	328.2(4.2)
GRADUATED H.S.	280.3(1.3)	34.0(0.7)	224.3(1.6)	235.9(2.0)	257.5(1.6)	280.0(1.6)	304.2(2.1)	324.3(2.6)	337.0(1.9)
SOME EDUC AFTER H.S.	295.2(1.2)	33.5(0.8)	238.7(2.6)	250.8(2.3)	272.3(2.4)	296.3(2.3)	318.8(2.5)	337.3(1.8)	349.3(3.8)
GRADUATED COLLEGE	307.7(1.5)	36.1(0.7)	245.8(1.6)	260.3(1.9)	283.1(1.6)	308.9(1.4)	332.6(1.5)	354.0(1.2)	365.2(1.8)
UNKNOWN	270.0(3.5)	35.1(3.0)	215.5(10.8)	225.4(13.7)	245.5(3.9)	271.0(4.4)	288.4(2.6)	315.6(12.4)	336.8(14.5)
TYPE OF SCHOOL									
PUBLIC	293.7(1.1)	37.5(0.6)	231.7(1.7)	244.8(1.1)	267.5(1.2)	293.6(1.4)	319.8(1.6)	342.4(1.4)	355.4(2.0)
PRIVATE	299.7(2.3)	33.6(1.2)	244.7(5.2)	256.9(2.7)	276.9(2.5)	299.9(1.7)	322.8(1.7)	342.4(3.3)	353.8(1.8)
TYPE OF HIGH SCHOOL PROG									
GENERAL	277.6(1.3)	32.3(0.8)	224.9(2.5)	236.5(1.7)	255.7(1.8)	277.1(1.1)	299.0(1.8)	319.9(1.5)	331.3(2.2)
ACADEMIC/COLLEGE PREP	307.6(1.2)	34.7(0.7)	248.2(2.8)	262.3(1.6)	285.0(1.2)	309.1(1.3)	331.4(1.1)	351.6(2.5)	363.2(3.1)
VOCATIONAL/TECHNICAL	270.4(1.9)	31.2(1.4)	218.1(5.5)	229.8(5.2)	249.6(2.0)	269.8(2.7)	291.0(3.2)	309.9(3.5)	322.4(5.3)

GRADE 12 - GEOMETRY PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	296.3(1.3)	41.0(0.6)	228.3(1.3)	241.7(1.3)	267.1(1.8)	297.0(1.6)	325.4(1.4)	350.1(1.2)	362.8(3.2)
SEX									
MALE	299.2(1.6)	41.4(0.7)	231.9(1.9)	244.9(2.1)	268.3(1.9)	299.5(1.7)	329.0(2.2)	354.2(1.9)	367.4(3.1)
FEMALE	293.6(1.3)	40.3(0.7)	224.9(1.7)	239.4(1.4)	265.9(1.6)	294.9(1.7)	322.3(1.8)	345.6(2.2)	357.8(2.6)
RACE/ETHNICITY									
WHITE	302.6(1.4)	39.1(0.6)	237.3(2.4)	250.5(2.2)	275.3(1.7)	303.4(1.9)	330.3(2.3)	353.6(1.3)	365.9(2.0)
BLACK	269.3(1.9)	36.5(1.3)	210.5(3.7)	222.1(2.8)	243.1(3.7)	268.5(2.1)	295.6(3.6)	316.2(3.8)	329.1(2.0)
HISPANIC	277.5(2.9)	40.1(1.7)	215.9(3.4)	228.2(4.4)	248.3(4.4)	275.9(3.5)	304.8(2.5)	331.5(6.9)	346.8(7.3)
ASIAN/PACIFIC ISLANDER	317.1(5.0)	37.7(2.2)	252.5(4.2)	266.3(6.6)	292.0(4.7)	319.2(7.5)	344.7(3.6)	363.5(4.9)	375.8(18.5)
AMER IND/ALASKAN NATV	288.9(6.9)	40.6(5.5)	223.1(16.6)	243.5(54.5)	263.2(4.6)	285.2(13.5)	319.4(25.1)	345.3(16.5)	360.4(44.3)
REGION									
NORTHEAST	304.2(2.8)	41.5(0.8)	233.3(5.2)	248.7(3.5)	275.5(2.9)	305.2(3.7)	334.6(3.3)	357.4(3.9)	369.9(2.5)
SOUTHEAST	282.7(2.8)	39.5(1.2)	219.4(2.5)	230.9(2.5)	254.6(2.7)	282.5(4.0)	310.1(2.7)	333.8(3.8)	349.0(4.2)
CENTRAL	299.2(2.1)	39.8(1.1)	232.6(2.8)	245.5(4.9)	270.9(2.7)	300.7(2.7)	327.0(2.7)	351.2(2.9)	362.7(4.4)
WEST	296.9(2.6)	40.3(1.3)	230.8(4.4)	244.1(2.7)	268.2(3.2)	296.9(3.4)	325.5(3.4)	350.1(3.9)	363.1(5.6)
AGE									
BELOW MODAL AGE	307.6(5.1)	41.6(4.8)	243.9(42.1)	255.5(7.9)	281.0(14.2)	305.9(4.9)	339.0(7.7)	364.9(14.7)	374.0(21.9)
AT MODAL AGE	301.8(1.3)	39.6(0.6)	235.2(2.2)	249.1(1.9)	274.2(1.9)	302.8(1.6)	329.8(2.2)	353.2(1.2)	365.4(2.6)
ABOVE MODAL AGE	284.9(1.6)	41.3(1.1)	220.0(2.0)	231.9(2.3)	254.8(1.8)	284.0(2.4)	314.3(3.0)	340.5(3.4)	355.3(2.8)
TYPE OF COMMUNITY									
EXTREME RURAL	290.7(3.8)	39.5(1.5)	225.7(5.0)	238.9(4.7)	262.0(3.1)	289.6(4.3)	320.5(5.0)	343.6(5.5)	354.8(3.5)
DISADVANTAGED URBAN	283.0(4.7)	41.2(2.0)	217.6(4.1)	230.9(6.7)	252.9(4.8)	281.4(4.1)	311.2(4.2)	337.3(6.5)	354.9(10.4)
ADVANTAGED URBAN	310.8(3.9)	41.1(1.9)	238.0(8.9)	253.9(5.2)	283.7(7.2)	313.6(5.2)	341.4(2.1)	361.6(2.8)	371.7(4.5)
OTHER	297.7(1.3)	40.3(0.7)	230.0(2.0)	244.4(1.7)	269.3(2.1)	298.5(1.6)	326.0(1.3)	350.5(1.3)	363.0(2.0)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	270.0(2.0)	35.6(1.4)	214.5(3.9)	223.9(1.7)	245.1(6.7)	268.4(3.9)	293.6(7.5)	316.8(2.5)	333.4(5.4)
GRADUATED H.S.	280.9(1.5)	38.1(0.9)	218.9(2.9)	231.4(2.0)	254.1(2.6)	281.0(2.4)	306.8(2.7)	331.6(2.4)	345.0(2.4)
SOME EDUC AFTER H.S.	298.4(1.2)	37.6(0.9)	234.9(2.5)	247.2(2.8)	272.2(1.6)	300.1(1.4)	324.8(2.1)	346.5(1.7)	358.9(2.2)
GRADUATED COLLEGE	310.8(1.6)	39.1(0.7)	243.1(4.9)	258.4(1.8)	284.6(2.5)	312.2(2.0)	339.0(1.8)	360.7(1.9)	372.0(1.9)
UNKNOWN	266.7(6.2)	38.4(4.8)	207.4(11.3)	221.9(10.3)	240.1(9.2)	264.4(10.4)	288.5(7.6)	317.3(7.7)	339.8(24.4)
TYPE OF SCHOOL									
PUBLIC	295.5(1.3)	4[illegible].4(0.7)	227.2(2.6)	240.5(1.3)	265.7(1.9)	295.9(1.6)	325.1(1.8)	350.3(1.5)	363.0(3.4)
PRIVATE	303.7(2.5)	35.5(1.2)	244.2(5.7)	258.0(3.3)	280.4(2.9)	304.4(2.2)	327.8(2.4)	348.3(3.2)	361.1(3.8)
TYPE OF HIGH SCHOOL PROG									
GENERAL	276.4(1.5)	36.4(0.8)	219.6(2.3)	230.5(1.5)	250.6(2.1)	274.8(1.2)	300.7(1.7)	324.4(2.1)	338.7(1.8)
ACADEMIC/COLLEGE PREP	312.2(1.4)	36.8(0.9)	248.4(3.5)	264.3(2.0)	288.3(1.7)	313.3(1.7)	338.0(1.8)	358.6(1.6)	370.5(2.4)
VOCATIONAL/TECHNICAL	267.7(2.1)	33.2(1.8)	215.4(4.1)	227.1(3.0)	245.2(2.6)	266.3(6.5)	288.6(4.5)	311.6(12.3)	327.1(3.1)

GRADE 12 - DATA ANALYSIS, STATISTICS, AND PROBABILITY PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	295.3(1.1)	36.3(0.7)	233.1(1.3)	247.0(1.4)	[illegible]0.7(1.6)	297.0(1.4)	320.7(1.3)	341.1(2.1)	352.8(1.7)
SEX									
MALE	297.5(1.3)	36.9(0.9)	234.2(1.9)	248.6(2.0)	272.7(1.8)	299.2(2.0)	323.3(1.9)	344.1(2.2)	356.2(3.4)
FEMALE	293.2(1.2)	35.7(0.7)	232.1(1.8)	245.7(1.8)	269.0(1.2)	295.3(1.7)	318.4(1.6)	337.8(1.8)	349.4(1.9)
RACE/ETHNICITY									
WHITE	302.3(1.2)	33.5(0.7)	245.1(2.1)	257.6(1.2)	279.9(1.3)	304.0(1.2)	325.2(1.7)	344.5(1.5)	355.3(1.2)
BLACK	267.4(1.4)	32.9(1.3)	213.9(3.1)	225.5(2.1)	244.6(1.8)	267.0(1.7)	289.3(3.1)	309.9(2.9)	323.0(3.7)
HISPANIC	275.0(2.6)	35.7(1.5)	214.0(3.6)	227.6(3.6)	251.1(3.3)	275.5(2.9)	300.5(4.3)	321.5(5.3)	331.5(3.7)
ASIAN/PACIFIC ISLANDER	306.3(5.1)	36.4(2.3)	242.7(8.9)	257.2(8.2)	285.0(2.7)	307.0(4.5)	329.7(7.2)	353.0(7.7)	363.9(4.5)
AMER IND/ALASKAN NATV	291.7(5.9)	34.6(4.9)	237.3(15.0)	252.0(12.4)	268.4(8.7)	289.1(5.7)	318.3(4.5)	335.7(13.4)	354.6(13.9)
REGION									
NORTHEAST	301.7(2.3)	36.3(1.4)	239.4(3.8)	252.8(2.5)	276.7(1.5)	304.1(2.2)	327.5(3.1)	346.6(2.5)	357.4(2.4)
SOUTHEAST	284.2(1.9)	35.6(0.9)	224.2(3.9)	237.0(3.3)	259.5(1.8)	284.8(2.6)	309.4(3.4)	329.1(2.4)	341.0(4.8)
CENTRAL	298.0(2.4)	35.4(1.1)	236.0(3.3)	251.2(2.6)	275.0(3.0)	300.2(3.5)	322.3(2.9)	342.1(2.8)	353.4(2.1)
WEST	295.5(2.3)	36.0(1.3)	234.2(3.0)	247.4(3.1)	271.7(2.7)	296.9(2.1)	320.3(3.0)	341.1(3.8)	353.0(3.1)
AGE									
BELOW MODAL AGE	302.8(5.9)	36.1(3.7)	243.7(10.3)	253.7(25.4)	277.8(11.2)	305.1(5.7)	328.4(4.9)	349.7(9.6)	357.3(9.5)
AT MODAL AGE	300.7(1.1)	34.6(0.7)	241.9(1.6)	255.4(1.5)	277.4(1.7)	302.3(1.3)	324.5(1.3)	344.6(1.8)	355.5(0.8)
ABOVE MODAL AGE	284.2(1.4)	37.2(0.9)	221.2(2.3)	234.6(2.1)	257.8(1.1)	285.1(1.9)	310.9(2.3)	331.7(1.9)	343.3(2.3)
TYPE OF COMMUNITY									
EXTREME RURAL	292.1(3.1)	35.8(1.1)	232.6(5.1)	245.0(4.9)	267.4(3.7)	293.2(3.5)	317.0(2.3)	337.9(7.2)	349.3(4.2)
DISADVANTAGED URBAN	280.5(5.0)	37.2(1.5)	218.6(6.1)	231.7(5.1)	254.8(6.0)	280.5(5.5)	307.7(5.5)	328.4(2.9)	341.2(4.3)
ADVANTAGED URBAN	305.7(3.2)	36.3(1.6)	241.3(6.9)	256.6(6.3)	282.1(4.3)	308.1(4.3)	331.2(2.5)	350.4(2.4)	362.3(3.8)
OTHER	297.1(1.2)	35.4(0.9)	235.8(2.0)	250.1(2.1)	273.2(1.5)	298.8(2.0)	321.8(1.5)	341.8(2.2)	353.1(2.0)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	273.3(1.8)	33.6(1.9)	215.2(6.1)	230.9(1.8)	250.5(2.6)	273.6(1.2)	296.1(5.9)	316.2(2.9)	327.8(5.4)
GRADUATED H.S.	283.4(1.4)	34.4(1.0)	225.3(2.9)	238.1(3.0)	259.5(1.4)	284.4(1.4)	308.6(2.1)	327.0(2.1)	337.7(3.6)
SOME EDUC AFTER H.S.	298.2(1.2)	32.8(0.8)	241.4(2.2)	254.5(1.3)	276.2(1.9)	300.4(1.6)	321.1(1.8)	339.8(1.4)	350.7(1.7)
GRADUATED COLLEGE	306.4(1.5)	35.0(0.9)	244.9(2.5)	259.8(2.5)	283.7(1.7)	308.6(2.0)	330.5(2.0)	349.7(2.1)	360.9(2.6)
UNKNOWN	267.2(3.8)	35.8(2.9)	208.8(15.7)	216.4(4.0)	242.6(4.2)	271.3(4.7)	291.4(9.1)	310.1(6.2)	321.6(31.6)
TYPE OF SCHOOL									
PUBLIC	294.9(1.2)	36.8(0.7)	232.2(1.8)	246.0(1.7)	269.7(1.5)	296.5(2.0)	320.6(1.3)	341.4(2.5)	353.2(1.8)
PRIVATE	299.4(2.0)	31.5(0.8)	246.2(2.1)	257.8(3.3)	278.0(3.2)	300.7(1.9)	321.5(2.2)	338.5(3.9)	348.8(2.1)
TYPE OF HIGH SCHOOL PROG									
GENERAL	280.1(1.3)	33.4(0.9)	224.5(3.8)	236.3(3.0)	257.0(2.0)	280.4(1.7)	303.4(1.7)	322.6(2.6)	334.0(1.9)
ACADEMIC/COLLEGE PREP	307.6(1.1)	33.1(0.6)	250.3(1.9)	263.9(1.5)	286.4(1.3)	309.5(1.7)	329.9(1.2)	348.5(2.1)	359.1(1.9)
VOCATIONAL/TECHNICAL	273.0(2.3)	33.3(1.7)	217.5(9.5)	230.8(5.3)	[illegible]49.5(4.2)	273.4(4.2)	296.2(4.1)	316.6(4.4)	328.9(5.3)

GRADE 12 - ALGEBRA AND FUNCTIONS PROFICIENCY
WEIGHTED MEANS, STANDARD DEVIATIONS, AND PERCENTILES

	MEAN	STD DEV	5TH	10TH	25TH	50TH	75TH	90TH	95TH
-- TOTAL --	296.7(1.1)	36.9(0.5)	236.0(2.4)	247.5(0.8)	269.7(1.4)	297.3(1.1)	323.7(1.4)	344.4(1.1)	356.7(1.4)
SEX									
MALE	297.1(1.4)	37.9(0.7)	236.3(2.0)	247.3(1.4)	268.8(2.0)	296.8(1.8)	325.2(1.9)	347.6(1.5)	359.4(2.7)
FEMALE	296.3(1.1)	36.0(0.6)	235.7(1.5)	247.8(1.3)	270.5(2.0)	297.8(1.1)	322.5(1.5)	341.5(2.0)	353.0(1.4)
RACE/ETHNICITY									
WHITE	301.8(1.3)	35.5(0.6)	242.0(1.8)	254.2(1.9)	276.2(2.0)	302.6(1.2)	327.7(1.0)	347.3(1.7)	359.1(1.6)
BLACK	273.9(1.4)	33.0(1.0)	221.1(1.8)	231.3(2.1)	250.7(1.4)	272.9(1.3)	296.5(4.7)	318.6(3.1)	328.7(1.4)
HISPANIC	280.0(2.5)	35.2(1.3)	224.3(12.2)	234.9(5.6)	254.2(6.0)	277.6(2.7)	305.7(3.5)	327.4(4.3)	339.6(6.3)
ASIAN/PACIFIC ISLANDER	320.0(4.3)	35.0(2.6)	259.1(8.1)	270.3(5.9)	297.1(7.0)	322.6(5.0)	344.3(5.0)	363.6(5.6)	375.1(7.1)
AMER IND/ALASKAN NATV	291.6(6.8)	32.7(4.3)	240.7(8.3)	251.9(4.9)	268.1(10.5)	290.3(10.9)	316.9(17.3)	337.0(16.5)	340.7(9.0)
REGION									
NORTHEAST	302.9(1.9)	37.1(0.9)	239.8(2.2)	253.2(3.4)	276.8(2.8)	304.4(2.4)	329.6(3.6)	350.1(6.3)	362.8(3.7)
SOUTHEAST	286.8(2.4)	35.6(0.7)	229.2(1.9)	240.4(2.8)	261.1(2.8)	286.3(3.3)	312.3(2.5)	334.6(4.0)	345.5(2.1)
CENTRAL	297.8(2.2)	36.4(1.0)	238.3(1.9)	249.4(2.5)	270.7(3.8)	298.7(1.8)	324.8(2.0)	345.1(1.6)	356.1(4.4)
WEST	297.7(2.3)	36.9(1.3)	236.8(6.3)	248.7(2.6)	270.9(4.0)	298.3(3.1)	324.5(3.0)	345.1(2.9)	357.7(2.0)
AGE									
BELOW MODAL AGE	310.4(5.6)	37.6(3.0)	253.2(12.1)	264.3(5.4)	281.6(11.7)	307.3(11.3)	340.3(11.1)	360.3(12.2)	370.4(5.4)
AT MODAL AGE	302.2(1.1)	35.5(0.7)	242.8(1.4)	255.0(1.5)	276.8(1.6)	303.2(1.2)	327.5(1.0)	347.5(1.7)	359.7(1.9)
ABOVE MODAL AGE	285.2(1.4)	37.1(0.7)	226.9(2.7)	237.6(1.2)	257.5(2.0)	283.4(1.5)	312.6(2.9)	335.5(3.1)	347.3(1.2)
TYPE OF COMMUNITY									
EXTREME RURAL	289.8(3.2)	35.0(1.0)	232.9(3.5)	244.2(3.6)	264.9(3.6)	289.5(5.0)	315.5(5.9)	336.4(4.7)	346.1(4.3)
DISADVANTAGED URBAN	284.6(4.4)	37.9(1.7)	225.0(7.2)	236.2(7.0)	256.0(4.2)	282.9(6.2)	312.3(6.0)	335.5(5.2)	348.6(3.9)
ADVANTAGED URBAN	311.1(3.3)	36.3(1.3)	247.8(4.0)	261.7(4.4)	286.9(5.8)	312.8(4.1)	337.6(3.5)	356.6(3.2)	367.4(3.1)
OTHER	298.1(1.1)	36.3(0.7)	238.1(1.0)	250.0(1.8)	271.8(2.0)	298.9(1.3)	324.6(1.0)	345.0(1.2)	357.4(1.7)
PARENTS' EDUCATION LEVEL									
LESS THAN H.S.	272.0(1.7)	31.6(1.4)	223.3(2.5)	231.1(1.8)	249.5(1.7)	270.0(3.2)	292.1(7.1)	314.0(3.8)	328.7(4.5)
GRADUATED H.S.	283.6(1.6)	34.1(0.7)	229.3(3.1)	240.0(1.9)	258.7(1.6)	283.1(2.8)	307.8(3.1)	329.0(2.8)	340.4(2.6)
SOME EDUC AFTER H.S.	297.4(1.0)	33.8(0.8)	240.8(2.9)	251.9(2.2)	273.2(1.2)	298.6(1.3)	322.1(1.4)	340.9(1.9)	351.0(3.2)
GRADUATED COLLEGE	310.4(1.4)	35.2(0.8)	249.3(2.5)	262.5(1.8)	286.2(1.8)	312.4(1.7)	335.3(2.3)	355.2(1.8)	365.8(3.2)
UNKNOWN	267.9(3.7)	36.1(3.1)	212.8(4.8)	224.0(12.8)	241.5(8.2)	265.3(5.0)	292.9(7.6)	315.0(4.4)	331.5(16.5)
TYPE OF SCHOOL									
PUBLIC	296.0(1.2)	37.4(0.6)	235.0(1.7)	246.2(1.6)	268.3(1.9)	296.5(1.5)	323.4(1.4)	344.4(1.1)	356.8(1.6)
PRIVATE	303.4(2.2)	32.2(0.8)	249.9(1.7)	261.5(4.3)	281.2(2.3)	303.7(2.2)	326.2(2.1)	344.7(2.4)	355.3(4.0)
TYPE OF HIGH SCHOOL PROG									
GENERAL	277.7(1.4)	32.0(0.8)	227.5(2.6)	237.6(1.2)	255.0(1.9)	275.7(1.7)	299.3(1.5)	320.6(2.4)	332.9(2.8)
ACADEMIC/COLLEGE PREP	311.9(1.0)	32.8(0.7)	255.4(1.4)	268.3(1.8)	290.2(1.2)	313.3(1.7)	335.0(1.4)	353.2(1.0)	363.5(1.8)
VOCATIONAL/TECHNICAL	268.5(2.1)	29.8(1.6)	222.3(4.4)	231.9(3.6)	248.0(2.4)	266.7(2.9)	287.4(4.7)	308.7(6.3)	320.7(5.5)

GRADE 12 - MEAN PERCENTAGE CORRECT BY CONTENT AREA

CONTENT AREA (NUMBER OF ITEMS)	NUM & OPER (38)	MEASURMENT (23)	GEOMETRY (25)	DATA ANALYS (22)	ALGEBRA (37)	TOTAL (145)	ESTIMATION (46)	PROBLEM SOLVING (13)
-- TOTAL --	63.6(0.5)	55.1(0.6)	55.2(0.7)	56.9(0.6)	43.8(0.6)	54.8(0.5)	70.5(0.5)	29.9(0.8)
SEX								
MALE	64.9(0.6)	58.1(0.7)	57.3(0.9)	58.2(0.7)	44.6(0.8)	56.3(0.7)	72.4(0.8)	31.5(1.0)
FEMALE	62.4(0.5)	52.3(0.6)	53.3(0.7)	55.7(0.6)	43.1(0.5)	53.3(0.5)	68.7(0.7)	28.4(1.0)
RACE/ETHNICITY								
WHITE	66.2(0.5)	57.8(0.6)	58.3(0.8)	60.5(0.6)	46.1(0.7)	57.5(0.6)	73.9(0.5)	33.1(0.9)
BLACK	52.8(0.7)	42.3(0.6)	41.4(1.0)	42.1(0.9)	32.4(0.6)	42.3(0.6)	57.7(1.1)	17.1(0.9)
HISPANIC	55.1(1.2)	47.9(0.9)	46.4(1.2)	46.9(1.4)	35.8(0.9)	46.3(1.0)	61.1(1.8)	20.3(1.4)
ASIAN/PACIFIC ISLANDER	71.9(1.5)	65.3(1.9)	65.5(2.2)	61.2(1.5)	56.3(1.6)	64.1(1.6)	74.0(2.8)	36.8(4.2)
AMER IND/ALASKAN NATV	61.8(3.0)	50.3(3.3)	49.6(3.6)	52.9(3.1)	39.2(1.9)	50.7(2.4)	62.7(4.5)	19.4(4.6)
REGION								
NORTHEAST	65.6(0.9)	57.8(1.1)	59.4(1.5)	60.0(1.3)	46.7(1.1)	57.7(1.1)	72.9(1.5)	33.2(1.9)
SOUTHEAST	59.4(0.8)	49.0(0.9)	49.0(1.2)	51.6(0.9)	38.9(0.9)	49.5(0.9)	66.1(0.8)	24.3(0.8)
CENTRAL	64.7(1.1)	56.3(1.3)	56.1(1.4)	58.1(1.3)	44.0(1.2)	55.6(1.2)	72.2(0.6)	30.6(1.3)
WEST	64.0(1.0)	56.1(1.0)	55.4(1.1)	56.9(1.0)	44.7(1.1)	55.3(1.0)	70.0(1.0)	30.4(1.7)
AGE								
BELOW MODAL AGE	70.2(2.5)	62.7(2.5)	61.7(3.0)	60.7(2.4)	52.2(2.6)	61.5(2.2)	79.4(5.2)	48.3(6.6)
AT MODAL AGE	66.0(0.5)	57.1(0.6)	58.0(0.7)	59.6(0.6)	46.2(0.6)	57.2(0.5)	72.8(0.5)	32.8(0.8)
ABOVE MODAL AGE	58.5(0.7)	50.9(0.7)	49.4(0.8)	51.3(0.7)	38.6(0.7)	49.6(0.6)	65.5(0.7)	23.2(0.8)
TYPE OF COMMUNITY								
EXTREME RURAL	61.2(1.6)	52.5(1 5)	52.5(2.0)	55.5(1.7)	39.9(1.2)	52.0(1.5)	68.8(0.9)	24.0(2.0)
DISADVANTAGED URBAN	58.4(1.9)	49.4(1.7)	48.7(2.6)	49.7(2.4)	38.7(1.9)	49.0(2.0)	65.6(3.2)	24.1(3.1)
ADVANTAGED URBAN	69.4(1.3)	61.7(1.5)	62.5(1.9)	61.2(1.4)	52.1(1.7)	61.4(1.5)	75.7(1.9)	40.8(3.1)
OTHER	64.2(0.5)	55.7(0.5)	55.9(0.7)	57.8(0.7)	44.3(0.6)	55.4(0.5)	71.0(0.6)	30.3(0.8)
PARENTS' EDUCATION LEVEL								
LESS THAN H.S.	54.1(0.7)	45.3(0.8)	41.9(1.0)	45.9(1.1)	32.3(0.6)	43.8(0.6)	60.9(1.1)	17.4(1.1)
GRADUATED H.S.	57.9(0.8)	48.8(0.7)	47.7(1.0)	51.6(1.0)	37.3(0.7)	48.5(0.7)	66.3(0.8)	23.2(0.8)
SOME EDUC AFTER H.S.	64.5(0.4)	55.5(0.6)	55.9(0.7)	58.1(0.6)	43.4(0.5)	55.2(0.4)	71.8(0.7)	29.1(0.9)
GRADUATED COLLEGE	68.8(0.6)	60.9(0.8)	62.5(0.8)	62.0(0.7)	50.5(0.8)	60.8(0.7)	74.7(0.6)	37.2(1.2)
UNKNOWN	52.3(1.5)	46.9(1.5)	42.1(1.7)	45.4(2.4)	31.6(1.8)	43.3(1.4)	54.1(3.8)	13.3(3.1)
TYPE OF SCHOOL								
PUBLIC	63.4(0.5)	55.0(0.6)	54.9(0.7)	56.7(0.6)	43.5(0.6)	54.5(0.6)	70.3(0.5)	29.8(0.8)
PRIVATE	65.8(1.1)	56.3(1.2)	58.1(1.2)	58.6(1.0)	46.4(1.2)	56.9(1.1)	72.1(1.6)	30.9(2.5)
TYPE OF HIGH SCHOOL PROGRAM								
GENERAL	55.8(0.6)	47.5(0.5)	44.6(0.8)	49.8(0.8)	34.2(0.5)	46.1(0.6)	64.1(0.7)	20.5(0.7)
ACADEMIC/COLLEGE PREP	69.7(0.5)	61.1(0.6)	63.3(0.8)	62.6(0.6)	51.1(0.7)	61.4(0.6)	75.7(0.5)	37.6(1.1)
VOCATIONAL/TECHNICAL	53.3(1.1)	44.5(0.9)	41.3(1.1)	46.7(1.6)	31.0(0.8)	43.1(0.9)	63.2(1.1)	16.4(0.8)

GRADE 12 - MEAN PERCENTAGE CORRECT BY CONTENT AREA ONLY CONSTRUCTED-RESPONSE QUESTIONS

CONTENT AREA (NUMBER OF ITEMS)	NUM & OPER (8)	MEASURMENT (3)	GEOMETRY (5)	DATA ANALYS (9)	ALGEBRA (10)	TOTAL (35)	PROBLEM SOLVING (13)
-- TOTAL --	60.5(0.7)	37.0(0.7)	35.0(0.8)	48.8(0.6)	32.3(0.7)	43.8(0.6)	29.9(0.8)
SEX							
MALE	62.2(1.0)	40.1(0.9)	38.1(1.2)	48.6(0.8)	33.2(1.1)	45.1(0.9)	31.5(1.0)
FEMALE	58.8(0.8)	33.9(0.7)	32.2(0.9)	48.9(0.7)	31.5(0.6)	42.5(0.6)	28.4(1.0)
RACE/ETHNICITY							
WHITE	64.0(0.8)	40.5(0.7)	38.2(1.0)	52.9(0.7)	35.2(0.9)	47.2(0.7)	33.1(0.9)
BLACK	46.0(1.1)	20.9(1.1)	19.5(1.2)	34.0(1.1)	18.6(1.1)	29.1(0.9)	17.1(0.9)
HISPANIC	48.2(1.3)	28.6(1.6)	26.9(1.6)	37.0(1.8)	22.7(1.1)	33.3(1.1)	20.3(1.4)
ASIAN/PACIFIC ISLANDER	72.1(1.9)	50.1(2.8)	46.7(3.2)	51.1(2.1)	46.5(2.2)	53.9(1.7)	36.8(4.2)
AMER IND/ALASKAN NATV	59.1(5.0)	30.1(7.4)	28.0(5.3)	39.1(4.2)	22.1(2.6)	36.5(3.3)	19.4(4.6)
REGION							
NORTHEAST	63.5(1.0)	39.9(1.4)	40.0(1.9)	51.9(1.4)	35.8(1.3)	47.2(1.2)	33.2(1.9)
SOUTHEAST	55.3(1.4)	28.6(0.9)	27.2(1.6)	43.3(1.2)	26.7(1.4)	37.8(1.2)	24.3(0.8)
CENTRAL	62.3(2.0)	40.3(1.3)	36.2(1.6)	50.2(1.1)	33.3(1.6)	45.3(1.4)	30.6(1.3)
WEST	59.9(1.2)	37.5(1.6)	35.4(1.4)	48.8(1.1)	32.5(1.3)	43.8(1.2)	30.4(1.7)
AGE							
BELOW MODAL AGE	65.1(3.5)	38.3(2.8)	36.6(4.9)	46.8(4.1)	38.1(4.0)	46.3(3.3)	48.3(6.6)
AT MODAL AGE	63.4(0.7)	38.8(0.7)	37.3(0.9)	51.5(0.6)	34.9(0.7)	46.4(0.6)	32.8(0.8)
ABOVE MODAL AGE	54.2(1.1)	33.1(0.8)	30.1(1.1)	43.2(0.9)	26.6(0.9)	38.2(0.8)	23.2(0.8)
TYPE OF COMMUNITY							
EXTREME RURAL	58.5(2.5)	35.4(2.1)	32.4(2.7)	48.3(2.5)	27.7(1.9)	41.4(2.2)	24.0(2.0)
DISADVANTAGED URBAN	52.5(2.4)	31.1(2.6)	28.9(2.9)	42.3(2.3)	25.3(2.2)	36.9(2.2)	24.1(3.1)
ADVANTAGED URBAN	68.1(1.8)	42.7(2.1)	42.1(2.7)	52.0(1.6)	41.5(2.0)	50.5(1.7)	40.8(3.1)
OTHER	61.2(0.8)	37.5(0.9)	35.6(0.9)	49.6(0.8)	33.1(0.7)	44.5(0.7)	30.3(0.8)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	47.9(1.3)	25.7(1.1)	23.3(1.7)	37.5(1.6)	18.1(0.9)	31.3(0.9)	17.4(1.1)
GRADUATED H.S.	53.9(1.4)	31.5(1.0)	27.0(1.1)	43.5(1.1)	24.5(0.8)	37.1(0.9)	23.2(0.8)
SOME EDUC AFTER H.S.	61.2(0.7)	35.6(0.7)	34.3(1.1)	49.9(0.7)	32.8(0.8)	44.1(0.6)	29.1(0.9)
GRADUATED COLLEGE	66.9(0.9)	43.8(1.2)	42.6(1.1)	54.4(0.9)	39.7(1.1)	50.4(0.9)	37.2(1.2)
UNKNOWN	48.9(3.2)	26.1(2.4)	21.7(4.6)	31.8(3.7)	19.3(2.9)	30.2(2.7)	13.3(3.1)
TYPE OF SCHOOL							
PUBLIC	60.3(0.8)	36.7(0.7)	34.9(0.9)	48.5(0.7)	32.0(0.8)	43.5(0.7)	29.8(0.8)
PRIVATE	62.0(1.4)	39.4(1.6)	36.6(1.8)	50.9(1.2)	34.9(1.4)	45.8(1.2)	30.9(2.5)
TYPE OF HIGH SCHOOL PROGRAM							
GENERAL	50.7(1.1)	29.6(0.7)	24.2(0.9)	41.0(0.9)	21.8(0.7)	34.4(0.7)	20.5(0.7)
ACADEMIC/COLLEGE PREP	68.1(0.7)	42.9(0.8)	42.9(1.1)	54.9(0.7)	40.1(0.8)	50.9(0.7)	37.6(1.1)
VOCATIONAL/TECHNICAL	46.6(1.7)	26.8(1.8)	20.5(1.7)	37.6(1.8)	17.8(1.4)	30.6(1.3)	16.4(0.8)

GRADE 12 - MEAN PERCENTAGE CORRECT BY CONTENT AREA
ONLY MULTIPLE-CHOICE QUESTIONS

CONTENT AREA (NUMBER OF ITEMS)	NUM & OPER (30)	MEASURMENT (20)	GEOMETRY (20)	DATA ANALYS (13)	ALGEBRA (27)	TOTAL (110)	ESTIMATION (46)
-- TOTAL --	64.5(0.4)	57.8(0.6)	60.3(0.7)	62.5(0.6)	48.1(0.5)	58.2(0.5)	70.5(0.5)
SEX							
MALE	65.7(0.5)	60.8(0.7)	62.1(0.8)	64.8(0.7)	48.8(0.8)	59.9(0.6)	72.4(0.8)
FEMALE	63.4(0.5)	55.1(0.6)	58.6(0.7)	60.4(0.6)	47.4(0.5)	56.7(0.5)	68.7(0.7)
RACE/ETHNICITY							
WHITE	66.8(0.5)	60.5(0.7)	63.4(0.8)	65.8(0.7)	50.2(0.6)	60.8(0.6)	73.9(0.5)
BLACK	54.6(0.7)	45.6(0.6)	46.8(1.0)	47.8(0.9)	37.4(0.6)	46.5(0.6)	57.7(1.1)
HISPANIC	57.0(1.3)	50.8(0.9)	51.2(1.3)	53.7(1.3)	40.7(0.9)	50.4(1.0)	61.1(1.8)
ASIAN/PACIFIC ISLANDER	71.9(1.7)	67.5(1.8)	70.2(2.4)	68.2(1.5)	59.9(1.9)	67.4(1.7)	74.0(2.8)
AMER IND/ALASKAN NATV	62.5(3.1)	53.3(3.6)	55.0(3.6)	62.4(3.0)	45.5(2.0)	55.3(2.4)	62.7(4.5)
REGION							
NORTHEAST	66.2(0.9)	60.5(1.1)	64.3(1.5)	65.6(1.3)	50.8(1.1)	61.0(1.1)	72.9(1.5)
SOUTHEAST	60.4(0.7)	52.1(1.0)	54.5(1.1)	57.4(0.7)	43.4(0.7)	53.3(0.8)	66.1(0.8)
CENTRAL	65.3(0.9)	58.7(1.3)	61.0(1.4)	63.6(1.5)	48.0(1.1)	58.9(1.1)	72.2(0.6)
WEST	65.2(1.0)	58.9(1.0)	60.5(1.1)	62.6(1.1)	49.2(1.2)	59.0(1.0)	70.0(1.0)
AGE							
BELOW MODAL AGE	71.5(2.5)	66.4(2.7)	68.0(3.1)	70.3(2.2)	57.4(2.7)	66.4(2.1)	79.4(5.2)
AT MODAL AGE	66.8(0.4)	59.8(0.6)	63.2(0.7)	65.1(0.6)	50.4(0.5)	60.7(0.5)	72.8(0.5)
ABOVE MODAL AGE	59.7(0.6)	53.6(0.7)	54.2(0.8)	57.0(0.7)	43.0(0.7)	53.2(0.6)	65.5(0.7)
TYPE OF COMMUNITY							
EXTREME RURAL	62.0(1.4)	55.1(1.5)	57.5(1.9)	60.4(1.4)	44.5(1.1)	55.4(1.3)	68.8(0.9)
DISADVANTAGED URBAN	60.0(1.9)	52.2(1.6)	53.7(2.5)	54.8(2.6)	43.6(1.8)	52.8(1.9)	65.6(3.2)
ADVANTAGED URBAN	69.8(1.2)	64.5(1.5)	67.7(1.9)	67.6(1.4)	56.0(1.6)	64.8(1.4)	75.7(1.9)
OTHER	65.0(0.5)	58.4(0.5)	61.0(0.6)	63.6(0.6)	48.4(0.6)	58.8(0.5)	71.0(0.6)
PARENTS' EDUCATION LEVEL							
LESS THAN H.S.	55.8(0.8)	48.2(0.8)	46.6(1.1)	51.6(1.0)	37.6(0.6)	47.8(0.6)	60.9(1.1)
GRADUATED H.S.	59.0(0.7)	51.4(0.7)	52.8(1.1)	57.2(1.0)	42.1(0.8)	52.1(0.7)	66.3(0.8)
SOME EDUC AFTER H.S.	65.3(0.4)	58.5(0.6)	61.2(0.7)	63.8(0.7)	47.4(0.5)	58.8(0.4)	71.8(0.7)
GRADUATED COLLEGE	69.4(0.6)	63.5(0.8)	67.4(0.8)	67.3(0.8)	54.5(0.8)	64.1(0.7)	74.7(0.6)
UNKNOWN	53.2(1.6)	50.0(1.6)	47.2(1.6)	54.7(2.2)	36.2(1.7)	47.5(1.2)	54.1(3.8)
TYPE OF SCHOOL							
PUBLIC	64.2(0.5)	57.7(0.6)	59.9(0.7)	62.4(0.6)	47.8(0.6)	58.0(0.6)	70.3(0.5)
PRIVATE	66.8(1.0)	58.8(1.2)	63.5(1.2)	63.9(1.0)	50.6(1.2)	60.4(1.1)	72.1(1.6)
TYPE OF HIGH SCHOOL PROGRAM							
GENERAL	57.1(0.5)	50.2(0.6)	49.7(0.8)	55.9(0.8)	38.7(0.6)	49.9(0.6)	64.1(0.7)
ACADEMIC/COLLEGE PREP	70.1(0.4)	63.8(0.6)	68.3(0.7)	67.9(0.6)	55.2(0.6)	64.7(0.5)	75.7(0.5)
VOCATIONAL/TECHNICAL	55.1(1.0)	47.2(0.9)	46.5(1.1)	53.0(1.7)	35.9(0.8)	47.1(0.8)	63.2(1.1)

GRADE 12 - PERCENTAGE OF STUDENTS RESPONDING CORRECTLY TO THE 1990 MATHEMATICS ITEMS

SHORT TEXT	TOTAL	MALE	FEMALE	WHITE	BLACK	HISPANIC	ASIAN AM.	CONTENT AREA	ITEM TYPE
CHANGE PERCENT TO DECIMAL	92.8(0.6)	92.4(0.8)	93.2(0.8)	94.7(0.6)	83.5(1.9)	89.0(2.8)	97.8(1.4)	1	1
APPLY TRANSITIVE PROPERTY	87.9(0.8)	88.6(0.9)	87.2(1.2)	89.6(0.8)	80.7(2.4)	81.9(2.8)	95.0(2.1)	2	1
COMPUTE WITH DATA IN TABLE	79.0(1.2)	80.5(1.5)	77.7(1.3)	81.1(1.3)	72.5(2.8)	68.5(3.2)	87.9(3.6)	4	1
INTERPRET DATA IN TABLE	91.1(0.7)	91.0(1.0)	91.2(0.8)	93.0(0.7)	85.0(2.1)	82.3(2.7)	95.8(2.2)	4	1
FIND VERTICAL ANGLE MEASURE	89.0(0.9)	88.9(1.2)	89.1(1.2)	90.6(1.0)	82.2(2.5)	86.1(2.9)	90.5(4.2)	3	1
APPLY ADDITIVE INVERSE	88.6(0.9)	90.2(1.2)	87.1(1.2)	91.3(1.1)	76.0(2.4)	82.0(3.0)	97.3(1.6)	1	2
IDENTIFY A SPHERE	75.4(1.1)	78.1(1.6)	72.9(1.4)	79.9(1.3)	56.1(3.0)	68.1(3.0)	76.3(3.4)	3	1
MULTIPLY FRACTIONS	76.9(1.4)	75.7(1.6)	78.0(1.7)	78.4(1.6)	72.7(2.4)	63.5(3.5)	92.2(2.3)	1	2
ADD MONOMIALS	79.5(1.3)	77.0(1.7)	81.7(1.3)	81.2(1.4)	69.7(2.6)	71.7(3.0)	96.3(1.6)	5	1
APPLY DECIMAL PLACE VALUE	76.1(1.1)	78.3(1.7)	74.1(1.4)	80.0(1.2)	59.5(2.4)	64.2(3.5)	88.4(3.5)	1	1
RELATE METRIC TO ENGLISH UNITS	68.8(1.3)	78.0(1.3)	60.6(2.0)	73.9(1.5)	46.7(3.0)	59.1(3.1)	72.0(3.3)	2	1
USE CONCEPT OF PERCENT	74.9(1.1)	79.5(1.5)	70.7(1.6)	78.8(1.2)	57.0(2.5)	62.9(4.7)	89.9(2.2)	1	1
USE SIGNED NUMBER CONCEPT	62.4(1.4)	65.8(1.7)	59.2(1.7)	64.6(1.6)	51.5(3.0)	51.1(3.0)	83.5(2.9)	1	1
APPLY CONCEPT OF PERCENT	63.3(1.3)	67.4(1.7)	59.6(1.9)	68.9(1.5)	38.5(3.0)	47.2(2.6)	79.4(4.0)	1	2
APPLY PROPERTY OF OBTUSE TRIANGLE	68.6(1.2)	71.0(1.5)	66.4(1.6)	72.3(1.3)	54.9(3.3)	53.5(4.1)	82.7(4.2)	3	1
APPLY PROPERTY OF OBTUSE TRIANGLE	53.0(1.4)	55.2(1.8)	51.1(1.6)	55.0(1.5)	40.3(2.6)	50.7(5.3)	65.6(4.7)	3	1
INTERPRET LOGIC STATEMENT	50.9(1.2)	54.4(1.6)	47.7(1.7)	54.8(1.2)	37.8(2.8)	38.5(2.9)	49.5(7.6)	5	1
EVALUATE A FUNCTION	52.2(1.7)	52.6(2.2)	51.8(1.8)	54.2(2.1)	38.6(2.3)	47.6(4.6)	75.6(4.4)	5	2
FIND AREA OF A SQUARE	45.1(1.5)	48.1(2.0)	42.5(1.9)	49.6(2.1)	21.6(2.1)	33.1(2.9)	71.1(4.2)	2	1
INTERPRET STATEMENT	25.4(0.9)	31.4(1.6)	20.0(1.0)	26.1(1.1)	22.7(2.1)	21.9(3.2)	31.0(5.5)	3	1
DESCRIBE GRAPH OF INEQUALITY	35.8(1.0)	37.6(1.5)	34.1(1.5)	3[illegible].2(1.1)	34.7(2.2)	37.0(3.4)	46.7(5.8)	5	1
COMPUTE WITH DATA IN TABLE	52.4(1.3)	53.1(1.8)	51.7(1.5)	57.5(1.4)	33.2(2.5)	36.1(4.5)	58.7(4.6)	4	2
ESTIMATE CIRCUMFERENCE	31.3(1.5)	35.7(1.9)	27.3(1.7)	34.4(1.8)	16.2(2.3)	21.6(3.1)	47.6(5.2)	2	1
ADD WHOLE NUMBERS	94.1(0.4)	93.0(0.6)	95.2(0.5)	94.1(0.5)	93.3(0.9)	94.2(1.1)	96.8(1.1)	1	1
COMPARE WEIGHTS	89.8(0.5)	90.8(0.6)	88.8(0.8)	91.3(0.5)	83.1(1.3)	88.0(1.5)	90.5(2.3)	2	1
APPLY TRANSFORMATIONAL GEOMETRY	86.2(0.6)	84.9(0.8)	87.6(0.8)	88.2(0.6)	80.6(1.6)	80.2(2.0)	81.3(3.7)	3	1
IDENTIFY SOLUTION PROCEDURE	89.4(0.6)	88.5([illegible].8)	90.3(0.7)	92.0(0.7)	80.0(1.9)	83.2(2.0)	87.2(3.6)	1	1
INTERPRET PIE CHART DATA	84.4(0.7)	85.1(0.9)	83.7(1.0)	89.0(0.7)	63.2(1.8)	77.1(3.6)	87.8(3.1)	4	1
SOLVE MULTI-STEP STORY PROBLEM	89.5(0.5)	89.3(0.9)	89.6(0.7)	92.6(0.5)	76.6(1.8)	84.4(2.5)	88.4(3.4)	1	1
APPLY PROPERTIES OF A CUBE	69.9(0.8)	71.[illegible](1.0)	68.4(1.2)	73.8(0.9)	51.3(2.2)	61.4(2.3)	80.5(3.2)	3	1
APPLY CONCEPT OF PERIMETER	71.4(0.9)	71.8(1.3)	71.0(1.2)	74.4(1.0)	60.8(1.7)	59.8(2.6)	78.9(3.6)	2	1
SOLVE MULTI-STEP STORY PROBLEM	82.8(0.7)	81.1(0.8)	84.4(1.0)	84.1(0.9)	77.5(1.6)	78.6(1.7)	85.1(3.3)	1	1
APPLY CONCEPT OF EQUALITY	79.7(0.7)	80.8(1.1)	78.7(1.0)	84.2(0.8)	60.4(1.7)	70.9(2.4)	84.8(3.9)	5	1
SOLVE STORY PROBLEM (DIVISION)	89.8(0.6)	89.6(0.7)	89.9(0.8)	91.4(0.[illegible])	84.1(1.6)	85.5(2.8)	88.1(3.6)	1	1
SOLVE STORY PROBLEM (FRACTIONS)	64.6(1.0)	66.6(1.2)	62.6(1.4)	68.5(1.2)	47.1(2.4)	51.7(3.1)	78.2(4.3)	1	1
READ A SCALE DIAGRAM	47.3(0.8)	51.9(1.2)	42.7(1.1)	49.1(1.0)	35.3(1.9)	44.2(2.6)	61.8(3.4)	1	1
SOLVE AN INEQUALITY	78.6(0.8)	78.6(1.1)	78.7(0.9)	83.2(1.0)	61.0(2.2)	65.1(2.4)	83.3(2.9)	5	1
IDENTIFY COORDINATES ON A GRID	67.0(0.9)	67.2(1.1)	66.8(1.4)	69.0(1.1)	52.8(2.0)	63.3(3.3)	85.7(3.6)	5	1
FIND A MEDIAN	22.1(1.4)	23.8(1.6)	20.4(1.5)	22.2(1.7)	19.3(1.7)	25.6(2.5)	23.8(3.6)	4	1
APPLY PROPERTIES OF A PARALLELOGRAM	62.8(1.0)	64.0(1.3)	61.7(1.3)	66.3(1.0)	45.2(2.2)	54.3(3.3)	77.2(3.6)	3	1
INTERPRET MEASUREMENT TOLERANCE	36.8(0.9)	39.5(1.4)	34.2(1.0)	39.4(1.0)	24.4(1.9)	31.6(3.1)	42.8(5.0)	2	1
FIND TOTAL SURFACE AREA	29.2(1.0)	32.5(1.6)	26.0(1.1)	31.8(1.3)	15.6(1.5)	22.5(1.6)	40.7(5.8)	2	1
FIT EQUATION TO DATA	57.3(0.9)	55.4(1.3)	59.1(1.2)	60.3(1.1)	39.4(1.9)	51.0(2.5)	73.6(3.6)	5	1
SOLVE QUADRATIC INEQUALITY	33.7(1.0)	34.0(1.4)	33.4(1.1)	33.8(1.2)	28.7(2.1)	36.2(2.2)	46.6(3.8)	5	1
FIND A POINT ON A SINE CURVE	19.9(1.0)	21.8(1.3)	18.0(1.2)	21.3(1.1)	11.7(1.3)	13.8(1.8)	28.9(5.4)	5	1
CONVERT DECIMAL TO FRACTION	59.1(1.3)	58.5(1.5)	59.7(1.8)	63.2(1.4)	45.3(3.3)	44.6(2.1)	67.2(5.9)	1	2
INTERPRET DATA IN TABLE	65.1(1.1)	64.7(1.5)	65.5(1.4)	71.6(1.2)	43.5(2.5)	43.7(3.8)	71.3(3.6)	4	2
INTERPRET DATA IN TABLE	80.0(0.9)	78.7(1.2)	81.3(1.3)	83.2(0.8)	68.7(3.1)	71.2(3.4)	81.6(3.3)	4	2
WRITE ALGEBRAIC EXPRESSION	8.6(0.9)	10.5(1.2)	6.7(1.0)	9.9(1.2)	2.3(0.8)	5.3(1.3)	17.6(3.5)	5	2
WRITE ALGEBRAIC EQUATION	10.7(0.7)	13.1(1.1)	8.4(0.9)	12.8(0.9)	2.0(0.7)	5.2(1.2)	19.5(4.4)	5	2

GRADE 12 - PERCENTAGE OF STUDENTS RESPONDING CORRECTLY TO THE 1990 MATHEMATICS ITEMS

SHORT TEXT	TOTAL	MALE	FEMALE	WHITE	BLACK	HISPANIC	ASIAN AM.	CONTENT AREA	ITEM TYPE
COMPLETE A BAR GRAPH	88.0(0.8)	85.8(1.2)	90.1(1.0)	90.8(0.9)	79.1(1.9)	79.5(3.6)	91.9(4.2)	4	2
READ A RULER	82.7(0.8)	86.4(1.2)	79.2(1.0)	89.5(0.9)	56.2(2.7)	69.0(2.4)	89.9(4.0)	2	2
COMPLETE A LETTER PATTERN	60.4(1.1)	57.1(1.8)	63.6(1.2)	67.1(1.4)	35.9(2.8)	42.8(2.6)	65.4(4.9)	5	2
USE A NUMBER LINE GRAPH	77.7(1.0)	83.6(1.3)	71.9(1.2)	84.6(1.0)	53.9(3.0)	56.0(3.7)	81.6(4.2)	1	2
LIST SAMPLE SPACE	22.1(1.0)	22.8(1.5)	21.4(1.4)	25.9(1.2)	8.9(1.9)	11.0(3.3)	25.6(3.8)	4	2
DRAW A LINE OF SYMMETRY	29.9(1.3)	31.2(1.9)	28.6(1.2)	33.0(1.6)	16.3(1.8)	24.8(3.6)	37.4(5.1)	3	2
USE SIMILAR TRIANGLES	70.4(1.3)	71.6(1.6)	69.2(1.6)	74.3(1.3)	55.3(3.5)	56.5(3.6)	84.7(3.7)	3	2
EXPLAIN SAMPLING BIAS	69.9(1.2)	69.9(1.4)	69.9(1.6)	76.7(1.1)	44.6(3.0)	55.8(4.2)	65.9(3.7)	4	2
GRAPH AN INEQUALITY	63.0(1.2)	63.8(1.6)	62.1(1.4)	68.1(1.5)	37.9(2.9)	52.3(4.0)	81.3(4.3)	5	2
FIND TERMS IN A SEQUENCE	34.3(1.1)	37.9(1.8)	30.9(1.2)	37.7(1.4)	19.0(2.3)	23.0(3.1)	47.9(4.7)	1	2
SUPPLY A COUNTEREXAMPLE	51.8(1.2)	52.1(2.1)	51.5(1.9)	56.0(1.3)	34.5(3.2)	38.2(3.2)	53.7(4.3)	5	2
SKETCH A TRIANGLE	15.2(1.2)	18.3(1.9)	12.2(1.3)	16.5(1.4)	6.8(2.1)	9.7(2.2)	28.9(6.6)	3	2
SOLVE STORY PROBLEM (MONEY)	91.8(0.8)	92.0(0.8)	91.6(1.0)	94.2(0.7)	83.0(2.5)	83.3(2.7)	95.8(2.6)	1	1
ESTIMATE DISTANCE ON MAP	88.1(0.8)	88.5(1.3)	87.7(1.0)	90.5(0.9)	80.1(2.1)	79.9(3.3)	87.1(6.0)	1	1
DIVIDE DECIMALS	62.0(1.7)	59.5(1.8)	64.3(2.0)	63.3(2.0)	54.0(2.3)	58.6(4.7)	75.7(3.8)	1	2
READ A PROTRACTOR	89.6(0.7)	90.8(0.9)	88.5(0.9)	91.4(0.7)	81.1(2.3)	85.7(2.2)	93.7(3.1)	2	1
RECOGNIZE PROPERTIES OF A RECTANGLE	65.7(1.1)	64.1(1.5)	67.1(1.3)	70.7(1.3)	46.2(3.0)	49.8(4.0)	68.2(4.9)	3	1
USE SCIENTIFIC NOTATION IN DIVISION	45.3(1.2)	44.8(1.7)	45.8(1.6)	48.3(1.5)	32.8(1.9)	31.8(3.3)	62.1(7.0)	5	1
CONVERT LIQUID MEASURE	46.3(1.4)	50.0(1.7)	43.0(1.7)	51.1(1.6)	24.0(3.3)	34.9(3.9)	61.7(4.5)	2	1
FIND SLOPE OF A LINE	38.9(1.1)	44.5(1.1)	33.8(1.8)	41.6(1.3)	23.1(2.0)	33.5(3.0)	58.1(6.0)	3	1
FIND RANGE OF SCORES	58.4(1.4)	59.1(1.7)	57.7(1.9)	60.4(1.5)	49.5(3.0)	55.0(4.1)	57.0(4.7)	4	1
ESTIMATE HEIGHT	52.4(1.3)	59.9(2.2)	45.5(1.6)	57.1(1.3)	31.0(2.8)	42.7(3.3)	58.9(5.6)	2	1
APPLY AREA OF A TRIANGLE	24.7(1.3)	29.2(1.8)	20.4(1.5)	28.0(1.4)	6.1(1.5)	15.4(2.8)	48.9(7.1)	2	2
FIND VOLUME OF A CYLINDER	65.3(1.6)	63.6(2.0)	66.9(1.8)	67.4(2.0)	55.6(2.6)	57.4(3.7)	79.7(5.4)	2	1
SOLVE A RATE PROBLEM	25.1(0.9)	28.5(1.4)	22.0(1.3)	25.1(1.1)	28.0(2.9)	21.1(2.9)	23.9(6.7)	2	1
EVALUATE AN EXPRESSION	74.1(1.5)	72.4(1.9)	75.6(1.4)	76.4(1.8)	62.5(3.0)	63.8(3.8)	90.2(2.9)	5	1
ESTIMATE EXPONENTIAL GROWTH	27.6(1.0)	29.3(1.3)	26.0(1.3)	28.3(1.1)	22.3(2.6)	28.7(3.2)	26.9(8.0)	1	1
USE TRIGONOMETRIC RATIOS	20.8(0.8)	22.4(1.4)	19.4(1.0)	21.8(1.0)	14.0(1.9)	18.1(2.5)	29.3(6.6)	5	1
EXPLAIN APPLICATION OF PERCENT	42.1(1.0)	42.7(1.1)	41.6(1.6)	42.3(1.1)	43.7(2.7)	32.4(3.0)	53.3(5.5)	1	1
EXPLAIN APPLICATION OF PERCENT	21.8(1.0)	25.1(1.4)	18.9(1.4)	24.5(1.2)	8.6(1.9)	11.1(2.1)	35.3(6.0)	1	2
FIND EXPECTED VALUE	49.7(1.4)	55.2(1.7)	44.8(1.8)	54.6(1.5)	25.9(3.1)	34.3(3.9)	63.1(6.9)	4	1
INTERPRET A LINE GRAPH	74.6(1.3)	77.5(1.7)	71.9(1.5)	78.9(1.3)	55.3(4.3)	61.2(4.5)	74.0(6.0)	4	1
WRITE A COMPOSITE FUNCTION	54.6(1.7)	55.0(1.8)	54.2(2.2)	55.9(1.8)	43.3(4.5)	47.9(4.1)	76.3(8.6)	5	1
CONVERT UNITS OF TIME	73.8(0.8)	75.0(1.2)	72.6(1.3)	76.4(0.9)	61.0(2.5)	67.6(3.0)	82.6(3.8)	2	1
SOLVE A PROPORTION	63.2(1.3)	64.4(1.7)	62.2(1.8)	64.9(1.5)	53.1(2.8)	56.6(4.4)	85.2(4.3)	1	1
APPLY PROPERTIES OF GEOMETRIC SOLIDS	76.2(1.0)	77.1(1.0)	75.3(1.6)	77.4(1.1)	72.2(2.6)	70.8(3.2)	81.2(4.3)	3	1
READ A MEASURE ON A SCALE	96.0(0.5)	96.5(0.6)	95.5(0.6)	97.3(0.5)	90.8(1.2)	92.5(2.1)	98.6(1.5)	2	1
APPLY CONCEPT OF AVERAGE	68.5(0.9)	74.2(1.3)	63.2(1.5)	73.6(1.1)	50.4(2.5)	49.6(3.4)	79.7(3.4)	4	1
RELATE EQUATION TO FIGURE	59.5(1.2)	57.2(1.5)	61.6(1.5)	60.0(1.5)	51.8(2.8)	60.1(3.1)	77.2(4.2)	1	1
SOLVE AN INEQUALITY	65.1(1.1)	65.8(1.6)	64.4(1.2)	69.5(1.2)	46.5(2.5)	51.6(4.7)	76.6(5.7)	5	1
FIND PROBABILITY (VISUAL STIMULUS)	70.9(1.3)	70.3(1.7)	71.5(1.6)	74.5(1.7)	54.5(3.0)	66.5(3.0)	73.9(4.8)	4	1
APPLY CONCEPT OF VOLUME	53.3(1.3)	62.2(1.9)	45.2(1.4)	57.3(1.4)	36.2(2.6)	39.0(3.0)	69.9(3.5)	2	1
APPLY TRANSFORMATIONAL GEOMETRY	74.8(1.1)	72.6(1.6)	76.9(1.3)	77.8(1.3)	61.4(2.4)	69.0(2.7)	77.0(5.7)	3	1
USE CONCEPT OF MIDPOINT	47.2(1.5)	50.8(2.0)	43.9(1.8)	53.0(1.9)	21.2(2.0)	32.0(3.7)	65.5(5.2)	3	1
USE LEAST COMMON MULTIPLE	28.5(0.9)	27.1(1.2)	29.7(1.3)	31.0(1.1)	17.8(2.2)	22.5(2.5)	35.0(4.5)	1	1
APPLY PYTHAGOREAN THEOREM	43.2(1.3)	49.7(1.9)	37.2(1.3)	47.6(1.6)	22.2(2.3)	29.2(2.4)	65.6(4.9)	3	1
IDENTIFY PERPENDICULAR SEGMENTS	49.1(1.4)	50.3(1.7)	48.0(1.9)	51.7(1.3)	37.0(2.9)	34.8(4.6)	71.2(5.3)	3	1
WRITE ALGEBRAIC EXPRESSION	27.5(1.3)	30.1(1.8)	25.2(1.4)	30.1(1.5)	13.3(1.6)	17.4(3.9)	51.2(7.9)	5	1
RECOGNIZE GEOMETRIC PATTERN	49.3(1.3)	52.9(1.8)	46.1(1.6)	52.6(1.5)	34.3(2.4)	36.1(3.4)	65.0(4.7)	5	1
EXPLAIN GEOMETRIC PATTERN	27.3(1.2)	28.9(1.7)	25.7(1.4)	29.8(1.4)	16.1(1.8)	15.6(3.2)	42.0(4.9)	5	2

GRADE 12 - PERCENTAGE OF STUDENTS RESPONDING CORRECTLY TO THE 1990 MATHEMATICS ITEMS

SHORT TEXT	TOTAL	MALE	FEMALE	WHITE	BLACK	HISPANIC	ASIAN AM.	CONTENT AREA	ITEM TYPE
INTERPRET FUNCTION GRAPH	48.3(1.3)	52.6(1.6)	44.4(1.6)	51.5(1.4)	34.1(2.3)	35.3(3.1)	63.0(6.6)	5	1
APPLY COMPOSITION OF FUNCTIONS	25.8(1.1)	26.9(1.6)	24.8(1.6)	27.2(1.2)	18.9(2.4)	17.6(2.5)	41.4(4.9)	5	1
SOLVE AREA PROBLEM	39.0(1.5)	46.1(1.9)	32.5(1.8)	43.3(1.7)	13.9(2.4)	30.7(3.5)	49.0(5.3)	3	2
SOLVE A QUADRATIC EQUATION	9.0(1.0)	11.0(1.4)	7.3(1.1)	9.4(1.1)	3.9(1.3)	2.5(1.2)	33.0(5.7)	5	2
USE ORDER OF OPERATIONS	96.1(0.4)	95.4(0.6)	96.8(0.5)	96.5(0.5)	95.1(1.3)	93.6(1.7)	99.6(0.5)	5	1
APPLY MULTIPLICATION	91.0(0.6)	92.1(0.9)	89.9(1.0)	93.2(0.7)	79.9(2.4)	87.0(2.4)	98.8(1.0)	2	1
FIND CHECKBOOK BALANCE	84.0(0.8)	81.8(1.2)	86.1(1.1)	86.1(0.9)	74.7(2.6)	80.8(2.8)	85.8(2.7)	1	1
SOLVE TWO-STEP STORY PROBLEM	57.6(1.1)	58.8(1.4)	56.5(1.6)	61.7(1.3)	44.7(2.7)	45.8(3.5)	54.7(9.3)	1	1
INTERPRET CIRCLE GRAPH	75.4(1.0)	77.7(1.5)	73.1(1.5)	78.8(1.3)	60.5(2.5)	68.0(3.0)	81.2(5.7)	4	1
IDENTIFY TRIANGLE TYPE	56.0(1.5)	55.6(1.8)	56.4(1.9)	58.3(1.7)	46.8(3.0)	48.0(3.8)	69.1(4.9)	3	1
FIND ANGLE IN TRIANGLE	70.2(1.3)	73.0(1.6)	67.6(1.8)	75.2(1.4)	52.0(3.6)	50.9(3.4)	89.6(7.7)	3	1
INTERPRET A GIVEN RULE	50.2(1.2)	53.6(1.6)	46.8(1.4)	54.3(1.4)	35.6(2.3)	34.3(3.4)	60.5(4.6)	1	1
FIND AN AVERAGE	28.7(1.1)	30.4(1.6)	27.1(1.4)	34.0(1.5)	9.8(1.4)	15.0(2.1)	25.3(9.9)	4	2
FIND A PROBABILITY	30.6(1.3)	29.9(1.6)	31.2(1.6)	34.1(1.7)	17.3(1.9)	20.6(2.7)	34.0(7.6)	4	2
EXTRAPOLATE NUMBER PATTERN	35.7(1.4)	37.4(1.9)	34.2(1.6)	38.0(1.7)	25.8(2.7)	26.3(3.5)	46.8(4.6)	5	1
INTERPRET REPRESENTATION OF FRACTION	89.2(0.8)	90.1(0.8)	88.3(1.3)	91.1(0.9)	80.8(2.7)	85.8(2.3)	90.4(3.8)	1	1
FIND SIDE OF SQUARE	47.7(1.3)	52.4(1.9)	43.3(1.5)	51.2(1.4)	28.2(3.5)	40.8(3.1)	66.1(5.4)	2	1
RELATE INDEPENDENT/DEPENDENT VARIABLES	44.3(1.1)	46.7(1.8)	42.0(1.4)	48.0(1.2)	27.2(2.9)	34.2(4.1)	56.1(8.4)	5	1
APPLY PERCENT INCREASE	19.7(1.1)	23.9(1.7)	15.8(1.1)	21.5(1.1)	8.6(1.6)	16.9(4.0)	37.5(6.9)	1	1
APPLY CONCEPT OF PROBABILITY	61.1(1.4)	63.3(1.8)	59.1(1.8)	65.6(1.5)	40.3(3.4)	47.9(4.6)	66.9(5.7)	4	1
APPLY PYTHAGOREAN THEOREM	46.9(1.2)	50.4(1.7)	43.7(1.6)	51.3(1.5)	25.9(3.2)	33.8(3.7)	64.6(7.0)	3	1
GRAPH ABSOLUTE VALUE	25.9(1.3)	26.4(1.9)	25.4(1.4)	27.0(1.4)	22.1(3.7)	20.7(3.4)	32.4(6.0)	5	1
FIND VOLUME OF A CUBE	3.5(0.6)	4.8(0.8)	2.2(0.5)	3.9(0.7)	0.3(0.3)	1.3(1.0)	11.5(4.0)	2	2
SOLVE SYSTEM OF EQUATIONS	24.9(1.4)	25.4(2.0)	24.5(1.7)	27.9(1.7)	9.7(2.0)	11.6(2.4)	51.9(6.5)	5	2
FIND COORDINATE OF POINT ON UNIT CIRCL	25.0(1.6)	24.1(2.4)	25.9(2.0)	25.4(1.8)	24.2(4.2)	19.7(3.6)	36.3(9.2)	5	1
MULTIPLY FRACTIONS	75.5(0.9)	76.0(1.4)	75.0(1.3)	77.9(1.1)	66.5(2.6)	61.9(2.8)	82.1(4.1)	1	1
FIND DIVIDEND	86.7(0.8)	86.4(1.0)	87.1(1.2)	88.7(0.9)	81.8(1.9)	75.7(2.5)	87.1(5.2)	1	1
APPLY SCIENTIFIC NOTATION	29.7(1.1)	33.3(1.6)	26.1(1.3)	32.7(1.3)	16.6(2.0)	16.2(3.4)	45.4(5.1)	1	1
COMPARE PRODUCTS (MONEY)	76.2(0.9)	75.9(1.1)	76.5(1.5)	79.4(1.0)	64.7(2.6)	61.3(4.3)	84.4(5.6)	1	1
FIND RADIUS (CENTIMETERS)	79.5(1.1)	81.1(1.5)	78.0(1.4)	82.4(1.3)	68.6(2.3)	66.9(3.3)	87.8(3.7)	3	1
INTERPRET PICTOGRAPH	67.2(1.1)	71.7(1.8)	62.7(1.4)	72.0(1.3)	40.7(2.9)	58.2(3.2)	79.1(3.8)	4	1
COUNT COMBINATIONS	10.3(0.9)	12.6(1.2)	8.0(1.0)	11.7(1.0)	3.9(1.0)	3.9(1.5)	16.5(6.5)	4	1
COMPARE AREAS	26.8(1.0)	28.1(1.6)	25.6(1.2)	27.6(1.1)	21.2(2.3)	21.3(2.6)	45.1(5.6)	2	1
APPLY PYTHAGOREAN THEOREM	20.8(0.9)	23.3(1.6)	18.3(1.2)	23.6(1.2)	5.5(1.2)	12.6(2.4)	33.6(4.3)	3	2
FIND PERCENT	49.0(1.2)	53.3(1.7)	44.8(1.3)	52.3(1.4)	31.8(2.8)	36.9(3.2)	61.8(5.3)	1	1
VISUALIZE INTERSECTION IN SPACE	27.6(1.0)	28.1(1.2)	27.1(1.6)	27.9(1.2)	26.6(2.8)	29.8(3.8)	21.7(8.4)	3	1
SUBSTITUTE AND SOLVE FORMULA	43.9(1.2)	42.6(1.7)	45.2(1.3)	46.1(1.3)	31.8(2.7)	35.2(2.5)	62.0(6.9)	5	1
SOLVE MULTI-STEP STORY PROBLEM	37.7(1.1)	40.8(1.4)	34.7(1.8)	40.3(1.2)	25.5(2.0)	29.2(3.6)	41.1(4.9)	1	1
SUM LENGTHS OF ARCS	29.0(1.1)	32.1(1.9)	25.9(1.4)	29.7(1.2)	25.1(2.9)	27.7(3.4)	33.1(6.9)	2	1
APPLY INTEREST (MONEY)	14.9(1.2)	18.6(1.5)	11.3(1.2)	16.0(1.4)	8.6(1.7)	12.2(2.7)	20.7(7.1)	1	1
APPROXIMATE SQUARE ROOT	47.1(1.3)	46.6(2.0)	47.6(1.7)	49.3(1.5)	38.6(2.6)	39.0(4.1)	49.4(7.3)	5	1
CALCULATE PROBABILITY	2.3(0.5)	2.3(0.5)	2.2(0.6)	2.5(0.5)	1.0(0.6)	0.4(0.4)	5.7(3.1)	4	2
FIND SINE OF ANGLE	14.9(0.9)	16.9(1.5)	13.0(1.1)	16.7(1.1)	5.2(1.3)	6.2(2.6)	25.0(4.8)	5	2
INTERPRET FUNCTION GRAPH	40.6(1.4)	43.4(2.1)	37.7(2.0)	42.5(1.6)	28.9(3.3)	39.2(4.8)	39.2(5.1)	5	1
FIND TERM OF A SEQUENCE	25.7(1.3)	25.2(1.6)	26.3(1.7)	26.0(1.5)	21.4(3.7)	23.9(3.6)	44.8(7.5)	5	1
ESTIMATE LENGTH IN INCHES	73.1(1.0)	78.0(1.6)	68.4(1.4)	77.6(1.1)	51.6(3.4)	67.0(3.3)	78.4(4.0)	6	1
ESTIMATE LENGTH IN CENTIMETERS	40.6(1.3)	44.0(2.0)	37.4(1.6)	39.5(1.4)	49.0(3.2)	33.9(3.0)	42.6(6.8)	6	1
ESTIMATE TREND ON LINE GRAPH	92.7(0.6)	93.9(0.9)	91.5(0.8)	94.2(0.7)	84.2(2.5)	91.9(2.2)	98.5(0.9)	6	1
ESTIMATE RELATIVE HEIGHT	79.9(1.1)	83.2(1.6)	76.7(1.5)	84.1(1.2)	61.7(3.1)	72.5(4.9)	84.2(4.9)	6	1
ESTIMATE A SUM OF MONEY	71.7(1.1)	73.6(1.6)	69.9(1.3)	74.7(1.3)	62.3(3.1)	61.9(3.3)	71.6(4.3)	6	1

GRADE 12 - PERCENTAGE OF STUDENTS RESPONDING CORRECTLY TO THE 1990 MATHEMATICS ITEMS

SHORT TEXT	TOTAL	MALE	FEMALE	WHITE	BLACK	HISPANIC	ASIAN AM.	CONTENT AREA	ITEM TYPE
ESTIMATE A PRODUCT	73.3(1.1)	75.2(1.6)	71.5(1.6)	74.0(1.3)	73.0(2.9)	65.2(4.0)	74.2(7.5)	6	1
ESTIMATE USING FRACTIONS	81.9(0.9)	84.8(1.2)	79.1(1.3)	85.9(0.9)	67.0(3.1)	71.2(2.6)	82.9(5.3)	6	1
ESTIMATE AN AREA ON A GRID	89.6(0.6)	88.3(1.0)	90.9(0.8)	92.7(0.5)	79.4(2.8)	81.3(2.1)	86.4(5.7)	6	1
ESTIMATE A SUM OF MIXED NUMBERS	60.6(1.4)	64.7(1.8)	56.6(1.8)	64.3(1.6)	49.8(3.6)	44.9(5.0)	60.2(6.7)	6	1
ESTIMATE PROPORTION	73.4(1.0)	75.8(1.7)	71.1(1.9)	77.9(1.1)	58.1(3.3)	59.6(4.8)	76.9(5.6)	6	1
ESTIMATE POSITION ON LINE	50.0(1.6)	54.0(1.9)	46.1(1.9)	54.3(1.9)	30.4(2.5)	45.9(3.7)	51.9(6.2)	6	1
ESTIMATE PRODUCT	72.3(1.2)	73.8(1.7)	70.9(1.5)	74.7(1.4)	68.2(2.8)	61.9(3.2)	62.8(9.4)	6	1
ESTIMATE ANGLE MEASURE	82.4(0.9)	84.9(1.5)	80.1(1.3)	86.4(1.0)	65.4(3.4)	76.1(2.4)	84.7(3.8)	6	1
ESTIMATE QUOTIENT	60.5(1.5)	62.1(2.3)	58.9(2.0)	65.2(1.6)	46.3(3.1)	41.4(2.9)	64.0(6.7)	6	1
ESTIMATE SCALE DISTANCE	62.4(1.1)	62.1(1.6)	62.7(1.8)	62.9(1.3)	58.1(3.2)	56.1(3.3)	79.9(5.1)	6	1
ESTIMATE TOTAL WEIGHT	71.4(1.2)	70.0(1.6)	72.7(1.6)	75.1(1.5)	59.1(3.3)	59.2(2.6)	72.5(5.1)	6	1
ESTIMATE DECIMAL QUOTIENT	37.8(1.2)	37.2(1.5)	38.4(1.4)	40.8(1.3)	23.3(2.6)	28.4(2.9)	55.5(6.9)	6	1
ESTIMATE YEARLY SALARY	55.8(1.4)	62.5(1.6)	49.3(1.7)	60.3(1.6)	45.9(3.4)	36.9(3.9)	43.4(6.4)	6	1
ESTIMATE VOLUME	67.3(1.3)	66.3(1.7)	68.4(2.1)	74.7(1.6)	42.2(3.0)	48.9(3.0)	57.6(7.2)	6	1
ESTIMATE TOTAL NUMBER	58.1(1.2)	61.7(1.6)	54.7(1.7)	60.0(1.6)	50.0(3.5)	52.8(3.8)	67.2(2.9)	6	1
ESTIMATE VOLUME	38.5(1.5)	41.9(1.8)	35.3(1.8)	40.0(1.8)	33.9(2.5)	29.0(3.5)	43.7(4.8)	6	1
ESTIMATE FUTURE PRODUCTION	41.1(1.5)	46.1(1.9)	36.3(1.9)	46.4(1.7)	17.7(2.5)	32.1(3.9)	49.2(7.2)	6	1
ESTIMATE SUM OF INTEGERS	86.7(0.9)	86.8(1.2)	86.6(1.2)	88.2(1.0)	81.5(2.7)	80.8(3.3)	87.9(3.4)	6	1
ESTIMATE SUM OF INTEGERS	85.9(1.0)	86.4(1.4)	85.4(1.1)	88.0(1.2)	76.0(3.2)	84.2(2.0)	86.9(3.5)	6	1
ESTIMATE SUM OF INTEGERS	82.0(1.0)	84.9(1.2)	79.3(1.5)	85.4(0.9)	69.8(2.9)	71.8(2.4)	85.6(5.7)	6	1
ESTIMATE SUM OF DECIMALS	78.6(1.0)	81.9(1.4)	75.3(1.6)	82.3(1.1)	62.4(3.5)	67.9(4.0)	88.8(3.3)	6	1
ESTIMATE SUM OF MONEY	91.3(0.6)	91.2(1.0)	91.5(0.9)	93.4(0.6)	81.1(2.7)	89.9(2.4)	93.2(3.1)	6	1
ESTIMATE PRODUCT OF DECIMALS	75.7(1.3)	75.0(1.7)	76.3(1.9)	79.5(1.3)	60.7(3.4)	64.7(5.8)	85.3(4.2)	6	1
ESTIMATE QUOTIENT	74.2(1.3)	73.0(1.6)	75.4(1.6)	77.5(1.5)	62.5(3.0)	58.7(2.8)	85.7(4.0)	6	1
ESTIMATE AVERAGE OF DECIMALS	87.7(0.7)	89.3(0.9)	86.1(1.2)	90.6(0.7)	74.6(2.5)	84.1(3.0)	87.3(4.6)	6	1
ESTIMATE VALUE ON NUMBER LINE	91.4(0.7)	94.4(0.7)	88.5(1.3)	93.7(0.7)	81.5(2.0)	87.1(3.1)	93.8(3.1)	6	1
ESTIMATE TIME IN HOURS	74.0(1.0)	73.7(1.9)	74.3(1.6)	78.4(1.0)	56.5(2.8)	62.2(4.4)	81.0(7.6)	6	1
ESTIMATE QUOTIENT OF MONEY	73.8(1.1)	75.2(1.9)	72.5(1.4)	77.6(1.3)	62.8(2.7)	57.8(4.0)	76.1(8.3)	6	1
ESTIMATE SIZE OF ANGLE	78.0(1.1)	79.1(1.7)	76.9(1.7)	82.0(1.2)	65.6(2.8)	65.5(2.5)	78.4(5.6)	6	1
ESTIMATE PERIMETER	79.5(1.1)	80.4(1.4)	78.6(1.9)	83.5(1.0)	64.9(3.1)	65.6(5.0)	88.1(3.6)	6	1
ESTIMATE LIQUID VOLUME	88.8(0.9)	91.5(0.9)	86.3(1.3)	92.5(0.8)	74.5(2.9)	81.0(2.7)	89.8(5.4)	6	1
ESTIMATE TIME	57.8(1.0)	56.9(1.6)	58.5(1.4)	62.2(1.2)	39.2(3.4)	47.2(3.6)	62.5(6.1)	6	1
ESTIMATE SUM OF MONEY	71.2(0.8)	73.3(1.5)	69.3(1.4)	73.6(0.9)	59.0(3.1)	68.8(3.2)	76.3(6.2)	6	1
ESTIMATE SQUARE ROOT	40.8(1.4)	46.6(2.0)	35.2(1.5)	44.7(1.6)	22.0(2.6)	30.5(4.6)	58.1(7.0)	6	1
ESTIMATE DIFFERENCE	73.1(1.0)	74.1(1.5)	72.2(1.5)	77.5(1.0)	61.9(3.6)	55.1(3.7)	70.2(5.3)	6	1
ESTIMATE DIAGONAL LENGTH	68.1(1.2)	71.6(1.8)	64.8(1.7)	72.4(1.4)	50.8(2.8)	61.4(4.4)	67.2(7.5)	6	1
ESTIMATE, USING RATIO	77.4(1.0)	79.6(1.4)	75.2(1.5)	82.1(1.1)	58.8(3.4)	65.9(5.4)	81.3(4.0)	6	1
ESTIMATE PRODUCT OF MONEY	70.2(1.2)	69.8(1.7)	70.6(1.7)	72.5(1.3)	60.0(3.3)	66.7(4.6)	70.6(4.2)	6	1
ESTIMATE SALES TAX	55.2(1.4)	59.6(1.6)	51.0(2.5)	59.5(1.7)	38.7(3.1)	41.5(3.9)	68.2(5.8)	6	1
ESTIMATE TREND ON LINE GRAPH	80.1(1.0)	80.7(1.4)	79.5(1.3)	83.9(1.1)	63.1(3.1)	74.7(4.0)	84.2(3.9)	6	1
ESTIMATE SUM ON BAR GRAPH	67.3(1.4)	69.3(1.6)	65.3(2.0)	71.2(1.4)	50.0(3.4)	61.3(5.2)	69.9(4.5)	6	1
APPLY DECIMAL ADDITION	77.4(1.1)	77.4(1.5)	77.3(1.5)	79.2(1.2)	71.9(3.1)	72.7(2.7)	71.9(7.1)	7	2
READ AND INTERPRET DATA	38.5(1.6)	39.2(1.6)	37.8(2.5)	42.6(2.0)	25.5(2.6)	26.1(3.2)	38.2(8.4)	7	2
READ AND INTERPRET DATA	42.2(1.4)	40.5(1.6)	43.9(1.8)	47.9(1.7)	21.9(2.3)	29.0(2.5)	39.9(6.4)	7	2
SKETCH AND DESCRIBE SOLID	31.7(1.2)	38.0(1.9)	25.6(1.3)	36.7(1.3)	12.3(2.3)	18.0(2.8)	40.2(5.7)	7	2
EXPLAIN CONCEPT OF AREA	9.6(1.0)	10.4(1.1)	8.8(1.2)	11.2(1.2)	1.8(0.8)	4.6(1.4)	18.9(4.4)	7	2
APPLY RATIO AND PROPORTION	59.4(1.3)	62.9(1.5)	56.0(1.9)	66.0(1.6)	35.4(2.3)	45.3(4.9)	53.4(7.3)	7	2
FACTOR A BINOMIAL	36.1(1.6)	36.9(2.1)	35.3(2.1)	39.2(2.0)	22.6(3.1)	22.2(3.2)	55.0(9.0)	7	2
USE RATE TABLE TO FIND COST	31.0(1.2)	31.0(1.7)	31.0(1.8)	36.2(1.5)	13.8(1.9)	17.3(3.6)	25.1(4.9)	7	2
USE SLOPE TO GRAPH A LINE	16.1(1.1)	19.8(1.5)	12.6(1.6)	19.2(1.3)	2.7(1.2)	6.2(1.7)	30.9(5.2)	7	2

GRADE 12 - PERCENTAGE OF STUDETNS RESPONDING CORRECTLY TO THE 1990 MATHEMATICS ITEMS

SHORT TEXT	TOTAL	MALE	FEMALE	WHITE	BLACK	HISPANIC	ASIAN AM.	CONTENT AREA	ITEM TYPE
EXPLAIN FUNCTION CONCEPT	18.9(1.3)	21.6(1.9)	16.3(1.3)	21.2(1.3)	7.6(2.2)	10.0(2.0)	35.3(9.2)	7	2
SOLVE A QUADRATIC EQUATION	10.8(1.0)	12.0(1.4)	9.6(1.3)	11.9(1.1)	3.5(1.1)	4.3(1.4)	28.7(5.6)	7	2
GRAPH A QUADRATIC EQUATION	14.0(1.2)	14.7(1.6)	13.3(1.4)	15.9(1.4)	3.3(1.0)	7.4(2.0)	31.9(5.0)	7	2
APPLY PYTHAGOREAN THEOREM	2.9(0.6)	4.5(0.9)	1.4(0.4)	3.5(0.7)	0.0(0.0)	0.5(0.4)	9.0(4.9)	7	2

CONTENT AREAS
1 = Numbers and Operations
2 = Measurement
3 = Geometry
4 = Data Analysis, Statistics, and Probability
5 = Algebra and Functions
6 = Estimation
7 = Problem Solving

ITEM TYPES
1 = Multiple Choice
2 = Constructed Response

Acknowledgments

NAEP's 1990 mathematics assessment, including the first Trial State Assessment, was truly a collaborative effort among staff from State Education Agencies, the National Center for Education Statistics (NCES), Educational Testing Service (ETS), Westat, and National Computer Systems (NCS). The program benefited from the contributions of hundreds of individuals at the state and local levels -- Governors, Chief State School Officers, State and District Test Directors, State Coordinators, and district administrators -- who tirelessly provided their wisdom, experience, and hard work. Finally, and most importantly, NAEP is grateful to the students and school staff who participated in the assessment.

Special recognition is due the Council of Chief State School Officers (CCSSO) for its considerable contributions to the program, especially its management of the National Assessment Planning Project. That project resulted in the mathematics framework and objectives for the assessment and recommendations about reporting the results of the program. In particular, we note the significant contributions of Ramsay Selden, Director of the State Education Assessment Center for the CCSSO, and the members of the Steering, Mathematics Objectives, and Analysis and Reports Committees of the National Assessment Planning Project (listed in the following pages).

The assessment was funded through NCES, in the Office of Educational Research and Improvement of the U.S. Department of Education. Emerson Elliott, NCES Acting Commissioner, provided consistent support and guidance. The staff -- particularly Gary Phillips, Eugene Owen, Stephen Gorman, Maureen Treacy, and Raul Garza -- worked closely and collegially with ETS, Westat, and NCS staff and played a crucial role in all aspects of the program.

The members of the National Assessment Governing Board (NAGB) and NAGB staff also deserve credit for their advice and guidance.

Under the NAEP contract to ETS, Archie Lapointe served as the project director and Ina Mullis as the deputy director. Mathematics and state statistical and psychometric activities were led by Kentaro Yamamoto and John Mazzeo, with consultation from Eugene Johnson and Donald Rock. John Barone managed the data analysis activities; Jules Goodison, the operational aspects; Walter MacDonald and Chancey Jones, test development; David Hobson, the fiscal aspects; and Stephen Koffler, state services. Sampling and data collection activities were carried out by Westat under the supervision of Renee Slobasky, Keith Rust, Nancy Caldwell, and the late Morris Hansen. The printing, distribution, and processing of the materials were the responsibility of NCS, under the direction of John O'Neill and Lynn Zaback.

We owe a great deal to the Mathematics Item Development and Mathematics Scale Anchoring Panels (listed in the following pages). These people -- from school districts, colleges and universities, and State Education Agencies -- worked tirelessly to help ETS staff develop the assessment and a framework for interpreting the results. The mathematics test development staff members, including James Braswell, Jeanne Elbich, Jeffrey Haberstroh, Marlene Supernavage, and Beverly Whittington, deserve special mention for their dedication and hard work.

We also express a debt of gratitude to the state NETWORK members listed in the following pages. The state representatives provided invaluable guidance in reviewing Trial State Assessment materials and procedures. They also deserve considerable credit for fulfilling the state data collection responsibilities in a timely and professional manner.

The large number of states and territories participating in the first Trial State Assessment introduced many unique challenges in reporting the 1990 mathematics results. To meet this challenge, a computerized table generation system was designed by Robert Patrick and David Freund. David Freund and Edward Kulick performed the mathematics data analyses, assisted by Drew Bowker. Ina Mullis, John Dossey, Eugene Owen, and Gary Phillips wrote the text for the report. Many thanks are provided to the numerous reviewers who suggested improvements to successive drafts, especially Paul Barton, Eugene Johnson, Stephen Koffler, John Mazzeo, and John Olson. Diane Rein, Sharon Davis-Johnson, Linda Myers, Jackie Zeis, Kathy Siler, and Debbie Stevens provided the excellent word-processing skills essential to the project. The ETS Publications Division and Word Processing Center coordinated the design and final production of this report.

NATIONAL ASSESSMENT PLANNING PROJECT: STEERING COMMITTEE

Robert Astrup	National Education Association
Lillian Barna	Council of the Great City Schools
Richard A. Boyd	Council of Chief State School Officers
Glenn Bracht	Council for American Private Education and, National Association of Independent Schools
William M. Ciliate	National School Board's Association
Antonia Cortese	American Federation of Teachers
Mary Brian Costello	National Catholic Educational Association
Wilhelmina Delco	National Council of State Legislators
Nancy DiLaura	National Governors' Association
Thomas Fisher	Association of State Assessment Programs
Alice Houston	Association for Supervision and Curriculum Development
C. June Knight	National Association of Elementary School Principals
Stephen Lee	National Association of Secondary School Principals
Paul LeMahieu	National Association of Test Directors

Glenn Ligon	Directors of Research and Evaluation
Barbara Roberts Mason	National Association of State Boards of Education
James E. Morrell	American Association of School Administrators, Austin Independent School District, Texas

NATIONAL ASSESSMENT PLANNING PROJECT: MATHEMATICS OBJECTIVES COMMITTEE

Joan Burks	Damascus High School, Damascus, Maryland
Phillip Curtis	University of California at Los Angeles, Los Angeles, California
Walter Denham	California Department of Education, Sacramento, California
Thomas Fisher	Florida Department of Education, Tallahassee, Florida
Ann Kahn	The National Parent-Teacher Association, Fairfax, Virginia
Mary M. Lindquist	Columbus College, Columbus, Georgia
Susan Purser	Whitten Junior High School, Jackson, Mississippi
Dorothy Strong	Chicago Public Schools, Chicago, Illinois
Thomas W. Tucker	Colgate University, Hamilton, New York
Charles Watson	Arkansas Department of Education, Little Rock, Arkansas
R.O. Wells Jr.	Rice University, Houston, Texas

NATIONAL ASSESSMENT PLANNING PROJECT: ANALYSIS AND REPORTS COMMITTEE

Irene Bandy	Assistant Superintendent, Columbus, Ohio
Leigh Burstein	Professor, UCLA, Los Angeles, California
Michael Cohen	Associate Director, National Governors' Association, Washington, D.C.
Valeria Ford	Director, Student Assessment, District of Columbia Schools, Washington, D.C.
Pascal D. Forgione Jr.	Chief, Office of Research and Evaluation, State Department of Education, Hartford, Connecticut
Anne C. Hess	Coordinator of Student Assessment, Department of Education, Montgomery, Alabama
H. D. Hoover	Professor/Director In Basic Skills Program, University of Iowa, Iowa City, Iowa
Paul LeMahieu	Director, Office of Research, Testing and Evaluation, Pittsburgh, Pennsylvania
Margaret Marsden	Member, Virginia Board of Education, Arlington, Virginia
Paul Sandifer	Director, Office of Research, State Department of Education, Columbia, South Carolina

NAEP MATHEMATICS ITEM DEVELOPMENT PANEL

Bruce Brombacher	Jones Junior High School, Westerville, Ohio
Iris Carl	Houston Independent School District, Houston, Texas
John Dossey	Illinois State University, Normal, Illinois
Linda Foreman	Portland State University, Portland, Oregon
Audrey Jackson	Parkway School District, Chesterfield, Missouri
Jeremy Kilpatrick	University of Georgia, Athens, Georgia
Mary Lindquist	Columbus College, Columbus, Georgia
Thomas Tucker	Colgate University, Hamilton, New York

NAEP MATHEMATICS SCALE ANCHORING PANEL

Laurie Boswell	Profile High School, Bethlehem, New Hampshire
Bruce Brombacher	Jones Middle School, Upper Arlington, Ohio
Catherine Brown	Virginia Polytechnic Institute, Blacksburg, Virginia
Joe Crosswhite	Consultant, Springfield, Missouri
John Dossey	Illinois State University, Normal, Illinois
Henry Kepner Jr.	University of Wisconsin at Milwaukee, Milwaukee, Wisconsin
Linda Kolnowski	Detroit Public Schools, Detroit, Michigan
Gordon Lewis	District of Columbia Public Schools, Washington, District of Columbia
Mary Lindquist	Columbus College, Columbus, Georgia
Donna Long	Indiana Department of Education, Indianapolis, Indiana
Vena Long	Missouri State Department of Education, Jefferson City, Missouri
William Masalski	University of Massachusetts, Amherst, Massachusetts
Wendell Meeks	Illinois State Board of Education, Springfield, Illinois
Andy Reeves	Florida Department of Education, Tallahassee, Florida
Diane Thiessen	University of Northern Iowa, Cedar Falls, Iowa
Alba Thompson	Center for Research in Mathematics and Science Education, San Diego, California
Sheila Vice	Kentucky Department of Education, Frankfort, Kentucky
Charles Watson	Arkansas State Department of Education, Little Rock, Arkansas
Vernon Williams	H. W. Longfellow Intermediate School, Falls Church, Virginia

NAEP TRIAL STATE ASSESSMENT NETWORK DIRECTORS OF TESTING, STATE COORDINATORS, AND MATHEMATICS SUPERVISORS

Katherine Carnes	Coordinator, Student Assessment, Alabama
Gloria Turner	Student Assessment, Alabama
Linda Pledger	Mathematics Specialist, Alabama
Robert Silverman	Director, Assessment Program, Alaska
Cathy Carney	Mathematics/Science Specialist, Alaska
Paul H. Koehler	Associate Superintendent for Education Services, Arizona
Charles Wiley	Coordinator, Statewide Testing, Arizona
Linda Kratz	Mathematics Specialist, Arizona
Vicki Gray	Administrative Advisor, State Assessments, Arkansas
Gayle Teal	Coordinator, Student Assessment, Arkansas
Charles Watson	Specialist, Mathematics, Arkansas
Tej Pandey	Coordinator, California
Dale Carlson	Director, California Assessment Program
Joan Akers	Mathematics Education Consultant, California
Wayne Martin	Coordinator, State Testing, Colorado
Don Watson	State Testing, Colorado
Mattye Pollard-Cole	Mathematics Consultant, Colorado
Peter Behuniak	Coordinator, Connecticut
Patricia Brandt	Coordinator, Connecticut
Douglas Rindone	Bureau Chief, Connecticut
Steven Leinwand	Mathematics Consultant, Connecticut
Wilmer E. Wise	State Specialist, Education Assessment, Delaware
Larry Gabbert	Department of Public Instruction, Delaware
William Geppert	Mathematics Supervisor, Delaware
Valeria Ford	Director of Student Assessment, District of Columbia
Gordon Lewis	Director for Mathematics, District of Columbia
Janice Smith-Dann	Florida Department of Education, Florida
Thomas Fisher	Director, Assessment Testing and Evaluation, Florida
Charles A. Reeves	Mathematics Supervisor, Florida
Sheila Lavert	Assessment Unit, Georgia
Stanley Bernknopf	Director, Assessment Unit, Georgia
Elizabeth Creech	Program Director, Georgia
William Roughead	Mathematics Coordinator, Georgia
Selvin Chin-Chance	Administrator, Test Development Section, Hawaii
Marian Creslip	Administrator, Test Development Section, Hawaii
Kathleen Nishimura	Mathematics Specialist, Hawaii
Sally Keister	Guidance/Assessment and Evaluation, Idaho

Tom Farley	Mathematics Consultant, Idaho
Dennis Goedecke	Assessment Consultant, Illinois
Thomas Kerins	Student Assessment Section, Illinois
Wendell Meeks	Education Consultant, Illinois
Donna Long	Mathematics Consultant, Indiana
Bill Strange	Senior Officer, Indiana
Rick Peters	Center for School Assessment, Indiana
Martha Wilson-Hegg	Mathematics Consultant, Indiana
Max Morrison	Director, P.R.E., Iowa
Leland Tack	Administrator, Planning, Evaluation & Information, Iowa
John Wheeler	Mathematics Consultant, Iowa
Ann Harrison	Program Planning, Kansas
Kim Gattis	Math Specialist, Kansas
Ken Draut	Kentucky Department of Education, Kentucky
Mr. Scott Trimble	Director, Kentucky
Sheila Vice	Mathematics Consultant, Kentucky
Sam C. Pernici	Louisiana Department of Education, Louisiana
Rebecca S. Christian	Director, Louisiana
Jean Reddy Clements	Mathematics Section Chief, Louisiana
Randy Walker	Director, Maine
Jacqueline P. Mitchell	Mathematics Consultant, Maine
Robert Gabrys	Director, Program Assessment Branch, Maryland
Horace P. Maxcy	Associate Director, Maryland
Cynthia Prince	Maryland State Department of Education, Maryland
Robert Gabrys	Director, Program Assessment Branch, Maryland
June Danaher	Sciences & Mathematics, Maryland
Allan Hartman	Director, Research and Assessment, Massachusetts
Elizabeth Badger	State Coordinator, Massachusetts
James Case	Associate Commissioner, Massachusetts
Edward D. Roeber	Michigan Department of Education, Michigan
Robert Smith	Department of Education, Michigan
Charles Allan	Mathematics Specialist, Michigan
Bill Allen	Minnesota Department of Education, Minnesota
William McMillan	Director, Assessment Program, Minnesota
Sharon Stenglein	Mathematics Specialist, Minnesota
Cynthia Ward	Director Statewide Testing, Mississippi
Carolyn Craig	Mathematics Specialist, Mississippi
James Friedebach	Director, Testing and Assessment, Missouri
Vena Long	Mathematics Consultant, Missouri
Jack Copps	Deputy Superintendent, Montana
Bob Ruthemeyer	Administrative Services, Montana

Dan Dolan	Mathematics Specialist, Montana
Roger Hudson	Administrative Curriculum Services, Nebraska
Deb Romanek	Math Supervisor, Nebraska
Thomas Klein	Director, Nebraska
Ron Gutzman	Mathematics Consultant, Nebraska
Donna Cavaleri	Division of Instructional Services, New Hampshire
Paul A. Fillion	Director, New Hampshire
Fernand J. Prevost	Mathematics Consultant, New Hampshire
Calla Smorodin	State Testing Program, New Jersey
Edward Masonis	State Testing Program, New Jersey
Larry Wiley	Mathematics Curriculum Specialist, New Jersey
Dean Arrasmith	State Testing Director, New Mexico
Kurt Steinhaus	State Testing, New Mexico
Carroll Hall	Evaluation, Assessment and Testing, New Mexico
Claire Fenton	Mathematics Consultant, New Mexico
Carolyn Byrne	Bureau of Elementary & Secondary Testing, New York
Fredric Paul	Chief, Mathematics Education, New York
William Brown	Assistant State Superintendent, North Carolina
Cleo M. Meek	Education Consultant, North Carolina
Phil Henry	Research and Testing, North Carolina
GayLynn Becker	Information and Research, Department of Public Instruction, North Dakota
Ron Torgeson	Director, Information and Research Department of Public Instruction, North Dakota
David Lee	Director, Guidance & Testing, North Dakota
Luna Zollinger	Ohio Department of Education, Ohio
Roger Trent	Director, Educational Services, Ohio
Zoe Leimgruebler	Oklahoma State Department of Education, Oklahoma
Wayne Neuburger	Director, Oregon
Michael Dalton	Assistant Superintendent, Oregon
James F. Hertzog	Pennsylvania Department of Education, Pennsylvania
Pat DeVito	Test Director, Rhode Island
James Karon	Consultant, Rhode Island
Sue Sadik	Researcher, South Carolina
Paul Sandifer	Educational Assessment Section, South Carolina
Lane Peeler	Mathematics Consultant, South Carolina
Carla Claymore	Director of Testing, South Dakota
Marilyn Hala	Mathematics Consultant, South Dakota
Angelia M. Golden	Director, Testing and Evaluation, Tennessee
Karen Hanna	Department of Education, Tennessee
Keith Cruse	Director, Student Assessment, Texas

David Nelson	Director, Statewide Educational Assessment, Utah
John D. Ross	Evaluation Specialist, Utah
W. Ross Brewer	Director, Planning and Policy, Vermont
Bob Kenney	Mathematics Consultant, Vermont
Gerald M. Eads	Director of Research & Testing, Virginia
Carol Rezba	Supervisor, Mathematics, Virginia
Gordon Ensign	Supervisor, Testing and Evaluation, Washington
Elden B. Egbers	Mathematics Supervisor, Washington
Therese M. Wilson	West Virginia Department of Education, West Virginia
Steve Bechelhimer	Assistant Director, Assessment Services Unit, West
James Moser	Mathematics Supervisor, West Virginia
Tom Stefonek	Director, Bureau for Achievement Testing, Wisconsin
Kathleen Lindas	Department of Education, Wisconsin
Jim Lendino	Wyoming Department of Education, Wyoming
William M. Futrell	Mathematics Supervisor, Wyoming
Elizabeth Haleck	Department of Education, American Samoa
Mere Bethan	Director, Department of Education, American Samoa
Jeffrey Shafer	Guam Department of Education, Guam
Henry I. Sablar	Department of Education, Northern Mariana Islands
Sara Lopez	Director, Puerto Rico
Luis Esquilin	Department of Education, Virgin Islands
Henrita Barber	Department of Education, Virgin Islands

U.S. GOVERNMENT PRINTING OFFICE : 1991 0 - 295-027 QL 3

NCES 91-1259