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ABSTRACT

During the 1979-80 school year, California public school students in grades 3, 6 and 12 were tested in the basic skills of reading, written expression, and mathematics. Complete statewide results of this California Assessment Program (CAP) are presented, including the following features that have become standard: (1) detailed findings including those of specific skill areas within each major area, and the skill area findings for mathematics reported separately for boys and girls on the basis of socioeconomic level; (2) national comparisons; (3) expert interpretations of the results by identifying skill areas of impressive student performance and those that need attention; (4) test results comparable to those of previous years; (5) subgroup analyses; (6) correlates of achievement focusing on the amount of time students spend watching television, reading, and doing homework. Two important changes to the CAP were related to grade 3 and included a new test of written language and mathematics, as well as a new scaled score reporting system which allows for comparisons of scores from year to year. Two reasons for revising the CAP included enhancing its relevancy and breadth, and using the matrix sampling technique to reduce the amount of testing time. (RL)

Student Achievement in California Schools

1979-80 Annual Report

California Assessment Program

CALIFORNIA STATE DEPARTMENT OF EDUCATION Wilson Riles, Superintendent of Public Instruction Sacramento, 1980

Student Achievement in California Schools

1979-80 Annual Report

Prepared Under the Direction of
Alexander I. Law, Chief
Office of Program Evaluation and Research

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I. Summary of Findings

During the 1979-80 school year, all third, sixth and twelfth grade students in California public schools were tested in the basic skills of reading, written expression, and mathematics.

Grade Three Results

Reading achievement test scores for third grade pupils have been improving steadily since statewide testing in that grade began in 1967. This trend has continued through 1980. A summary of the test results is presented in Table 1. The overall gain in 1979-80 was 2 scaled score points. These gains reflect pupil performance on the California Assessment Program's new Survey of Basic Skills: Grade 3, developed pursuant to legislation of 1978. This legislation also added the areas of written language and mathematics to the third grade testing. The new test, administered for the first time in May of 1980, was constructed specifically to assess the students' attainment of proficiency in the broad range of programs in California's public schools.

Special equating studies were conducted to determine the relationship of the current performance of California pupils to the performance of a sample of students across the nation. The median score of third grade pupils in California was determined to be at the 58th percentile rank in reading, the 53rd in written language, and the 51st percentile rank in mathematics.

Grade Six Results

All students in grade six took the Survey of Basic Skills: Grade 6, another test developed in (1974-75) specifically for the California Assessment Program. The scores of California sixth grade students improved in all content areas tested; reading, written expression, spelling, and mathematics (see Table 1). The gain was least in spelling (0.4 percent correct), next most in reading (0.7 percent correct), and most (0.8 percent correct) in written expression and mathematics.

An equating study provided a basis for comparing California students with a national sample of students tested in 1973. On the basis of the results of the study, the median sixth grade student in California is above the national median in all areas. In mathematics the median sixth grader in California moved from the 54th to the 55th percentile rank in 1979-80. The median student moved from the 52nd to the 53rd percentile rank in written expression and increased to the 56th in reading.

Grade Twelve Results

All students in grade twelve took the same test that has been administered since 1975-76 -- the Survey of Basic Skills: Grade 12. Reading performance continued to decline by 0.1 percent correct, the same level of decline as last year. Written expression did not change from 1978-79, and spelling and math both showed improvement, 0.4 and 0.3 percent correct, respectively.

Special equating studies provide a basis for comparing the performance of California twelfth graders with that of national test publishers' norm samples tested in 1962 and 1970. On the basis of the 1962 norms, the median twelfth grade student in California in 1979-80 was at the 41st percentile rank in reading, the 34th percentile rank in written expression, and the 44th percentile rank in mathematics.

Comparisons with two other tests with 1970 norms placed California twelfth grade students somewhat lower: at the 32nd and 34th percentiles in reading, at the 27th and 28th percentiles in written expression, and at the 42nd and 44th percentiles in mathematics.

Subgroup Analyses

Statewide test performance was analyzed separately for several different subgroups of pupils. A summary of the main findings is presented below:

1. A negative relationship was found between the amount of time students indicated they spent watching television and the scores they attained. The relationship was very strong, and none of several other factors--such as socieoeconomic status and English language fluency--that were analyzed substantially affected it.

2. Girls scored higher than boys in reading, and boys scored higher than girls in mathematics. In reading, the gap between the boys and girls stayed about the same as last year. In mathematics, the girls made considerable progress in closing the gap at grade twelve, while the boys maintained their lead in grade six. Most of these differences are quite small; however, the boys' lead in mathematics in grade twelve is still quite substantial.

3. Substantial score differences were observed among pupils grouped according to level of English language fluency. The highest scoring group of pupils were those considered fluent in English who also spoke Chinese or Japanese. This small group of pupils scored higher than those who spoke English only. The students who spoke limited English and another language scored substantially lower than the other groups. Nearly all groups scored higher in 1979-80 than in 1978-79.

Table 1

Number of Students Tested and Average Test Score by Grade Level and Content Area, from 1975-76 through 1979-80

Grade level and content area	Number tested	Average test score								
							Difference			
		1975-76	1976-77	1977-78	1978-79	1979-80	75-76 to 76-77	76-77 to 77-78	77-78 to 78-79	78-79 to 79-80
Grade 3	286,413									
Reading		242	243	245	248	250	1	2	3	2
Written Language		--	--	--	--	250	--	--	--	--
Mathematics		--	--	--	--	250	--	--	--	--
Grade 6	281,907									
Reading		66.1	65.9	66.3	66.8	67.5	-0.2	+0.4	+0.5	+0.7
Written Language		62.5	63.6	64.1	64.6	65.4	+1.1	+0.5	+0.5	+0.8
Spelling		63.6	63.6	64.1	64.5	64.9	-0-	+0.5	+0.4	+0.4
Mathematics		57.4	57.7	58.5	59.0	59.8	+0.3	+0.8	+0.5	+0.8
Grade 12	233,125									
Reading		64.1	63.6	63.3	63.2	63.1	-0.5	-0.3	-0.1	-0.1
Written Language		62.3	61.9	62.1	62.4	62.4	-0.4	+0.2	+0.3	-0-
Spelling		68.0	67.9	68.4	68.4	68.8	-0.1	+0.5	-0-	+0.4
Mathematics		67.0	66.3	66.3	66.5	66.8	-0.7	-0-	+0.2	+0.3

Note: The scores for grade three are now reported in scaled score units. These scores, briefly described in Chapter II, range from 100 to 400 with a statewide average of 250. They enable the reader to follow more easily the trend of scores from the former Reading Test to the new Survey of Basic Skills: Grade 3, introduced in 1980. National comparisons for all scores are available in Chapter VIII. The scores for grades six and twelve continue to represent the percentage of questions answered correctly.

Within the two categories of "fluent English and another language" and "limited English and another language," those students whose other language was Spanish scored substantially lower than those whose other language was other than Spanish.

4. There was a direct relationship between test scores and parental occupational level. The higher a parent's occupational or educational level, the higher the average student's test scores. Perhaps more significantly, the gap between the average scores of the pupils from the highest economic, or occupational, levels and those from the lower economic levels continued to decrease at all three grade levels.

II. Introduction to the Report

This report contains the complete statewide results of the California Assessment Program, including the following features that have become standard:

- Detailed findings. Information is presented not only for the major content areas of reading, written expression, and mathematics but also for a variety of specific skill areas within each major area. The skill area findings for mathematics are also analyzed and reported separately for boys and girls on the basis of socioeconomic level.

- National comparisons. Although the tests were developed to correspond specifically to the skills and concepts being taught in California schools, special studies have been conducted to show how the performance of California students compares to that of recently tested samples of students from throughout the nation.

- Expert opinions. Recognized authorities in each professional field have presented their interpretations of the results for each of the content areas by identifying skill areas of relatively impressive student performance and other skill areas that need attention. Previous reports included some classroom instructional strategies suggested by the various subject-matter committees to overcome these weaknesses. This year's report expands those suggestions.

- Comparable results. All test results in this report are comparable to those of previous years, since the tests in grades six and twelve have not been changed and the new test in grade three has been equated to the former test and the results placed on a common scale.

- Subgroup analyses. With the stability of the tests, it has become possible and appropriate to examine the differences in the rate of progress achieved by various subgroups of students. Three or more years of findings for different groups of students are included in this year's report.

- Correlates of Achievement. Each year the California Assessment Program collects information about the characteristics of students and examines the relationship between those characteristics and performance on the tests. In last year's report the focus was on years of English taken and frequency of essay writing. This year the focus is on the amount of time students spend watching television, reading, and doing homework.

Two important changes to the California Assessment Program are reflected in this report, both of which relate to Grade three:

- A new test was administered to all third grade pupils in May of 1980. It included written language and mathematics for the first time. The next section in this chapter briefly describes that test and the process used in developing it.

- A new scaled score reporting system has been implemented in conjunction with the new third grade test. Among other advantages, the new system allows for easier and more accurate comparisons of scores from year to year. It is briefly described at the end of this chapter.

Development of the California Assessment Program

The California Assessment Program was first fully implemented in 1974-75. In design, development, and procedures, it is unique in the nation. The assessment program was designed with several criteria in mind: (1) It must be relevant to California schools; (2) It must cover the full range of instructional objectives; (3) It must provide program-diagnostic information at the local and state levels; and (4) It must take only a minimum of testing time. This section describes the process of developing such a program.

Background and Assumptions

The state assessment program had its foundation in two legislative acts: (1) the California School Testing Act of 1969, a revision of a 1961 law which first required an achievement testing program in the public schools; and (2) the Miller-Unruh Basic Reading Act, which originally required reading tests in grades one, two, and three. The testing program was revised by 1972 legislation, and major changes were made in the program as a result of that legislation.

The changes in the statewide testing program were based on the principle that an efficient state testing program has to be limited in scope -- that is, limited primarily to the task of furnishing useful information to state-level policymakers and decision makers. It was assumed that the program could not meet all of the many information needs of local school district personnel and that assessment information needed at the classroom level could best be collected by local school personnel.

In spite of this assumption, the program was designed to report as much information as possible to local personnel. Since all students at a grade level in all schools were tested, it was possible to provide very detailed analytical reports for each school to supplement locally obtained information. In fact, the results of a survey of all districts in California showed that most districts have found this unique information very useful in evaluating and revising programs. Board members and other local citizens have relied heavily upon statewide results in making judgments about local needs and accomplishments primarily because of the uniform and comparable nature of the information provided.

Reasons for Revising the Testing Program

Two major problems were addressed through the revision of the statewide testing program:

Test relevancy and breadth. The incomplete match between the relatively narrow range of skills measured by any one published standardized test, on the one hand, and the variety of instructional programs in California schools, on the other, made it difficult to assess the skills of California students or the effectiveness of the programs with any degree of assurance of fairness. Furthermore, it was not possible to assess the relative strengths and weaknesses of California students in order to have an indication of how instructional programs should be redirected, since the standardized tests being used yielded only total scores.

Testing time. Previous testing instruments required an inordinate amount of student time for the testing process -- inordinate, at least, in relation to the usefulness of the results. The use of a new testing technique called matrix sampling has now reduced the amount of testing time at certain grade levels from as much as three and one-half hours to 30 minutes. Under this sampling method, all students at a grade level in all schools are tested, but each student takes only a portion of the total test. Results for an individual student cannot be obtained, but quite accurate estimates of the overall performance of groups of students can be computed.

A New Test for Grade Three

The 1977 Assembly Advisory Committee on Statewide Testing recommended several changes to the California Assessment Program, most of which became law in 1978. Two of the most significant ones called for an end to testing in grade two and a shift of those resources to obtaining a broader assessment of pupil achievement in grade three by the addition of written language and mathematics to the test.

The rationale

The test development process for the new third grade CAP test was based on two primary considerations. First, every effort was made to ensure that the test would reflect the third grade curriculum commonly taught in public schools throughout California. Second, the test was designed to ensure that the third grade assessment information to be reported back to schools and districts would be as useful as possible in the identification of programmatic strengths and weaknesses. Essentially, all test development efforts can be traced back to these two overriding considerations as illustrated in the following discussion.

Relevance to Instruction. The first step taken to ensure a match between the CAP test and California's basic skills curriculum was to reconvene committees of content area specialists in reading, language, and mathematics. Such committees have traditionally served in an advisory capacity to the Department in the creation of the reading, language, and mathematics assessment instruments. The content area specialists who served on the three advisory committees represented a cross section of geographical regions and educational institutions from across the state. The advisory committees served as the final decision makers in the test development process.

Each of the content area committees began the task of test development with a thorough examination of the appropriate statewide curriculum framework (reading, mathematics, or English language). In each case the framework provided the guiding philosophy for the creation of test content specifications and assessment items. The content area committees also relied heavily on content analyses of commonly used state-adopted third grade textbooks.

Lists of objectives with sample item formats were developed and refined. This process culminated in the drafting of preliminary sets of test content specifications, which served as blueprints throughout the item-writing process.

In December of 1978 every school district in California received an invitation from the Department to participate in the development of the new third grade CAP test. Approximately 300 districts agreed to participate in some phase of the test development process.

As soon as the preliminary sets of test content specifications were drafted, copies were mailed to those districts which had indicated a willingness to review them. Participating reviewers were asked to (1) rate each of the proposed skill areas in terms of the degree of emphasis that the district placed on it; and (2) indicate whether or not the given skill should be tested on the third grade CAP test.

This review included an extensive amount of content-specific detail in addition to broad skill-area information. For example, teachers were asked not only whether contractions, irregular verbs, and irregular noun plurals were typically taught by the end of the third grade but also which contractions, irregular verbs, and irregular noun plurals were routinely covered at this level. The advisory committees used these data from the field review to make final decisions about the skills to be included in the CAP Test Content Specifications.

Teachers from across the state were then invited to write questions in accordance with the specifications. The item-writing phase of the test development process resulted in large pools of items for each of the content areas. The item pools were reviewed, refined, and checked for compliance with the specifications by the appropriate content-area committees and departmental staff.

The item pools were then subjected to several rounds of field review and field testing. During the preliminary field-testing phase, 330 participating teachers were asked to evaluate specific test items on the basis of

these two questions: (1) To what degree have you emphasized the skill measured by this item by the end of grade three? (2) Should this item be retained, modified, or omitted?

These teacher-judgment data were then used by the advisory committees during the next test development phase, in which the committee members eliminated or modified unacceptable items. The items which survived this screening were then assigned to prototype test forms (following the matrix sampling design) and were subjected to a second and final field testing. This final round of field testing was accompanied by additional reviews of the items by over 600 California teachers, who were asked to rate the various items as a final quality-control screening. All of these data were then considered by the advisory committees during the final selection of items for the Survey of Basic Skills: Grade 3.

Usefulness of the Test. The second major consideration in the test development effort was that the test results be useful to school personnel in evaluating and improving their instructional programs. It was determined that the results would be useful only if the following criteria were met:

1. The results must be reported in sufficient detail to permit identification of specific strengths and weaknesses. A single score for a content area, such as math, may be helpful in judging the overall success of a math program, but it does not indicate how the program can or should be improved.

2. The reporting categories, or skill areas, must be clearly described and must correspond to logical learning units, or strands, so that teachers can easily relate performance in a given skill area to the corresponding instructional component.

3. The test items themselves must be valid; that is, they must measure the actual skill or concept in question. The variety of potential barriers to creating valid test items is almost unending. Poorly worded directions, confusing item formats, poor test layout, uninteresting reading selections, passage independent comprehension items (items that one could answer without reading the accompanying passage), difficult vocabulary in the language and math sections, and cultural, sex, and linguistic bias are only a few of the obstacles that must be avoided. A number of analyses were conducted to be sure that the questions were "functioning" as intended.

A few of the steps that were taken to ensure the usefulness of the test findings are described below:

- The test was designed to produce the greatest amount of program-diagnostic information possible to report to districts and schools. A total of 90 reporting, or skill, areas, were designated (29 for math, 27 for reading, and 34 for written language). Most schools receive scores for each of these categories and a total score for each content area.

- The skill areas were defined so that the test would clearly reflect the impact of good instruction. For example, the area of capitalization was delineated so that each item would measure pupils' knowledge of only one capitalization convention at a time, and each of these was grouped into one of three clusters: persons, places, and days and months. Thus, there is every reason to expect that if children have been taught to capitalize the names of persons, places, and days and months, their achievement scores will reflect this.

- Care was taken to ensure that categories corresponded to logical learning units. In the area of reading, for example, "Drawing conclusions," was further divided into three subcategories: (1) "About characters"; (2) "From details"; and (3) "From overall meaning." Similarly, most of the math reporting categories included a skills component and an applications component. This breakdown was designed so that if a given school or district should discover a weakness in one of these areas, it could plan appropriate remedial efforts.

- A practice test was developed to familiarize pupils with the kinds of directions, questions, and item formats to be included on the final test.

- The vocabulary and syntax of all directions on the test were simplified as much as possible and checked for clarity in a wide variety of settings. Moreover, the directions on most of the language items were designed to be read aloud by the teacher to ensure doubly against any confounding effect from directions.

- Item formats were carefully selected to ensure congruence with the actual skill being assessed. For example, the language item formats were designed to simulate written production within the context of a multiple-choice format.

  On the spelling items, pupils are asked to write the word on their booklets and then to select the missing letters needed for a blank in the word. Again, the purpose of this format is to simulate actual production and to avoid presenting children with misspelled words.

  The math item formats in a given skill area were deliberately varied to reflect the immense variety of ways that math problems are presented in textbooks used across the state.

- A variety of readability concerns was addressed on every section of the Survey. Math and language items were carefully monitored to keep the reading difficulty as low as possible.

- A work space was provided next to each of the math questions. This formatting feature was designed to ensure that math scores would reflect math achievement and to minimize the possibility of errors related to perceptual matching or motor skills.

- Special efforts were taken to ensure that the test items would actually measure the intended learning. For example, departmental staff, teachers, and testing experts carefully checked the reading comprehension items to be sure that none could be answered without the students' reading the accompanying test passage. Those items suspected of passage independence were then excluded.

- Several steps taken to eliminate linguistic, sex, and cultural biases were directly related to the goal of ensuring that the test would measure only the intended learning outcomes. These steps included (1) a series of in-depth reviews by linguists and representatives of ethnic minorities; and (2) a scrutiny of several statistical indexes designed to facilitate identification of bias which might be introduced as a result of ethnic, sex, linguistic, or socioeconomic variables.

- The distractors were written so that pupils would have a fair opportunity to demonstrate their knowledge of skills without being misled by "tricky" alternatives.

Description of the Test

The Survey of Basic Skills: Grade 3 consists of 1,020 items covering the skill areas. The test includes 270 reading items, 390 written language items, and 360 mathematics items. Under the matrix sampling technique, each student takes only a small portion of this comprehensive test. A practice test is provided so that students can become familiar with marking requirements, directions, and item formats.

The Survey has been divided into 30 unique forms. Each student takes one form made up of 13 written language items, 12 mathematics items, and nine reading items. The content areas appear in this order in every test booklet. Each test form contains items from all major skill areas, and a balance is maintained between easy and difficult items.

The language questions appear first in the test booklets since the directions for most of them are administered orally. Students work on their own on the remaining test items. Space for working the mathematics problems is provided adjacent to the math items in the test booklets. Each form includes only one reading passage, and all of the reading questions are derived from this selection. In this way, students are never asked to deal with reading skills apart from the context of a passage.

The National Norm Dilemma

Since 1962, the first year of statewide testing in California, all tests adopted for use had been commercially published instruments with "national" norms. The new tests described in this report were constructed specifically for use in California schools. The decision to develop tests rather than use commercial "off-the-shelf" tests with national norms was not made

casually. Comparisons to national averages are not only interesting but are also useful as a basis for judging the overall relative effectiveness of California's instructional programs. Furthermore, California law (Education Code sections 60663 and 60640) requires that such information be made available.

A real dilemma, one with both philosophical and technical aspects, faces anyone who would measure the basic skills of California students; to choose a test which has national norms but fails to address all the skills taught in California schools, or to develop a relevant test which does not allow easy and immediate national comparisons. Assessment programs in other states are about equally divided between these two approaches. After 11 years of using tests with national norms but less than satisfactory coverage of the skills being taught in California schools and after observing the difficulties faced by other states in interpreting the results from their own tests without national norms, the course to be followed was obvious: develop a test which fits the instructional programs of most California schools and then find a way to compare those results to national norms.

A plan which could accomplish this (allow one to have one's cake and eat it too) had to overcome two main problems with the national norms associated with published standardized tests:

1. No single test is given to all students in the country. Of necessity, a publisher's norm is, therefore, only an estimate of what the distribution of scores would be like if, in fact, the test had been taken by all students in the United States. For this reason, norms vary from publisher to publisher, sometimes in the extreme. In California's own recent history, the Stanford Reading Test was administered to all second grade students in the 1969-70 school year, and the median California student scored at the 38th percentile of that publisher's norms. In the following year the Cooperative Primary Reading Test was administered to all second grade students. The median California student scored at the 50th percentile of that publisher's norms. The different result was clearly a reflection more of the difference in norms than of the difference in reading achievement.

2. A second problem with norms is that they are not updated very often. For instance, the Cooperative Primary Reading Test was normed during the 1965-66 school year. As a result, when those norms are referred to, it must be clearly understood that the comparisons being made are to the publisher's estimate of what scores on that test would have been if administered to all students in the country at that time. If reading scores for the nation had dropped continuously since 1965-66, an "average" score for California students might, in fact, reflect achievement far above current nationwide averages.

The resulting plan is straightforward and efficient. It involves the equating of the California tests to standardized tests with national norms and updating those comparisons as new norms or new tests become available. The equating process requires that a sample of students take both the

California test and one of the other tests. The effect of the statistical analyses following the testing is to show how California students would have scored if they had all taken the standardized test. Following recent refinements to the equating procedures, a study now has to be conducted only once, but the annual progress on the California test can be translated into the appropriate national percentile ranks -- against the year in which the publisher's test was normed, of course, not against the national performance for that year. The latter would be most useful information, but it is simply not obtainable.

This solution has several advantages: (1) the national comparisons are more timely since they can be updated as new norms become available; (2) the estimates are more stable since they do not depend on the representativeness of a single publisher's sample; and (3) it allows California schools to be assessed with a test which fits the objectives of the instructional program, and simultaneously, with almost no additional testing, allows that performance to be compared to national norms.

Essential Information About the Numbers Used in This Report

The Percent Correct Score. A statistic used in this report to indicate the achievement levels of California students is the "average percent correct score." For a given set of test questions, this number is the percentage of correct test responses, with one response being equal to the answer of one student to one question, and the total number of responses being equal to the number of students multiplied by the number of items on the test. For example, if three students took a test with ten questions and if each of the three answered five of the ten questions correctly, the total number of responses would be 30, the total number correct would be 15, and the average percent correct score would be 50. It can also be said that the average student answered 50 percent of the questions correctly; or that, on the average, 50 percent of the questions were answered correctly.

The average percent correct score and the simultaneous presentation of illustrative test questions or excercises are designed to add to the clarity and usefulness of the findings. It should be easier, as a result, to see what California students are able to do. Unfortunately, this method is so new in educational evaluation and assessment that guidelines and rule-of-thumb benchmarks are not available. Each reader will have to evaluate the adequacy of the results. The emphasis is on establishing realistic and necessary levels of actual competence rather than on the traditional comparing of results to a national norm.

How high is high? It will be noted that most of the average percent correct scores hover around the 60s and 70s; however, some are down in the 30s, and some are up in the 90s. Two points must be kept in mind in interpreting these figures:

1. The major reason that the average scores are in the 60s and 70s, rather than the 90s, is that the aims of the instructional programs at each level in California schools go beyond the basic, minimal levels of performance expected of all students. In

reading, for example, those skills which are mastered by most students by the end of the third grade are not even tested in the sixth grade. Testing time is too valuable and the scoring and the processing too expensive to justify gathering information which does not add to what is already known about California students.

2. It should be obvious that high scores in particular skill areas do not necessarily indicate effective programs; or low scores, the opposite. Some tasks are inherently more difficult. In reading, for example, it is not considered outstanding that by the end of grade three, nearly all students can immediately recognize and read certain short words; and it is not at all disappointing that only about 67 percent can answer certain questions requiring a student to recognize cause-and-effect relationships among sentences.

Development of a New Reporting System

The Need. For many years the results of the California Assessment Program have been reported in this volume in terms of the percent of questions answered correctly. School district personnel have also received their local results in this form. Local results, of course, can also be compared to the scores of other schools and districts, using the percentile rank tables prepared annually,

Although the percent correct score has the advantages described in the preceding section and will continue to be the basis for most of the interpretations and recommendations proposed in this report, they have certain disadvantages, some of which are outline below:

1. When a new test is introduced, as in grade three this last year, the scores from the new test cannot be compared directly to those of the old test. The new test in grade three, for example, is more difficult than the old test. A simple comparison of the scores would make it appear as if all schools had declined, when in reality the average score for 1980 went up slightly. The relationship of the scores on both tests must be determined through an "equating" study. The progress of a school or district can then be followed when the scores for both tests are put on a common scale.

2. The percent correct scores do not easily facilitate comparisons across content areas (e.g., reading with math) or across grade levels. This is not really a problem at the state level, since the focus is primarily on the actual performance of students; i.e., what proportion of them can answer given types of questions correctly. School personnel, however, often wish to compare the relative performance of their students in different content areas, for example, reading performance with math performance. It can be seen that the rationale for and process of developing the tests militates against this simple comparison.

The California Assessment Program tests were expressly designed to measure the wide array of skills taught in a good instructional program rather than to make an easy test by focusing on simple skills or an extremely difficult test by covering only the complex or advanced skills. Statewide advisory committees designated the proportion of the test to be devoted to the various skill areas on the basis of their importance, rather than their relative easiness or difficulty. Therefore, there is no reason to expect a 70 percent correct score in reading to be equal to a 70 percent score in math, or a 65 percent correct on the third grade math test to equal a 65 percent correct on the sixth grade math test.

A New Scale. After three years of developmental effort, the Department of Education has developed a scaled score system for reporting the results of the California Assessment Program tests. It is introduced this year at the third grade level since it was developed in conjunction with the new Survey of Basic Skills: Grade 3.

The new scaled scores range from approximately 100 to 400. However, very few of the district-level scores go below 150 or over 350. This particular range of numbers was selected to avoid decimals, negative numbers, and confusion with percent correct scores and percentile ranks. Otherwise, the scale is quite arbitrary; that is, any particular score -- for example, a score of 320 -- has no obvious meaning that would allow an immediate judgment about a school program. Scores do not indicate the percent of questions answered correctly or the percentage of schools which score higher or lower -- although both of these pieces of information can be obtained from tables which are provided to all school districts. In fact, it is this detached, objective quality which makes these scores most valuable. They are not tied to any particular test in any particular year. They are designed to be a baseline measure which can reflect the progress of a school or a school district (or the state) over a period of years -- irrespective of changes to the test or the progress of other schools or districts. Unlike percentile ranks, which are calculated annually, this scale has the same meaning in terms of relative achievement each year. A school or district can monitor its progress without being affected by the achievement of other schools or districts.

The achievement for the average (mean) third grade pupil in California has been set to a scaled score of 250 for 1979-80. Bearing some similarity to the more familiar Consumer Price Index, the score of 250, although arbitrary, becomes a useful point of reference for monitoring change from earlier years or changes to be noted in future years.

Since the scores for the content areas of reading, language, and mathematics are all on the same scale, it is possible to compare the performance of a school in reading to its performance in math without making any translation into normative scores, such as percentile ranks.

Furthermore, in comparison to other scores, the units on the scale (100 to 400) represent more nearly equal intervals. The differences between different percentile rank points, for example, are particularly uneven;

the distance between a school at the 50th percentile and one at the 55th percentile is very small in comparison to the distance between a school at the 90th percentile and one at the 95th. These uneven intervals make it very difficult to compare the progress of a school at the 50th percentile with one at the 90th. Such comparisons are greatly facilitated by scaled scores.

In summary, the new scaled scores introduced in grade three have the following characteristics and features:*

- Scaled scores range from approximately 100 to 400, with the statewide average student achievement in 1980 set at 250.
- Scores can be compared over years, independent of test changes or amount of statewide progress.
- Scores can be compared among content areas.
- More equal intervals allow better assessment of the progress of high and low scoring schools and school districts.

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* A number of statistically subtle, and in some ways more important, advantages accrue from the use of this scaling system -- advantages which relate to the validity and reliability of the test results. Technical reports explaining these characteristics of scaled scores are in preparation.

III. Reading Achievement for Grades Three, Six, and Twelve

Synopsis of Findings

California's third and sixth grade pupils continued to show improvement in reading achievement from 1978-79 to 1979-80 and continued to score above the national average. Twelfth grade students, scoring below national norms, declined for a fourth consecutive year.

Over the past 13 years, reading achievement test scores in grade three have shown slow but steady improvement. Third grade scores increased two scaled scores from 1978-79 to 1979-80, an increase which translated into a gain of 1 percentile point on national norms. The median third grade pupil now ranks at the 58th percentile, 8 percentile points above the national average.

Sixth grade reading scores also showed an increase (0.7 percent correct) from 1978-79 to 1979-80, a change which translated into a gain of 1 percentile point on national norms. The median twelfth grade pupil is scoring at the 41st percentile--9 percentile points below the national average.

Skill Area Strengths and Weaknesses

The members of the Reading Assessment Advisory Committee reviewed the statewide reading results, as they do every year, to check the progress and identify strengths and weaknesses in the reading achievement of California students. While the following presentation of skill area strengths and weaknesses is based upon the committee's judgments, the Department of Education accepts full responsibility for the conclusions in this report.

The members of the committee discerned recurring patterns of strengths and weaknesses in the reading achievement results at each of the grade levels tested, (three, six, and twelve). Their judgments for each of these grades are consolidated in the following summary of areas of special need.

Areas of Special Need

Use of context

Grade 3 - Example 7
Grade 6 - Example 21

Recognizing word meanings

Grade 6 - Example 20
Grade 12 - Examples 27-29

Close, careful reading for details

Grade 3 - Examples 8 and 12
Grade 6 - no example shown but problem exists at 6th grade
Grade 12 - Example 32

Putting sentences and sentence parts together

Grade 3 - Example 10
Grade 6 - Examples 21 and 23
Grade 12 - Examples 31 and 32

Drawing inferences from details

Grade 3 - Example 18
Grade 6 - Example 26
Grade 12 - Examples 34 and 35

The members of the Reading Assessment Advisory Committee offered the following broad instructional recommendations for the three grade levels after reviewing the statewide reading results.

Recommendations for Grade Three

The committee recommended that primary students receive increased experience and instructional assistance in the following:

1. Comprehending, manipulating, and paraphrasing sentences to increase students' understanding of how sentences and sentence parts fit together (with special emphasis on connecting words, such as conjunctions and pronouns).

2. Drawing inferences of all kinds from a variety of classroom reading materials, including such skills as getting the main idea, sensing cause and effect relationships, making judgments, and applying information to new situations.

Recommendations for Grade Six

After reviewing the statewide pattern of strengths and weaknesses within the sixth grade reading results, members of the Reading Assessment Advisory Committee recommended that intermediate students receive increased instructional assistance in the following:

1. Word study and vocabulary development (including word-forming skills involving the spelling, meaning, and use of words based upon roots, prefixes, and suffixes)

2. Location of an idea within one or more sentence structures (including the relationship between an appositive and its referent--and the relationship between a pronoun and its referent)

3. Inferential and critical comprehension (including inferring, interpreting, and evaluating information and ideas stated in written material)

Recommendations for Grade Twelve

1. The advisory committee concluded that the continuing decline in twelfth grade reading scores, especially in contrast to this year's results in math and written expression, demonstrates the need for direct reading instruction in vocabulary and the comprehension skills in the context of every single subject area.

   All members of the committee agreed that English, science, social studies, and math teachers need to work on vocabulary and especially the higher inferential thinking skills within their disciplines.

2. Because of the continuing decline and uneven performance within the interpretive-critical comprehension skill area, members of the committee concluded that the higher reading and thinking skills are in need of special instructional emphasis.

3. In addition to emphasis on the higher inferential comprehension skills, members of the committee suggested the following instructional emphasis in response to the observable weaknesses within the twelfth grade reading achievement results.

   - Word-forming skills involving the spelling, meaning, and use of words based on roots, prefixes, and suffixes

   - Vocabulary development in all the content areas

- The multiple meanings and connotations of words
- Use of careful word choices to reveal feelings and attitudes and to create special effects
- Use of context for deciphering word meanings
- Understanding of the relationships between words within sentences and paragraphs (such as relating a pronoun to its referent and relating a prepositional phrase to the word it modifies)

4. The committee members recommended wide reading as one very effective method for helping students to increase their vocabulary and improve their comprehension skills. In addition, they recommended the sustained discussion of reading materials as a productive teaching strategy. Such discussions focusing on the details of word, sentences and paragraph meaning are helpful in the development of both vocabulary and comprehension skills. The committee reiterated that all of the various vocabulary and comprehension skills should be taught within the context of all the content areas at the secondary level.

After reviewing the data on television watching, homework, and outside reading, (see Chapter VI), members of the Reading Assessment Advisory Committee offered the following recommendations for administrators and other instructional leaders at all grade levels.

1. Administrators and instructional leaders need to promote staff development activities which will stimulate the teaching of comprehension and thinking skills in all disciplines across the curriculum. This should include instruction in specialized content area vocabularies and higher level thinking skills, such as interpreting deeper meanings, detecting the author's purpose, analyzing characters, identifying cause and effect relationships, predicting consequences, testing hypotheses, and evaluating outcomes.

2. Districts should review their homework policies and practices to ensure that routine homework assignments reinforce classroom instruction, provide opportunities for success on assigned tasks, and include pleasure reading at home.

3. Programs should be established which will involve parents in promoting pleasure reading in the home.

Reading Results for Grade Three

Test Scope

The reading section of the Survey of Basic Skills: Grade 3 consists of 270 reading questions. The questions were developed to measure third grade students' achievement of a comprehensive array of objectives compiled by the Reading Assessment Advisory Committee and published in Survey of Basic Skills: Grade 3--Rationale and Content (Sacramento: California State Department of Education, 1980). The reading questions assess four major content areas: word identification, vocabulary, comprehension, and study-locational skills. The relative degree of emphasis assigned to each of the reading skill areas in the Survey is presented graphically in Figure 1. See Chapter II for information about the rationale and test development process underlying the new third grade test.

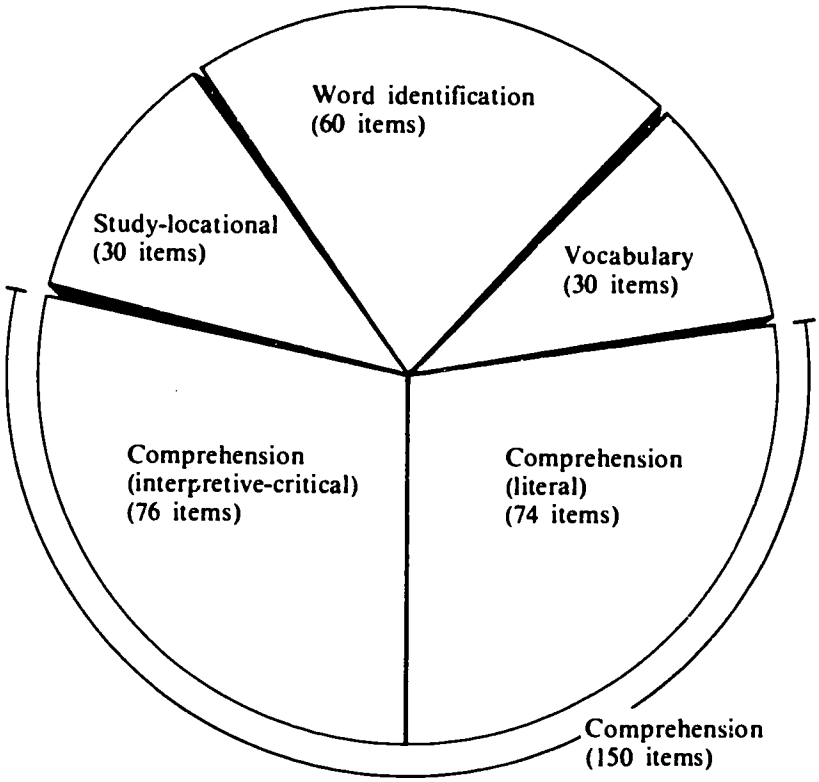


Fig. 1. Number of questions, by skill area, in the reading portion of the *Survey of Basic Skills: Grade 3*

Reading Results for Grade Three

The results of third grade reading achievement for 1979-80 are shown in Table 2.

Table 2

Reading Scores of California Third Grade Students on the Survey of Basic Skills: Grade 3, 1979-80

Skill area	Number of questions	Average Percent Correct
READING, TOTAL	270	70.0
Word identification	60	76.5
Phonics	30	78.8
Vowels	15	77.6
Consonants	15	80.1
Structural Analysis	30	74.2
Prefixes, suffixes, roots	18	69.0
Contractions and compounds	12	82.1
Vocabulary	30	62.5
Recognizing word meanings	16	68.5
Using context	14	55.7
Comprehension	150	65.7
Literal	74	65.2
Details	37	63.4
--single sentence	20	63.7
--2 or 3 sentences	17	63.1
Pronoun references	18	70.9
Sequence	19	63.2
Inferential	76	66.3
Main idea	19	69.5
Cause and effect	20	66.8
Drawing conclusions	37	64.3
--about characters	15	70.5
--from details	12	56.5
--from overall meaning	10	64.4
Study locational	30	85.9
Alphabetizing	15	82.2
Table of contents	15	89.5

Analysis and Interpretation of Skill Area Results, Grade Three

Members of the Reading Assessment Advisory Committee analyzed, interpreted, and evaluated the 1979-80 reading results. In this process they weighed such factors as the inherent difficulty of the skills and the particular items used to assess each skill. The substance of their analysis is presented on the following pages with skill area descriptions and illustrative test questions in the left column and committee observations and judgments in the right column. Guided by an understanding of the kinds of errors students are making, the committee members concluded their analysis with recommendations for instruction.

Skill area descriptions and illustrative questions	Committee's observations and judgments
I. WORD IDENTIFICATION The student will use phonics skills to identify vowel and consonant sounds and structural analysis skills to identify prefixes, roots, suffixes, and the words making up contractions and compound words.	The advisory committee observed that the scores for almost all word identification skill areas were considerably higher than the total mean score (70.0) on the reading test. See Table 2, page 22. The only exception to this pattern was the area of prefixes, suffixes, and roots, which showed an average score of 69.0. Members of the committee concluded that third graders appear to be approaching mastery on many of the simple word identification skills tested on the Survey, and were, therefore, pleased with the results in this area.
A. Phonics The student will identify a word which rhymes with a word used and underlined in a passage or will identify a word which contains the same tested vowel or consonant sound as a word used and underlined in a test passage.	The phonics questions assessed 15 different consonant sounds and 15 vowel sounds. The scores on the phonics items were uniformly high, ranging from 61 to 88 and averaging 78.8. The vowel items tended to be slightly more difficult than the consonant items. Example 1, a typical phonics item, illustrates the average score for this skill area.
Example 1 Mark the word that **rhymes** with Main. 6 ○ pan 79 ● pane 6 ○ pin 9 ○ pine	

Skill area descriptions and illustrative questions	Committee's observations and judgments
B. Structural analysis The student must identify meanings of prefixes, suffixes, and roots, and the words making up contractions and compound words. 1. Prefixes, suffixes, and roots. The student will identify (1) the way in which a suffix or prefix alters the meaning of a base word; (2) the root or base form of a tested regular verb (for example, hurried-hurry); and (3) the semantic association between an irregular past tense of a verb and its infinitive (for example, taught-teach). Example 2 The root (or base) of the word moving is 5 ○ more. 4 ○ make. 5 ○ moon. 86 ● move. Example 3 In the word unusual, the un makes the word mean 34 ○ usually. 18 ○ very usual. 42 ● not usual. 6 too usual.	Members of the committee were generally satisfied with the achievement levels on the 30 structural analysis questions, which showed an average score of 74.2 percent correct. The advisory committee observed that the prefix, suffix, and root questions showed the lowest score (69.0) of all the word identification skill areas. Scores within this category varied considerably from item to item. Examples 2 and 3 illustrate both a high and a low item within this area. Members of the committee were generally satisfied with these results.

Skill area descriptions and illustrative questions	Committee's observations and judgments
2. Contractions and compound words The student will identify the words which make up a contraction or compound word, both of which are used and underlined in a passage.	Scores for both the contractions and compound word items were uniformly high, showing an average score of 82.1 percent correct. Examples 4 and 5 illustrate typical questions and scores within this category. Members of the committee were quite satisfied with the results in this area.

Example 4

The word won't means the same as

10 ○ could not.
5 ○ will to.
77 ● will not.
8 ○ do not.

Example 5

The two words in farmhouse are

5 ○ far + mhouse.
4 ○ farmho + use.
88 ● farm + house.
3 ○ f + armhouse.

Skill area descriptions and illustrative questions	Committee's observations and judgments
II. VOCABULARY	Committee members were generally satisfied with the scores on those items which required students to recognize word meanings. They expressed concern, however, over the weak performance registered on questions requiring students to use the context of the passage to select the meaning of a word.
A. Recognizing word meanings The student will identify the definitions, synonyms, and antonyms of words which are used and underlined in a passage.	Sixteen questions required students to identify the meaning of a word used in a passage. The average score for this skill area was 68.5 percent correct. Example 6 is illustrative of this domain. Members of the committee concluded that scores on the word meaning questions were consistent with their expectations of third grade vocabulary performance.
Example 6 In this story, expensive means 70 ● costs a lot. 14 ○ costs very little. 10 ○ hard to find. 6 ○ hard to use.	
B. Using context The student will use the context of a passage to identify the meaning of a multiple-meaning word which is used and underlined in a passage.	Of all the reading skill areas tested on the Survey, questions requiring students to use the context of the passage to determine word meanings registered the lowest mean score (55.7 percent correct). Each of the questions involved a common word, such as "spring," "down," or "freeze," with more than one meaning, and the task was to determine the meaning of the test word by examining

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 7

Some people think the possum is the most stupid animal on earth. But Old Slowpoke is a peaceable little creature and minds his own affairs. He looks something like a woolly pig with grayish fur and small, naked ears.

Old Slowpoke does not hurry on his nightly prowl. Danger surrounds him, for he has many enemies. Eagles, hawks, and large cats seek his flesh. Men with dogs hunt him for his fur. Nature has given sharp claws to some animals, while others have speed as a means of protecting themselves. What protection does the possum have?

When a pack of hounds attacks him, the possum freezes in his tracks. He bares his teeth in order to protect his throat. The dogs chew and shake him. At this point, the possum falls to the ground and curls into a dead-looking heap. The dogs sniff and leave. Long afterward, the possum may get up and walk away. He is the only animal that protects himself by playing dead.

In this story, freezes means

24 ○ turns into ice.
19 ○ becomes cold.
9 ○ kills with frost.
48 ● stops moving.

it in relationship to the surrounding passage. Members of the committee were quite concerned by the low scores on these questions. In Example 7, for instance, the test word "freezes" was underlined in the first sentence of the third paragraph: "When a pack of hounds attacks him, the possum freezes in his tracks." However, only 48 percent of the students selected "stops moving" as the correct response, and over half of the students selected one of the other answers involving "cold," "ice," or "frost." Such errors probably would not have occurred if students had read just the one sentence containing the underlined test word "freezes." On the basis of this item and many others like it, members of the committee concluded that more instruction is needed to help children use context to put together the total meaning of words, sentences, and paragraphs.

Skill area descriptions and illustrative questions	Committee's observations and judgments
III. COMPREHENSION The student will identify explicit information within a passage including details, pronoun references, and sequential elements,and will infer main ideas, cause and effect relationships, and a variety of other conclusions implied by written material.	Members of the committee observed that on almost all of the word identification and study-locational skill areas, third graders were scoring above the average for the total reading test. However, on most of those skill areas which tested students' ability to determine literal or implied meaning (such as the prefix, suffix, and root items; vocabulary; and most of the comprehension domains), skill area averages were below the total reading score. They concluded from this pattern that third graders seem to be able to handle many of the mechanics of reading but that when it comes to putting the elements together to determine the total intended meaning, many students encounter difficulty. The committee recommended more of a focus upon comprehension, through discussions of what has been read and thoughtful questioning to help children learn to draw literal and deeper meanings from their reading.
A. Literal comprehension The student will identify explicit information stated within a passage including details, pronoun references, and sequential elements.	The average score for the literal comprehension questions (65.2 percent correct) was lower than that for the inferential items (66.3 percent correct). Members of the committee were able to understand this unexpected outcome when they observed that children often encountered as much difficulty on some of the very literal questions requiring close, careful reading as they did on many of the general inference questions.

Skill area descriptions and illustrative questions	Committee's observations and judgments
1. Details The student will identify the verbatim answer to a question which is derived entirely from one, two, or three sentences within a passage. Example 8 You cannot see thunder, but you can hear it. It has the sound of an explosion, like a shot from a gun. Many people are afraid of thunder. But thunder cannot hurt you. It is only air rushing away from the heat of lightning that makes the noise. Thunder has different sounds. Sometimes, it roars. Sometimes, it claps. Sometimes, it crashes. Thunder and lightning always go together. It is the lightning that causes thunder. But light moves faster than sound, so you see lightning before you hear thunder. Next time you see lightning, start to count slowly. If you count to five before you hear the thunder, you know the lightning was about one mile away. If you count as far as ten, you know the lightning was about two miles away. The story tells you that light moves faster than 29 ○ air. 11 ○ heat. 51 ● sound. 9 ○ miles.	Twenty of the 37 detail items were based upon a single sentence, whereas 17 of the questions required students to put together explicit information from two or three sentences. Scores on the detail questions fluctuated considerably, depending apparently upon many factors, such as difficulty of the passage and the visibility of the key sentence containing the critical information. The committee members observed that scores were often low on questions requiring very close reading. For example, 51 percent of the students selected the correct answer in Example 8. Members of the committee noted that this is a good example of an item on which close reading should yield an explicit answer to the question. However, almost half of the third graders experienced difficulty with this kind of reading task.

Skill area descriptions and illustrative questions	Committee's observations and judgments
Examples 9 and 10	Members of the committee also observed that children experienced greater difficulty on literal items requiring them to put together two or three sentences than on items based upon a single sentence. Examples 9 and 10 were derived from the same passage; however, Example 9 was derived from only one sentence (the first sentence in the second paragraph), and Example 10 was derived from two sentences (the first two sentences of the first paragraph). Predictably, students registered a higher score on Example 9 than on Example 10. Members of the committee concluded that children need focused comprehension instruction which will help them learn to put sentence parts, sentences, and paragraphs together in the process of determining total meaning.

Carlos and Sam were walking home from school. All at once someone shouted, "Help! Fire!"

They saw smoke coming from the house next to Sam's house. Just as they stepped on the porch, a big red fire engine came clanging down the street.

Sam's mother came rushing out of the door. "Sam! Carlos!" she said. "We'll have to get out of the house. Our house could catch fire, and I can't find your sister anywhere. Help me!"

Sam and Carlos looked all over the house. Nobody could find her. The boys rushed out to the back yard. At last Carlos saw a little red shoe behind a tree. There was Sam's little sister fast asleep. Carlos grabbed her and they all ran to safety.

Where was the smoke coming from?

19 ○ Sam's house
3 ○ the fire engine
73 ● the house next to Sam's
5 ○ the house on the other side of the street

What were Carlos and Sam doing when someone shouted, "Help! Fire!"?

23 ○ stepping on the porch
10 ○ rushing out to the back yard
58 ● walking home from school
9 ○ looking all over the house

Skill area descriptions and illustrative questions	Committee's observations and judgments
2. Pronoun references The student will answer a question which involves identifying the antecedent of a pronoun. Example 11 Sleeky and his mate found their way to Miller's Pond one fall day. It was a cold day and very, very clear. The sun shone on the bright fall leaves. It made the water look silver. Both otters were swimming down the stream that ran into Miller's Pond. As they swam, their dark brown heads broke through the bright water. They were swimming slowly. Often they played and splashed in the water. But all at once they saw the pond. Then they started to swim as fast as they could. When they saw there was a mudbank, they began to chatter. They sounded very happy. They climbed out of the water and bounded to the highest place on the bank. Whoosh! They slid down the mudbank, barking and wiggling with excitement. What a wonderful place to spend the day! What made the water look silver? 73● the sun 14○ the cold day 8○ the mudbank 5○ the otters	Of all the literal comprehension skill areas, the 18 pronoun reference questions registered the highest average score (70.9 percent correct). The scores on these items fell between 60 and 85, with half of the items having scores between 71 and 75 percent correct. Example 11 is a typical pronoun reference item and illustrative of the average score in this area. As members of the committee have noted in previous years, a substantial proportion of children would probably benefit from specific instruction and practice in the skill of connecting pronouns and the words to which they refer.

Skill area descriptions and illustrative questions	Committee's observations and judgments

3. Sequence

The student will answer a question which involves identifying the sequence of events, facts, or other elements in a passage.

Example 12

The littlest pine tree in the woods was unhappy because it wanted golden leaves instead of needles. "That would make me the most beautiful tree in the forest," it kept saying.

One night, the wood fairy granted its wish. "Now I shall always be happy," cried the little tree. But the next day, a man came along and picked them all off.

"How foolish," said the tree. "Glass leaves would be as pretty but no one would pick them." In the morning, the tree's wish had been granted again. Then a wind storm came and broke all the glass leaves.

The little tree cried, "I shouldn't have wished to be better than the other trees. I would be so happy to have green leaves."

The next morning, the little tree awoke covered with green leaves. What a happy morning! But a goat came and ate all the leaves off.

"How foolish I have been," sobbed the little tree. "Needles are best after all. I wish I could have them back again."

The next morning, the little tree had its own long green needles and it never wished for leaves of any kind again.

What was the **last** thing the tree wished for?

6 ○ glass leaves
59 ● needles
9 ○ golden leaves
26 ○ green leaves

Like the detail questions, many sequence items involved close, careful reading and perhaps rereading of a passage in order for students to identify the order of a particular event or other element in a given test passage. On the sequence questions students registered an average score (63.2 percent correct) which was quite similar to that for the literal detail category (63.4 percent correct). Example 12 is a typical sequence question. The large proportion of students selecting the fourth option (26 percent) suggests that many students who missed the item may have failed to do the careful reading required by the question. As members of the committee have observed previously, when items require close, attentive reading, scores tend to drop.

Skill area descriptions and illustrative questions	Committee's observations and judgments
B. Inferential comprehension The student will identify main ideas, infer cause and effect relationships, and draw conclusions from details, from overall meaning and about characters.	The inferential comprehension skill area showed an average score (66.3 percent correct) which was higher than that for literal comprehension (65.2 percent correct). The inferential skill area with the highest score was drawing conclusions about characters (70.5 percent correct), while that with the lowest score was drawing conclusions from details (56.5 percent correct). Committee members concluded that a great deal of attention needs to be devoted to developing the comprehension and deeper thinking skills in children.
1. Main ideas The student will identify the primary topic of a sentence. Example 13 The coast redwoods of California are the tallest trees in the world. When the world's climate was much warmer, there were redwoods in many parts of the world. Now they are found only in northern California and southern Oregon. Very few coast redwoods grow from seed. Usually new trees sprout from old trees or stumps. A "fairy ring" is a circle of trees that has sprouted from the same stump. Redwood trees have few natural enemies. Their average age is 1,500 years. Their thick bark helps to protect them from insects and disease. It also helps to protect them from forest fires. The Indians, and then the Spaniards, who lived in California, had many uses for redwoods. But after the discovery of gold, people came from all over the country. They built many homes of redwood. Whole forests were cut down with no thought of replanting the trees. In a short time, only fields of stumps were left in many places.	The 19 main idea questions required students to weigh various elements within a passage and identify the one representing the primary topic of a passage, as illustrative by Example 13. The main idea category had one of the highest average scores of all the comprehension skill areas (69.5 percent correct). Scores varied considerably from item to item on the main idea questions. Examples 13 and 14 illustrate both a high and a low score, respectively. Members of the committee observed that the score on the second question probably illustrates the error of jumping to conclusions from a cue in an early sentence and the failure to put together the meaning of the entire passage. Committee members noted that children need comprehension instruction which will help them understand and synthesize what they read.

Skill area descriptions and illustrative questions	Committee's observations and judgments

Today many people are trying to save the remaining redwood forests. It is a long and expensive fight to save those California giants for the future.

This story is mostly about

79 ● California coast redwoods.
9 ○ fairy rings around stumps.
6 ○ early Indians and Spaniards.
6 ○ California Gold Rush days.

Example 14

During the 1849 Gold Rush, many people went to California to look for gold. One brave group had a very difficult trip. The leader of the group was William Manly. He had met a man with a new map. It showed a shorter way to go.

The group decided to try it. Soon they came to a lonely valley with high mountain walls around it. Not a blade of grass or a drop of water could be seen. Everyone was hungry and thirsty. They went slower and slower..

Their food was almost gone so they ate the oxen. What could they do next? Manly and another man decided to go for help. The rest stayed near a little spring they had found.

At last Manly found help at a ssion in sourthern California. He and the man started back with food. They were surprised to find the others still alive.

As they left that camping place, the people said, Good-by, Death Valley." And the place has had that name to this day.

This story is mostly about

9 ○ high mountain walls.
37 ● a difficult trip.
46 ○ looking for gold.
8 ○ a little spring.

Skill area descriptions and illustrative questions	Committee's observations and judgments
2. Cause and effect The student will associate a cause with an effect. Example 15	The average score on the 20 cause and effect questions was 66.8 percent correct, with most items showing scores between 60 and 80 percent correct. Example 15 is illustrative of a typical cause and effect item. Members of the committee were pleased that third graders performed as well as they did in this important skill area. They concluded that comprehension and thinking skills need to be fostered in all content areas. Drawing cause and effect relationships is, of course, a good example of a comprehension and thinking skill which cuts across all disciplines.

Today, many farmers are glad that George Washington Carver, a famous black American, liked farming. Thanks to Mr. Carver, they grow good crops.

Once, Southern farmers planted only cotton. But George Washington Carver told them, "Plant peanuts. They will make your soil rich. Your other crops will grow better."

The farmers listened to him. They planted peanuts. Then they came to him again. Where could they sell thousands of peanuts?

Once again, George Washington Carver helped them. He invented hundreds of ways for using peanuts. Some things that could be made from peanuts were peanut butter and candy. Soap, oil, paint, ink, and many other things could be made from peanuts, too.

Today, the work of George Washington Carver is known all over the world.

Why did Mr. Carver say, "Your other crops will grow better"?

- 15 ○ to sell thousands of peanuts
- 62 ● because planting peanuts would make the soil rich
- 12 ○ to make peanut butter and candy
- 11 ○ because planting cotton made the soil rich

Skill area descriptions and illustrative questions	Committee's observations and judgments
3. Drawing conclusions a. About characters b. From details c. From overall meaning	Thirty-seven inferential questions required students to draw conclusions (1) about characters; (2) from details; and (3) from overall meaning. Members of the committee observed that students were typically more successful on questions involving large elements, such as characters, overall meaning, and main ideas, than on those requiring them to read closely, find details, and draw inferences from details. Examples 16 and 17 illustrate the typically strong scores associated with items requiring students to draw conclusions about characters (Example 16) and to draw conclusions about overall meaning (Example 17).

Example 16

"Good morning, Mr. Fox," said the cat. "Don't you find it hard to get enough to eat these days?"

"No, indeed," said the fox. "I am so very clever that I can always find plenty of food."

"How?" asked the cat. "I haven't been able to catch even one mouse for two days."

The fox looked down his nose at the cat and said, "Why don't you learn a few useful tricks?"

"Oh," said the cat, "I only know one trick. When dogs chase me I can climb a tree and save myself."

The fox laughed. "That simple trick is the only one you know? I feel sorry for you. I know a hundred tricks."

Just then a hunter came along with four dogs. The cat quickly ran up a tree and cried to the fox, "Use some of your hundred tricks and save yourself."

But the dogs had already caught the fox.

"Oh, Mr. Fox," said the cat. "Your hundred tricks are useless. But my simple trick would have saved you."

You can tell from the story that

7 ○ the cat was very heavy.
74 ● the fox wasn't as smart as he thought.
11 ○ the dogs were smarter than the cat.
8 ○ the fox was very thin.

Skill area descriptions and illustrative questions

Committee's observations and judgments

Example 17

A lesson to be learned from this story is:

16 ○ Dogs and cats can be friends.
10 ○ It is better to have one hundred tricks than one funny one.
8 ○ A cat shouldn't look down its nose.
66 ● It is better to have one good trick than many useless ones.

Example 18

During the 1849 Gold Rush, many people went to California to look for gold. One brave group had a very difficult trip. The leader of the group was William Manly. He had met a man with a new map. It showed a shorter way to go.

The group decided to try it. Soon they came to a lonely valley with high mountain walls around it. Not a blade of grass or a drop of water could be seen. Everyone was hungry and thirsty. They went slower and slower.

Their food was almost gone so they ate the oxen. What could they do next? Manly and another man decided to go for help. The rest stayed near a little spring they had found.

At last Manly found help at a mission in sourthern California. He and the man started back with food. They were surprised to find the others still alive.

As they left that camping place, the people said, Good-by, Death Valley." And the place has had that name to this day.

If you were to visit the group's camping place today, you

22 ○ would discover much gold.
48 ● would be in Death Valley.
14 ○ would be at a mission.
16 ○ could talk to William Manly.

On the other hand, Example 18 illustrates the greater difficulty encountered by students on items requiring them to draw an inference from a detail. This difficulty occurred again and again on these items, which registered an average score of 56.5 percent correct and clustered between 45 and 65 percent correct.

Attitudes Toward Reading

Always of paramount importance to the members of the Reading Assessment Advisory Committee has been the goal of nurturing children's positive attitudes toward reading as a foundation for establishing lifelong habits of reading for information and pleasure. Members of the committee were, therefore, very pleased that baseline data on reading attitudes was collected in 1979-80 by the California Assessment Program.

At the end of each Survey of Basic Skills: Grade 3 test booklet, students were asked the following question:

How much do you like to read?

- Very much
- A little
- Not at all

The data resulting from this survey are shown in Table 3.

Table 3

Percent of Third Grade Students and Their Reading Scores by Attitude Toward Reading

How much do you like to read?	Percent of Students	Percent correct score
Very much	63.5	73.4
A little	30.1	68.1
Not at all	4.6	51.1
Non-respondents	1.8	36.2

As the data in Table 3 reveal, almost two-thirds of the students reported liking to read "very much," and this group achieved the highest reading score (73.4 percent correct). Only 5 percent reported not liking to read at all, and this small proportion achieved the lowest average score (51.1 percent correct), other than the non-respondents. The other remaining 30 percent reported that they liked to read "a little" and they scored in between the other two groups with 68.1 percent correct. Members of the committee were pleased to see that so many students reported favorable attitudes toward reading. They recommended that to maintain and further stimulate positive attitudes toward reading, instructional leaders

should work to assure that reading aloud to children be a strong component in school programs; and that programs be designed to stimulate pleasure reading with student-selected books in school and at home, encouraging parental involvement in this process as well.

Summary of Committee's Analysis

The members of the Reading Assessment Advisory Committee were generally pleased and encouraged by the scores on most of the reading skill areas on the new Survey of Basic Skills: Grade 3. The pattern of strengths and weaknesses discerned by the committee is displayed below.

Area of strength	Area in need of improvement
Word identification (Examples 1-5)	Use of context (Example 7)
Pronoun references (Example 11)	Close, careful reading such as on some detail and sequence questions (Examples 8 and 12)
Main ideas (Example 13)	
Drawing conclusions about characters (Example 16)	Drawing conclusions from details (Example 18)

After examining the kinds of errors that students are making, the committee recommended that students receive increased experience and instructional assistance in comprehension, especially in the following:

1. Comprehending, manipulating, and paraphrasing sentences to increase students' understanding of how sentences and sentence parts fit together (with special emphasis on connecting words, such as conjunctions and pronouns).

2. Drawing inferences of all kinds (including getting the main idea, sensing cause and effect relationships, making judgments, and applying information to new situations) from a broad variety of reading materials.

After reviewing the data on student attitudes toward reading, the committee offered the following recommendations.

3. Instructional programs for elementary children should include a strong component in reading aloud to children.

4. Programs should stimulate reading for enjoyment in school and at home with student-selected books, and should encourage parent involvement and support in this process, as well.

Reading Results for Grade Six

Test Scope

The reading section of the Survey of Basic Skills: Grade 6 consists of 128 questions. The items were selected to assess the students' attainment of a wide variety of objectives discussed broadly in Framework in Reading for the Elementary and Secondary Schools of California (Sacramento: California State Department of Education, 1973) and specified, with the help of the Reading Assessment Advisory Committee, in Test Content Specifications for California State Reading Tests (Sacramento: California State Department of Education, 1975). Both the objectives and the questions used to assess them fall into one of five major skill areas: word identification, vocabulary, literal comprehension, interpretive-critical comprehension, and study-locational skills. The emphasis assigned to each of the reading skill areas in the Survey of Basic Skills: Grade 6 is presented graphically in Figure 2.

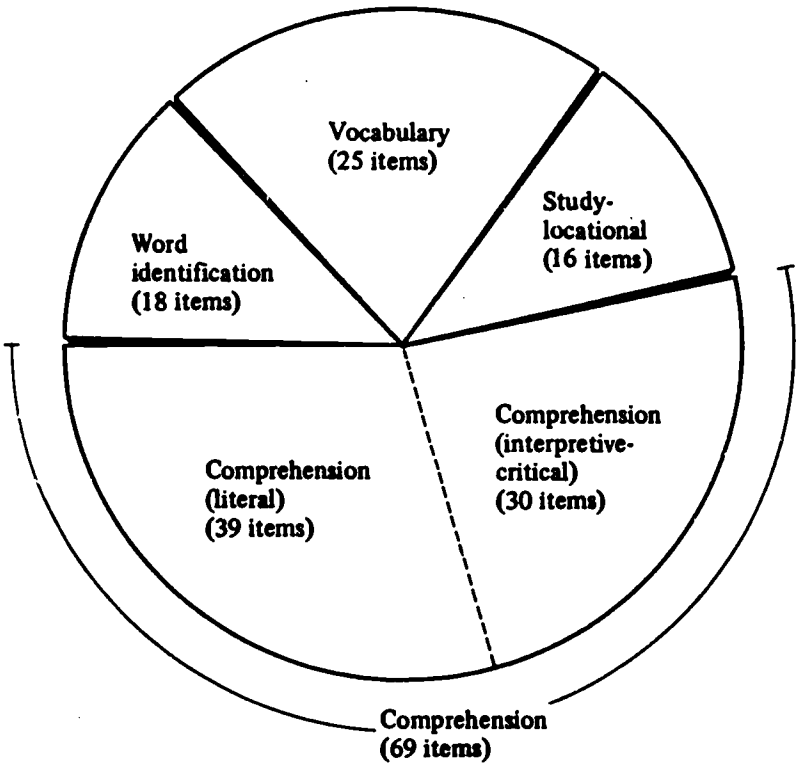


Fig. 2. Number of questions, by skill area, in the reading portion of the *Survey of Basic Skills: Grade 6*

Reading Results for Grade Six

The results of sixth grade performance on the total reading test and in each of the skill areas for 1975-76 through 1979-80 are presented in Table 4. Year-to-year changes in overall performance and in skill area performance are also shown in the table.

Table 4

Reading Scores of California Sixth Grade Students on the Survey of Basic Skills: Grade 6

Skill area	Number of Questions	Average percent correct					Change			
		1975-76	1976-77	1977-78	1978-79	1979-80	1975-76 to 1976-77	1976-77 to 1977-78	1977-78 to 1978-79	1978-79 to 1979-80
READING, TOTAL	128	66.1	65.9	66.3	66.8	67.5	-0.2	+0.4	+0.5	+0.7
Word Identification	18	74.3	74.2	74.7	75.2	76.2	-0.1	+0.5	+0.5	+1.0
Vocabulary	25	67.1	66.3	66.9	67.3	68.1	-0.8	+0.6	+0.4	+0.8
Comprehension	69	64.9	64.9	65.2	65.6	66.0	-0-	+0.3	+0.4	+0.4
Literal	39	67.4	67.2	67.5	67.9	68.3	-0.2	+0.3	+0.4	+0.4
Interpretive-critical	30	61.8	62.0	62.2	62.6	63.1	+0.2	+0.2	+0.4	+0.5
Study-locational	16	60.0	59.8	60.5	61.8	63.2	-0.2	+0.7	+1.3	+1.4

The following observations about changes in achievement are evident from an examination of the data in Table 4:

- From the spring of 1979 to the spring of 1980, sixth grade reading test scores improved by 0.7 percent correct. This was the third consecutive year sixth grade reading achievement improved, resulting in a total change of 1.4 percent correct since the spring of 1976.

- From the spring of 1979 to the spring of 1980, increases were registered in all reading skill areas, the largest of which occurred in the word identification and study-locational skills. When total changes from 1975-76 to 1979-80 are calculated, the study-locational skills area again shows the largest overall gain (3.2 percent correct).

Analysis and Interpretation of Skill Area Results, Grade Six

The members of the Reading Assessment Advisory Committee analyzed, interpreted, and evaluated the 1979-80 reading results. In this process they considered such factors as the inherent difficulty of the skills, the

particular items used to assess each skill, and changes in performance since 1975-76. The substance of their analysis is presented on the following pages with skill area descriptions and illustrative examples in the left column and committee observations in the right. Guided by an understanding of the typical errors being made by sixth graders, members of the committee concluded their analysis with instructional recommendations.

Skill area descriptions and illustrative questions	Committee's observations and judgments

I. WORD IDENTIFICATION

The student must identify correct pronunciation of words used in context, root words, the meaning of affixes, and contractions.

Example 19

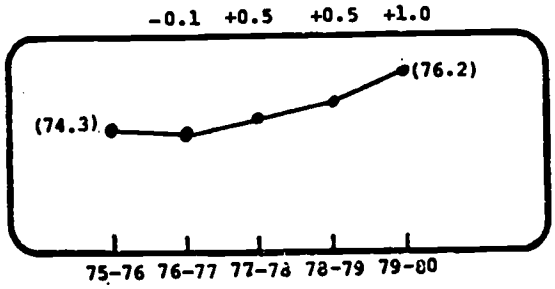
The toga was a loose outer garment worn by Roman citizens when they appeared in public. It was made of a single broad piece of undyed woolen cloth, usually cut in the shape of a semi circle. A large toga might contain from 10 to 20 square yards of cloth. The toga was draped about the body with the straight side thrown over the left shoulder. The help of a servant, and sometimes of more than one, was required to drape a large toga artfully. It was heavy and hot, and did not permit freedom of movement.

Togas were usually white in color. Some men, especially candidates for public office, had the cloth bleached to make it extra white. On festive occasions army generals and certain public officials wore red or purple togas embroidered with gold thread. A Roman boy wore a purple bordered toga until sometime between the ages of 12 and 16, when he put away the toga of childhood and put on the plain white toga of manhood.

We know from the prefix un in the word undyed that the woolen cloth was

6 ○ dyed apart.
7 ○ dyed back.
14 ○ dyed over again.
73 ● not dyed.

The 18-item word identification skill area showed an average score of 76.2 percent correct. Changes in this area from 1975-76 through 1979-80 are displayed in the graph below.



Most of the word identification questions on the Survey of Basic Skills: Grade 6 were written to measure students' knowledge of suffixes, roots, and prefixes. Members of the Reading Assessment Advisory Committee have stressed in past reports the importance of teaching these skills as key building blocks to reading comprehension. Therefore, the committee was pleased to see the improvement shown in this skill area over the last three years. However, committee members were still not satisfied with the proportions of students responding correctly on these questions. They expected, for example, nearly all of the sixth graders to recognize the meaning of the prefix un- in Example 19.

Skill area descriptions and illustrative questions	Committee's observations and judgments

The committee members concluded from the percent correct scores on questions such as this one that more emphasis is needed throughout the elementary grades on basic word-building skills (such as recognizing the meaning, use, and spelling of words with prefixes and suffixes). This judgment was corroborated by the members of the English Language Assessment Advisory Committee in their analysis of sixth grade spelling results (see Chapter IV).

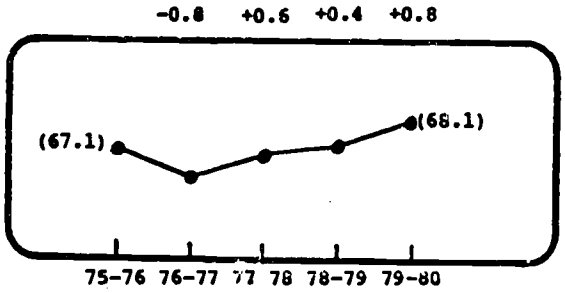
II. VOCABULARY

The student must identify the meaning of a specific word in context.

Example 20

> Let's visit the weather station on top of Mt. Washington in New Hampshire and see how weather balloons work. The peak of Mt. Washington is high above the timber line and is reached by a steep, rocky automobile road or a little cog railroad. The weather station is one of the highest in the country and is located on the most Arctic spot in the East.
>
> At Mt. Washington weathermen send up weather balloons, with radios and weather instruments fastened to them, to explore the upper air high above the clouds. Usually, men do not go up in airplanes during the storms. Their ships would be caught in the whirl and dashed to pieces. So they send up balloons. As the balloons rise higher and higher, their tiny radios click busily, sending back news of temperature, air pressure, and moisture. Sometimes the balloons sail up fifteen miles or more before they are dashed to pieces.
>
> It is of great value to airmen to have weather conditions reported from Mt. Washington. When the weather is overcast or cloudy, Mt. Washington is the only station in the Northeast that sends out news of the weather one mile above sea level. From this station reports are sent out by radio and telephone every six hours all through the day and night. The weathermen at Mt. Washington are also making a study of the sun's rays and of air currents around the mountain.

The average percent correct for vocabulary was 68.1, a score which reflects a third year of positive growth in this area as is displayed in the graph below.



The 25 vocabulary questions on the sixth grade reading test required students to identify the meanings of words as they were used in a paragraph. Members of the committee were pleased to see the improvement in average vocabulary scores over the last four years. However, they judged that performance in this area should still be higher. For example, less than 70 percent of the sixth graders demonstrated an understanding of the word "value" in (Example 20).

Skill area descriptions and illustrative questions

Committee's observations and judgments

In this story the word value means the same as.

10 ○ cost
7 ○ price
8 ○ necessity
69 ● importance
6 ○ valor

Example 21

Can bees see colors? If they can, color vision is probably useful to them. If bees can see colors, they probably find flowers more easily. Bees fly from flower to flower gathering nectar, a sweet substance used in making honey. In the process they transfer pollen from flower to flower. If it were not for the pollinating process, plants couldn't make seeds.

To find out if bees can see color, some investigators placed two squares of paper—one blue and one green—in the bottom of a cage of bees. They set a tiny dish on each square. They filled the dish on the blue square with a solution of sugar and water and left the dish on the green square empty.

At first the bees landed on both squares. But soon they were all clustered on the blue square, feeding on the sugar water. After a while the investigators emptied the dish of sugar water but left the dish in the cage. The bees still landed only on the blue square. Even when the squares were moved to different places in the cage, the bees went to the blue square.

The investigators knew, however, that many animals can't see color; they see things only in different shades of gray. Perhaps the bees could tell the squares apart because they saw green and blue as different shades of gray. The investigators replaced the green square with many gray squares, each a different shade. On each gray square they put an empty dish, on the one blue square they also put an empty dish. As before the bees landed only on the blue square.

The word nectar means:

79 ● a sweet substance
9 ○ honey
10 ○ pollen
2 ○ seeds

Some members of the committee were disappointed with the percent of students responding correctly on this item and other familiar vocabulary items, such as "skeleton," "harvest," and "average."

Moreover, careful examination of several paraphrased comprehension items indicated that a lack of vocabulary knowledge probably hindered many students in their reading performance.

Thus, sixth grade achievement on a variety of vocabulary and comprehension questions led the committee to conclude that more intensive work in word study and vocabulary development is needed to ensure maximal growth for elementary students in reading comprehension.

Committee members were even more concerned about the number of students who failed to make use of obvious and explicit context clues in deciphering word meanings, as in Example 21.

Some members of the committee speculated that many students who missed this item may have been confused by the sentence structure since the context clue was presented as an appositive. The committee members concluded that specific instruction in understanding more complex sentence structures is likely to be an important strategy for helping children learn to take advantage of context clues.

Skill area descriptions and illustrative questions

Committee's observations and judgments

III. COMPREHENSION

The student must identify explicitly stated elements and make inferences from explicit and implicit elements in the material read.

A. Literal comprehension

The student must identify or remember elements which have been explicitly stated. These elements include main ideas, details and cause-and-effect relationships.

Example 22

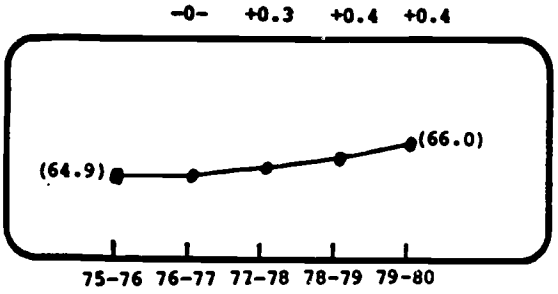
A new kind of star is shining over New York City. It is at the top of a tall, steel tower on an office building. It can be seen from a distance of five miles and tells by changing its color what kind of weather New York City is going to have. Clear weather is coming if the star is green. Orange means the weather will be cloudy. If the star is flashing orange, New York children wear rubbers and raincoats because rain is on the way. When the star is flashing white, snow is on the way and children get out their sleds. This is the most modern way to predict what the weather is going to be. For a long time radio and newspapers were the principal sources of information concerning the weather. Now a new way has been found.

How would you like to have a star tell you when you can go on your picnic? Maybe the star will tell you the weather is unsuitable and you will have to eat your picnic lunch inside.

A green star shining atop the building means

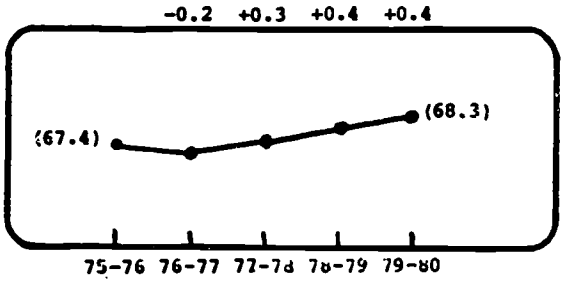
3 ○ children should wear their boots.
2 ○ snow.
92 ● clear weather.
3 ○ children should get out their sleds.

The overall area of comprehension, including both the 39 literal and 30 interpretive-critical questions, registered an average score of 66.0 percent correct in 1979-80. This score reflects a third year of gains for this major area, as is shown in the graph below.



Members of the committee were extremely pleased to see another year of growth in the overall area of comprehension, since comprehension is the primary goal of reading instruction.

The literal comprehension area also showed gains for the last three years, which resulted in an average score of 68.3 percent correct. These results are displayed in the graph below.



Skill area descriptions and illustrative questions	Committee's observations and judgments

Most literal comprehension items asked students to identify a single fact presented in the reading material, and several of these required fairly close reading and careful discriminations. Members of the committee observed that most students did very well on basic, literal questions dealing with isolated details, as in Example 22. The information needed to answer this question is essentially contained within a single sentence (underlined in the passage for the reader's convenience).

However, Example 23, based upon the same passage, proved to be more difficult. The question in Example 23 was derived from the first three sentences of the same passage. The literal comprehension task in this item involved relating the word "It" in the third sentence to its referent, "A new kind of star," in the first sentence. Thus, while over 90 percent of the students were able to answer successfully the question in Example 22, which was based upon one sentence, only about three-fourths of the students successfully related words from sentence to sentence in Example 23. Thus, some committee members concluded that more intensive and specific instruction in helping students understand and follow relationships between words (as from the pronoun to its referent in Example 23) is a key strategy for improving comprehension.

Example 23

What can be seen from a distance of five miles?

5 ○ New York City
14 ○ A steel tower
4 ○ An office building
77 ● A new kind of star

Skill area descriptions and illustrative questions	Committee's observations and judgments

B. Interpretive-critical comprehension

The student must infer from, relate, or generalize from elements in the material read.

Example 24

My name is James, same as my father's. My mother calls me Jimmy. My father is called Jim. He always wakes me up in the morning. He calls me Jim. I hope I'm like him when I grow up.

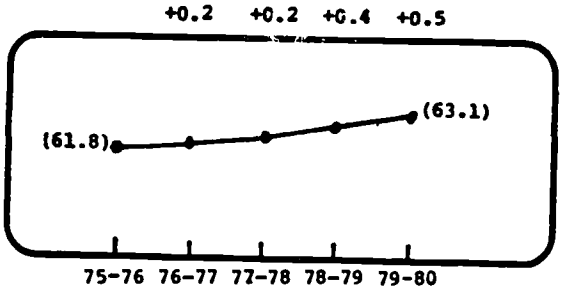
My father works as a plumber's helper, and for extra money, he is a night watchman. Mother says that Daddy works very hard to make us happy, and Daddy says the same thing about Mother. Both Daddy and Mother say that we make them happy because we are their children.

On Sunday we all go to church together—my father, mother, my older sister, and my younger brothers, Jerry and Willie, and I. When we come home, we have a good dinner. We have fun on Sundays. Daddy and Mother don't have to go to work then. They have time to play with us or take us for a ride in the car.

The story tells the most about

1 ○ what a plumber does.
92 ● a happy family.
2 ○ going to church.
5 ○ a hard job.

The 30 interpretive-critical comprehension questions on the Survey required students to glean from a passage some conclusion that was not explicitly stated. As one might expect, the questions in this skill area were more difficult for students than those in any of the foregoing skill areas. Members of the committee were pleased to observe that the 1979-80 school year marked a fourth year of increasing scores in this area, with an average of 63.1 percent correct. These score changes are shown in the following graph.



Scores on the items in this category ranged from a high of 92 to a low of 30 percent correct. The 92 percent correct score was achieved on the question in Example 24. This item was based upon a passage that is probably representative of some of the easier reading materials encountered by sixth graders. The question asked students to determine what the story was mostly about. Since all the options given were mentioned in the passage, the

Skill area descriptions and illustrative questions

Committee's observations and judgments

Example 25

You can tell from the story that James is the

8 ○ oldest child.
73 ● second oldest child.
11 ○ third oldest child.
8 ○ youngest child.

students had to weigh the various choices and decide which one represented the main idea. Thus, the item appears to be a good test of the students' overall comprehension of the passage.

Another interpretive-critical comprehension question based upon the same passage presented more difficulty. This question (Example 25)required students to make an inference from a detail provided in the first sentence of the third paragraph.

While 92 percent successfully identified the main idea of the passage, only 73 percent of the students reached a correct conclusion from a detail contained within the same passage. Thus, 27 percent failed to make the correct inference from the key information or failed to locate the sentence containing the key information in the first place.

Example 26

The toga was a loose outer garment worn by Roman citizens when they appeared in public. It was made of a single broad piece of undyed woolen cloth, usually cut in the shape of a semicircle. A large toga might contain from 10 to 20 square yards of cloth. The toga was draped about the body with the straight side thrown over the left shoulder. The help of a servant, and sometimes of more than one, was required to drape a large toga artfully. It was heavy and hot, and did not permit freedom of movement.

Togas were usually white in color. Some men, especially candidates for public office, had the cloth bleached to make it extra white. On festive occasions army generals and certain public officials wore red or purple togas embroidered with gold thread. A Roman boy wore a purple bordered toga until sometime between the ages of 12 and 16, when he put away the toga of childhood and put on the plain white toga of manhood.

On which occasion would the toga least likely be worn?

22 ○ In the public market
23 ○ In a Roman temple on a holiday
12 ○ At a banquet for a group of boys
43 ● At a family meal

Example 26 illustrates a more difficult interpretive-critical question. To answer this item correctly, students needed to (1) comprehend from the first sentence of the passage that togas were worn in public; and (2) judge which of the four options listed in the item were not public occasions. Thus, students had to understand what they read and apply their understanding to new material not discussed in the passage. As the data reveal, less than half (43 percent) were able to handle this kind of comprehension question. Scores on items like this one and uneven performance throughout the interpretive-critical comprehension skill area prompted the members of the Reading Assessment Advisory Committee to judge this important area in need of greater instructional emphasis.

Summary of Committee's Analysis

The members of the Reading Assessment Advisory Committee were pleased to see the gains registered on the overall sixth grade reading results and in all the reading skill areas from 1975-76 to 1979-80.

They observed that most sixth graders can perform successfully on very basic, literal questions dealing with isolated details and main ideas based upon relatively easy material. Performance starts to drop off as soon as the questions begin to place demands upon students' knowledge of word meanings, understanding of more complex sentence structures, ability to follow the relationships between sentences, and ability to draw inferences.

The pattern of strengths and weaknesses discerned by the committee members in their analysis of the sixth grade reading results is summarized below.

Committee Judgments of Sixth Grade Skill Area Results

Area of strength	Area in need of improvement
Identifying explicitly stated details from one or two sentences within a paragraph (Example 22)	Recognizing word meanings (Examples 19, 20, 21)
Recognizing the main idea of a relatively easy paragraph (Example 24)	Putting sentences and sentence parts together (Example 23)
	Drawing inferences from written material (Examples 25 and 26)

After reviewing the statewide pattern of strengths and weaknesses within the sixth grade reading results, members of the Reading Assessment Advisory Committee recommended that students receive increased instructional assistance in the following:

- Word study and vocabulary development (including word-forming skills involving the spelling, meaning, and use of words based upon roots, prefixes, and suffixes).
- Location of an idea within one or more sentence structures (including the relationship between an appositive and its referent--see Example 21; and the relationship between a pronoun and its referent--see Example 23).
- Inferential and critical comprehension (including inferring, interpreting, and evaluating information and ideas stated in written material).

After reviewing the data on television watching, homework and reading for enjoyment (see Chapter VI), members of the Reading Assessment Advisory Committee offered the following recommendations for administrators.

1. Administrators and instructional leaders need to promote staff development activities which will stimulate the teaching of comprehension and thinking skills in all disciplines across the curriculum. This should include instruction in specialized content area vocabularies and higher level thinking skills such as interpreting deeper meanings, detecting the author's purpose, analyzing characters, identifying cause and effect relationships, predicting consequences, testing hypotheses, and evaluating outcomes.

2. Districts should review their homework policies to assure that routine assigned homework reinforces classroom instruction, provides opportunities for success on assigned tasks, and includes pleasure reading at home.

3. Programs should be established which will stimulate reading for enjoyment and involve parents in promoting pleasure reading in the home.

Reading Results for Grade Twelve

Test Scope

The reading section of the Survey of Basic Skills: Grade 12 consists of 141 questions. These items were designed to assess the students' attainment of a wide range of objectives discussed broadly in Framework in Reading for the Elementary and Secondary Schools of California and specified, with the help of the Reading Assessment Advisory Committee, in Test Content Specifications for California State Reading Tests. As shown in Figure 3, both the objectives and the questions used to assess the achievement of the objectives fall into one of four reading skill areas: vocabulary, literal comprehension, interpretive-critical comprehension, and study-locational skills. Figure 3 is also an illustration of the emphasis placed on each of the reading skill areas in the Survey of Basic Skills: Grade 12.

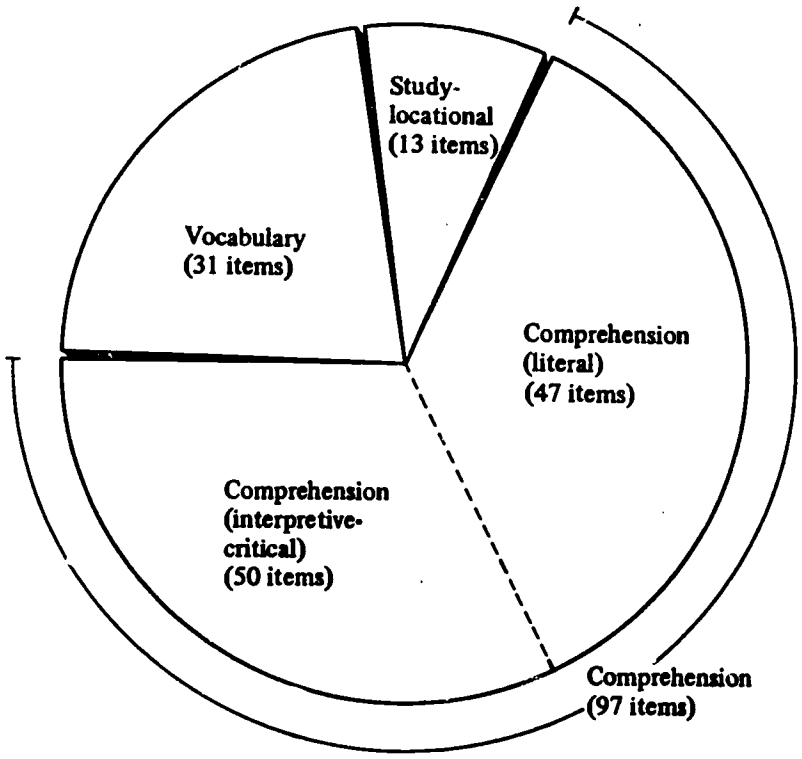


Fig. 3. Number of questions, by skill area, in the reading portion of the *Survey of Basic Skills: Grade 12*

Reading Scores for Grade Twelve

The results of twelfth grade performance on the total reading test and in each of the skill areas for 1975-76 through 1979-80 are presented in Table 5. Year-to-year changes in overall performance and in skill area performance are also shown in the same table.

Table 5

Reading Scores of California Twelfth Grade Students on the Survey of Basic Skills: Grade 12

Skill area	Number of Questions	Average percent correct					Change			
		1975-76	1976-77	1977-78	1978-79	1979-80	1975-76 to 1976-77	1976-77 to 1977-78	1977-78 to 1978-79	1978-79 to 1979-80
READING, TOTAL	141	64.1	63.6	63.3	63.2	63.1	-0.5	-0.3	-0.1	-0.1
Vocabulary	31	61.3	60.9	60.5	60.2	60.0	-0.4	-0.4	-0.3	-0.2
Comprehension	97	64.5	63.9	63.7	63.7	63.5	-0.6	-0.2	-0-	-0.2
Literal	47	69.2	68.9	68.5	68.4	68.5	-0.3	-0.4	+0.1	-0.1
Interpretive-critical	50	60.1	59.3	59.2	59.0	58.9	-0.8	-0.1	-0.2	-0.1
Study-locational	13	68.4	67.2	67.3	67.4	67.4	-1.2	+0.1	+0.1	-0-

The following observations about the changes in twelfth grade reading achievement are evident from an examination of the data in Table 5:

- For the fourth consecutive year, twelfth grade reading achievement declined slightly (0.1 percent correct). This results in a total decline of 1.0 percent correct since 1975-76, when the test was first administered.
- Slight declines were registered from 1978-79 to 1979-80 in all skill areas except for the study-locational area. The greatest loss since 1975-76 has occurred in the interpretive-critical comprehension area (1.2 percent correct), whereas the smallest loss has occurred in literal comprehension (0.7 percent correct).

Skill area descriptions and illustrative questions	Committee's observations and judgments

I. VOCABULARY

The student must identify the meaning of a specific word in context; given a definition, the student must select from a list the word most nearly opposite in meaning.

Example 27

A group of lines of poetry

30	○ rhyme	2	○ foot
7	○ quatrain	58	● stanza
3	○ meter		

Year	76-77	77-78	78-79	79-80
Percent correct	64.1	62.3	60.6	58.2

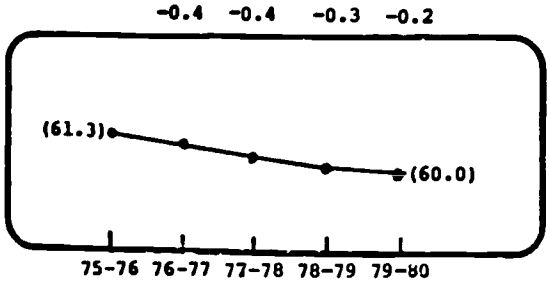
Example 28

The word "obsolete" means the OPPOSITE of:

16	○ absolute	53	● current
9	○ old-fashioned	22	○ obvious

Year	76-77	77-78	78-79	79-80
Percent correct	63.0	59.3	55.7	52.8

As the graph below reveals, 1979-80 marked the fourth consecutive year of declining vocabulary scores in the twelfth grade, resulting in an average score of 60.0 percent correct.



The Survey contains 31 vocabulary items, including definitions, antonyms, and words used in context. An examination of score changes on individual items revealed declining trends on all of the antonym items, eight of the 12 items testing vocabulary in context, and about half of the items involving definitions. There also appeared to be more of a decline on items containing words related to the academic disciplines, such as "telescope," "space," "stanza," and "synonym." On the other hand, increases were registered on several items that included words of a more practical nature: "knead," "commission," and "mortgage," for example. Example 27 illustrates (1) a typical Survey vocabulary item reflecting academic classroom material; (2) an average score for vocabulary; and (3) declining scores on many vocabulary questions of this nature. Example 28 illustrates the most dramatic decline on a particular item.

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 29

A percentage of the amount of business done paid to the agent who does it

3 ○ collateral
2 ○ security
1 ○ principal
85 ● commission
9 ○ interest

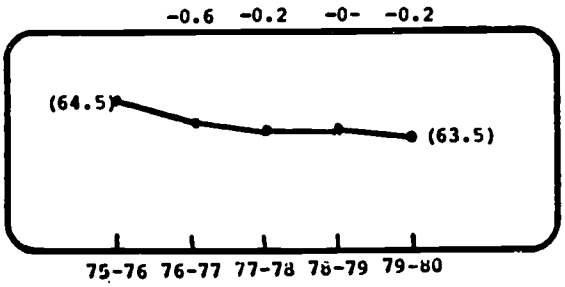
Year	76-77	77-78	78-79	70-80
Percent correct	82.6	83.4	83.8	85.1

Since 1975-76 scores on the item containing the word "obsolete" have declined 16.2 percentage points. On the other hand, Example 29 illustrates the slight gains registered on a few items, especially those more practical and less academic in nature. Members of the Reading Assessment Advisory Committee expressed considerable concern over the fourth year of declining vocabulary scores at the twelfth grade.

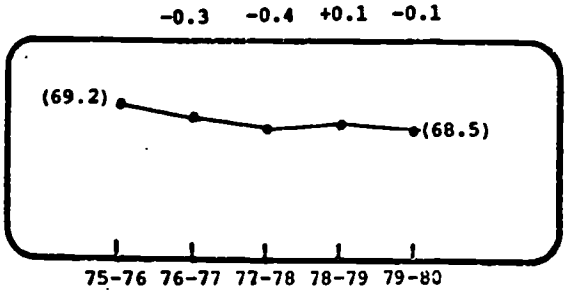
II. COMPREHENSION

The student must identify explicitly stated elements and make inferences from explicit and implicit elements in the material read.

The 97 comprehension items registered a decline in 1979-80, resulting in an average score of 63.5 percent correct for that important overall category. The score changes from 1975-76 through 1979-80 are presented in the graph.



Skill area descriptions and illustrative questions	Committee's observations and judgments
	The committee was discouraged by the continuing downward trend in comprehension. Members of the committee noted that bigger declines occurred in interpretive-critical comprehension than in literal comprehension. They remarked that mastering minimal competencies is not enough and that scores have declined in spite of minimal competency testing. They concluded that much more instructional emphasis is needed on the higher-level thinking skills in all content areas across the curriculum.
A. Literal The student must identify or remember elements which have been explicitly stated.	Committee members expressed concern over the slight decline in literal comprehension scores from 1978-79 to 1979-80 which marked a score loss for three out of the four years. These changes are shown below.



Example 30

ENGLISH MUFFINS

1 package active dry yeast
½ cup warm water
1½ cups milk, scalded
2 tablespoons sugar
2 teaspoons salt
¼ cup shortening
5¾ to 6 cups sifted all-purpose flour

Soften yeast in water. Combine next 4 ingredients; cool to lukewarm. Stir in *2 cups* flour; beat well. Add yeast; mix. Add enough of remaining flour to make a moderately stiff dough. Turn out on a lightly floured surface; knead till smooth (8 to 10 minutes). Place in lightly greased bowl, turning dough once. Cover; let rise till double (1¼ hours).

The 47 literal comprehension questions required students to demonstrate their understanding of what they had read by selecting either a restatement or paraphrase of words, sentences, or paragraphs.

Skill area descriptions and illustrative questions

Committee's observations and judgments

Punch down; cover and let rest 10 minutes. Roll to slightly less than ½ inch thick on lightly floured surface. Cut with a 3-inch round cutter. (Reroll edges.) Cover and let rise till very light (1¼ hours). Bake on top of range on medium hot greased griddle; turn frequently till done, about 30 minutes. Cool thoroughly. Split with a fork; toast on both sides. Serve at once. Makes 2 dozen.

How long does it take to bake English muffins on top of range?

3 ○ 8 to 10 minutes
1 ○ Exactly 10 minutes
90 ● About 30 minutes
5 ○ 1¼ hours
1 ○ More than 3 hours

Example 31

APPARENTLY WITH NO SURPRISE

Apparently with no surprise
To any happy flower,
The frost beheads it at its play
In accidental power.
The blond assassin passes on,
The sun proceeds unmoved
To measure off another day
For an approving God.

by Emily Dickinson

The "it" in line three is

8 ○ the accidental power.
84 ● the happy flower.
3 ○ an approving God.
5 ○ the sun.

A few of the literal questions on the Survey required students to identify an isolated fact from materials one might have to read in everyday life (such as an automobile insurance policy, a recipe, and directions for treating poison ivy). Example 30 is a literal comprehension test item of this type, including the percent of students who chose each of the options.

Similarly, on several other questions based upon everyday reading materials, scores were quite high, as in Example 30. Moreover, on the majority of literal questions based upon academic materials (historical, scientific, and literary selections), scores of at least 70 percent correct were attained. Thus, members of the committee concluded that most twelfth graders can perform adequately on literal questions requiring them to locate isolated facts or details from everyday and academic reading materials.

In the further examination of literal questions with low percent correct scores, some members of the committee observed that a weak grasp of vocabulary appeared to be a source of difficulty for many twelfth graders.

Literal comprehension is more than a knowledge of word meanings, however. It also involves the ability to follow the relationships between words, relationships that are signaled by structural cues within sentences and paragraphs. For example, some twelfth graders were still displaying confusion on questions which required them to follow the relationship between a

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 32

The Director of the FBI wrote an article for the March 8, 1975, issue of *TV GUIDE* that started like this:

At 9:40 p.m. last July 24, as the House Judiciary Committee debated Presidential impeachment charges before millions of television viewers, a bomb threat came into the Capitol switchboard. The hearing room was cleared and, during the precautionary search, newspeople quite properly reported the threat to vast network audiences.

A television newsman commented, somewhat stoically I thought, to the effect that "Simply by reporting it, we may well be encouraging someone else to telephone a bomb threat."

The newsman was correct. Beginning that evening there were seven telephoned threats to obliterate the Committee, all apparently generated by the instant, nationwide exposure given the initial threat.

The news about the first bomb threat was reported over television

16 ○ as the threat was being called in.
24 ○ as the room was being cleared of people.
55 ● during the search for the possible bomb.
5 ○ after it had been determined that there was no bomb.

pronoun and its referent. Example 31 is an illustration of this difficulty.

Understanding this poem involves recognizing that the "it" in line three refers back to the "flower." Just as many third and sixth graders encountered difficulty with items involving pronoun reference, so too are some twelfth graders (16 percent) still displaying confusion on this kind of literal comprehension question. On the basis of test data at grades three, six, and twelve, the committee judged that many students at all grade levels would benefit from focused instruction in following the reference of a pronoun back to its antecedent.

Example 32 illustrates a somewhat similar kind of difficulty.

On this item students needed to recognize that the phrase "during the precautionary search" modifies the word "reported" and thus indicates that the search and the reporting were going on at the same time. The data on this question suggest that many students either failed to comprehend this structural clue or failed to read carefully.

After reviewing student performance on examples 31 and 32, and others like them, members of the committee concluded that many students need specific instruction designed to help them read carefully and understand relationships between words, sentences, and paragraphs.

Skill area descriptions and illustrative questions	Committee's observations and judgments

B. Interpretive-critical comprehension

The student must infer from, relate, or generalize from elements in the material read.

Example 33

The thirty years from 1455 to 1485 were a period of almost constant civil war between the supporters of two branches of the royal family—the house of Lancaster and the house of York. This fighting is usually called the War of the Roses, because the house of Lancaster had a red rose as its badge, and the house of York a white rose. At the end of it, Henry Tudor, who belonged to the Lancaster branch of the family, came to the throne as Henry VII. He married Elizabeth, who belonged to the York branch, and thus helped to heal the wounds of the prolonged conflict. Its chief result was the wiping out of many noble families and the reduction of the power of these lords and barons so that a king could have his own way without much trouble.

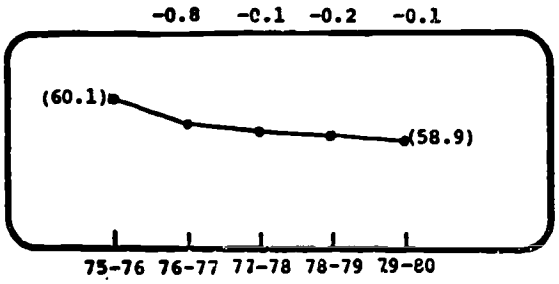
Henry VII's reign (1485–1509) was a time of rebuilding for England. He kept order in the country and strengthened the royal power by special courts and economical management. In his reign John Cabot made his famous trip across the Atlantic—the first of modern Europeans to see the continent of North America where Columbus had reached only the Carribean Islands. Henry's economy is seen in the entry in his diary when Cabot came back: "To hym that found the new isle, £10"—less than fifty dollars for discovering a continent—but of course Henry didn't know how important this discovery was going to be in the history of England.

A conclusion that can be drawn from this passage is that

7 ○ the position of king of England was weaker after the War of the Roses.
3 ○ explorers were handsomely paid in the time of Henry VII.
4 ○ Henry VII was a navigator before he became king.
86 ● Henry VII lived in a time of conflict and exploration.

A higher level reading skill, interpretive-critical comprehension, is assessed by 50 questions on the Survey. All other things being equal, interpretive-critical comprehension questions should be more difficult than the purely literal comprehension items because the reader is required to make inferences.

This proved to be the case with the Survey of Basic Skills: Grade 12, on which students averaged 58.9 percent correct in the interpretive-critical skill area (in constrast to 68.5 percent correct for the literal). The committee members were disturbed to see that the interpretive-critical area showed a fourth year of decline in 1979-80, registering a greater total loss over the previous five-year period (-1.2 percent correct) than did literal comprehension (-0.7 percent correct). The changes in score for interpretive-critical comprehension are shown in the graph below.



Members of the committee also observed that twelfth graders were typically more successful at drawing inferences about the main idea or entire meaning of a passage than they were at making inferences from details within a passage. This pattern is illustrated by examples 33 and 34, which are based on the same selection.

Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 34 According to the passage, Henry VII ruled at the time of 31 ○ a revolution against the nobility. 39 ○ the settlement of New England. 25 ● the voyages of Columbus. 14 ○ the destruction of the house of York.	Example 33 required students to demonstrate an understanding of the primary message of the material, whereas Example 34 required them to find a detail pertaining to the time period in the passage and relate it to basic historical knowledge concerning the voyages of Columbus. While 86 percent of the twelfth graders succeeded on the former task, only one-fourth of them successfully managed the latter.
Example 35 I Skiing has recently become one of the more popular sports in the United States. Because of its popularity, thousands of winter vacationers are flying north rather than south. In many areas, reservations are required months ahead of time. II I discovered the accommodation shortage through an unfortunate experience. On a sunny Saturday morning I set out from Denver for the beckoning slopes of Aspen, Colorado. After passing signs for other ski areas, I finally reached my destination. Naturally I lost no time in heading for the nearest tow. After a stimulating afternoon of miscalculated stem turns I was famished. Well, one thing led to another and it must have been eight o'clock before I concerned myself with a bed for my bruised and aching bones. III It took precisely one phone call to ascertain the lack of lodgings in the Aspen area. I had but one recourse. My auto and I started the treacherous jaunt over the pass and back toward Denver. Along the way, I went begging for a bed. Finally a jolly innkeeper took pity and for only thirty dollars a night allowed me the privilege of staying in a musty, dirty, bathless room above his tavern. The author's love for skiing is suggested in which paragraph(s)? 13 ○ I 42 ● II 1 ○ III 8 ○ I and II 36 ○ None of the paragraphs	Some interpretive-critical questions required students to infer the author's attitude or purpose. The ability to answer this kind of question correctly involves being aware of the way an author chooses words to create a particular feeling toward the topic. This critical reading skill is central to identifying the mood or tone of a selection as well as to detecting propaganda devices. Example 35 is an illustration of this kind of reading skill. As the item data reveal, less than half of the twelfth graders answered this question correctly. (Key words revealing the answer to this question are underlined.) The low performance on this item and others like it may be related to weaknesses in language choices at both grades six and twelve (discussed in Chapter IV).

Skill area descriptions and illustrative questions	Committee's observations and judgments
	under "Written Expression Results Grades Three, Six, and Twelve"). Thus evidence from both reading and written expression test results suggests that elementary and secondary students would profit from intensified instruction in the way in which deliberate word choices in writing can reveal the author's feeling toward the topic.

Summary of Committee's Conclusions and Recommendations

Members of the Reading Assessment Advisory Committee were disappointed to see a fourth year of declining twelfth grade reading scores. In their analysis of the test results, they discerned the following pattern of strengths and weaknesses (which paralleled a number of points from the analysis of the grade six reading test results and grade twelve written expression test results):

- A majority of twelfth graders can identify isolated facts and details from a variety of academic and everyday reading materials. The two major obstacles to higher literal comprehension scores appear to be (1) difficulty in recognizing word meanings in context and (2) difficulty in following structural clues such as those involving prepositional phrases and pronoun references.

- Twelfth graders are typically more successful at inferring the main idea or overall meaning of a selection than they are at drawing conclusions from details within a passage. This finding was also reported by the National Assessment of Educational Progress in a report on national reading performance.

- Many twelfth graders are not adept at detecting the ways in which authors reveal their feelings toward a topic through careful word choices. This finding is all the more significant in light of the weakness in the written expression skill area of language choices at both grades six and twelve.

This pattern of strengths and weaknesses is summarized below:

Committee Judgments of Twelfth Grade Skill Area Results

Area of strength	Area in need of improvement
Identifying isolated facts and details in a variety of academic and everyday reading materials (Example 30)	Recognizing word meanings (Examples 27-29)
Recognizing the main idea of a paragraph (Example 33)	Understanding structural relationships between words and sentences--such as following a pronoun back to its referent (Examples 31 and 32)
	Drawing inferences--such as drawing conclusions from details (Example 34) and detecting the author's attitude (Example 35)

In response to this observed pattern of strengths and weaknesses, members of the Reading Assessment Advisory Committee offered the following recommendations:

1. Committee members concluded that the continuing decline in twelfth grade reading scores demonstrates the need for direct reading instruction in vocabulary and the comprehension skills in the context of every single subject area. As one committee member said, "Reading is not a subject. It is a skill which must be taught in every subject area." All members of the committee agreed that English, science, social studies, and math teachers need to work on vocabulary and especially on the higher inferential thinking skills within their disciplines.

2. Because of the continuing decline and uneven performance within the interpretive-critical comprehension skill area, members of the committee concluded that the higher reading and thinking skills are in need of special instructional emphasis. This judgment and the philosophy behind it are expressed in the following quotation from the Framework in Reading for the Elementary and Secondary Schools of California:

> The fullest comprehension requires rising above the literal to the inferential; that is, to induction, deduction, analogy, and other logical processes. It also invites individualistic, imaginative elaborations based on what the writer has suggested. These sets of competencies are sometimes called "thinking skills." Although these competencies are not unique to the reading process, they are essential to success in reading. They include such abilities as getting the main idea, separating fact from opinion, sensing cause and effect relationships, making judgements, and applying information to new situations. These competencies are developed in all areas of the school curriculum; but until they are successfully applied in the reading process, the major objectives in reading instruction cannot be achieved.[3]

3. In addition to increased emphasis on the higher inferential comprehension skills, members of the committee suggested the following instructional emphases in response to the observable weaknesses within the twelfth grade reading achievement results:

[3] Framework in Reading for the Elementary and Secondary Schools of California. Sacramento: California State Department of Education, 1973, p. 43.

- Vocabulary development in all the content areas
- The multiple meanings and connotations of words
- Use of careful word choices to reveal feelings and attitudes and to create special effects
- Use of context for deciphering word meanings
- Understanding the relationships between words within sentences and paragraphs (such as relating a pronoun to its referent and relating a prepositional phrase to the word it modifies)

4. Committee members recommended wide reading as one very effective method for helping students to increase their vocabulary and improve their comprehension skills. In addition, they recommended the sustained discussion of reading materials as a productive teaching strategy. Such discussions focusing on the details of word, sentence, and paragraph meaning are helpful in the development of both vocabulary and comprehension skills. The committee reiterated that all of the various vocabulary and comprehension skills should be taught within the context of all the content areas at the secondary level.

After reviewing the data on television watching, required reading and outside reading, members of the Reading Assessment Advisory Committee offered the following recommendations to administrators and other instructional leaders.

1. Administrators and instructional leaders need to promote staff development activities which will stimulate the teaching of comprehension and thinking skills in all disciplines across the curriculum. This should include instruction in specialized content area vocabularies and higher level thinking skills such as interpreting deeper meanings, detecting the author's purpose, analyzing characters, identifying cause and effect relationships, predicting consequences, testing hypotheses, and evaluating outcomes.

2. Districts should review their homework policies to assure that routine homework assigned reinforces classroom instruction, provides opportunities for success on assigned tasks, and includes pleasure reading at home.

3. Programs should be established which will stimulate reading for enjoyment and involve parents in promoting pleasure reading in the home.

IV. Written Expression Achievement for Grades Three, Six, and Twelve

Synopsis of Findings

Written language skills of third graders were tested for the first time in the spring of 1980 with the new Survey of Basic Skills: Grade 3. A comparison of the results from the new test with national norms showed the median California student to be at the 53rd percentile. Sixth grade written expression scores have registered improvement every year since 1974-75, when the Survey of Basic Skills was first administered. The median sixth grade student is scoring at the 53rd percentile--3 points above the national average.

Between 1969-70 and 1974-75 the median twelfth grade student in California dropped steadily from the 42nd percentile to the 32nd percentile on national norms in written expression. Since 1975-76, the median twelfth grade score has fluctuated between the 33rd and 34th percentiles, and in 1979-80, is still at the 34th percentile--16 points below the national average.

Skill Area Strengths and Weaknesses

The members of the English Language Assessment Advisory Committee analyzed the test results to identify strengths and weaknesses in skill area performance. They concluded their analyses with instructional recommendations. While the discussion of skill area strengths and weaknesses is based on the committee's judgments, the Department of Education accepts full responsibility for the interpretations in this report. The committee's analysis of written expression skill areas in need of special attention for grades 3, 6, and 12 are presented below.

Areas of Special Need

1. Language choices

   Grade 3 - Using specific and sensory words (Examples 14-19)
   Grade 6 - Using specific words and words which reflect particular attitudes (Examples 42 and 41)
   Grade 12 - Using specific words and words which reflect particular attitudes; identifying the intended audience of a selection (Examples 51, 52 and 53)

2. Spelling

   Grade 3 - Spelling words with suffixes (Example 36)
   Grade 6 - Spelling words with suffixes (Examples 48 and 49)
   Grade 12 - Spelling words with suffixes (Examples 63 and 64)

3. Sentence manipulation

   Grade 12 - Recognizing the most effective and consise statement of an idea (Example 56)

4. Paragraphs

   Grade 12 - Achieving coherence from sentence to sentence within paragraphs (Examples 58 and 59)

Guided by an understanding of the difficulties students were having at all three grade levels, the English Language Assessment Advisory Committee offered the following broad instructional recommendations for teachers.

Instructional Recommendations for Grade Three

1. Devote more focused instruction to language choices. Such instruction should stimulate students to begin thinking about careful word choices based upon such factors as the degree of specificity, the emotion conveyed by a particular word, and the communication needs of the audience.

2. Devote more instructional emphasis to the spelling of words with suffixes. Children should be exposed to homogeneous groups of words following similar spelling patterns so they can more easily internalize several useful rules which apply to many other words as well.

Instructional Recommendations for Grade Six

Guided by an understanding of sixth graders' strengths, weaknesses, and most frequent mistakes, members of the committee offered the following broad instructional recommendations:

1. A more efficient approach to teaching spelling is needed at the elementary level. Children should be exposed to homogeneous groups of words following similar spelling patterns so that they can more easily internalize generalize to other words. Such instruction should include more emphasis on the generalizations pertaining to the spelling of words with suffixes. If students fail to form such basic generalizations in the third and fourth grades, where they are first introduced, these lessons should be retaught, reviewed, and practiced in the fifth and sixth grades.

2. Some of the simplest capitalization rules pertaining to days of the week and months of the year need to be retaught and reinforced in the fourth, fifth, and sixth grades. Intermediate students also need more specific instruction in the skill of identifying all the words in a multiple-word proper noun and recognizing that all of them must be capitalized.

3. Focused instruction and skill-building practices are needed in the language choices skill area to help pupils understand some of the issues related to effective word choices. Pupils need this understanding if they are to write effectively, read critically, and be alert to propaganda devices.

Instructional Recommendations for Grade Twelve

1. A skill maintenance program in spelling for junior high and high school students is needed. Such a program should involve a highly structured approach to spelling instruction which would introduce words grouped according to spelling generalizations, particularly generalizations which apply to the formation of new words by the addition of suffixes to a base word. This kind of structure coupled with appropriate practice should enable students to internalize a number of highly useful generalizations which can be applied to many other words. More time and especially more efficient and specific instruction should be devoted to the spelling needs of junior high and high school students.

2. Intermediate and secondary students should have more experience and more focused instruction in a number of dimensions which relate to effective language choices in writing. These factors include the degree of specificity of a word (see Example 51) and the emotional tone conveyed by a given word in a particular context (see Example 52). The Reading Assessment Advisory Committee, which found that many twelfth grade students displayed confusion on some of the reading questions requiring them to detect the author's emotion or attitude in a selection, concurred that students need more focused instruction in the language choices skill area.

3. High school students need more experience with sentence manipulation activities in order to help them (1) learn to equate effectiveness with economy of expression, and (2) gain control of sentence structure in their own writing.

Instructional Recommendations for Administrators

In the course of their review of achievement results in written expression, the members of the English Language Assessment Advisory Committee offered the following recommendations to administrators and other instructional leaders.

1. Administrators in districts and on site principals need to encourage the use of CAP resources at the plant level for purposes of program improvement. School and district patterns of strength and weakness should be analyzed and compared to the state. Teacher committees should take their own assessment results and use them to strengthen their instructional programs.

2. District leaders need to continue to devote attention to increasing writing practice in the classroom. Subskills should not be overdone at a loss to the total writing process. Nor should composition and language skill development be divorced from the writing task. Drills do not substitute for writing and reading. There should be more writing, more teaching of writing, a greater variety of writing assignments, and an extension of the audiences available to the student as writer. One learns to write by writing.

3. Administrators should promote staff development which will stimulate increased attention to writing as a way of learning about the content areas across the curriculum. One of the best ways to learn about science or history is by writing about it. Furthermore, skills such as sensitivity and discrmination with respect to words and their meanings and coherence between sentences and paragraphs are not the private domain of the English teacher. They can and should be taught continually in all disciplines. (For example, paragraphs developed through comparison and contrast might be used as an effective teaching strategy in any content area.)

4. District instructional leaders should refine their integrated language arts curriculum, reaffirming the connection between reading, writing, literature and oral language. Instructional leaders need to work toward still stronger articulation between grade levels in language arts programs.

5. District administrators should try to ensure that teachers, paraprofessionals and others working in the classroom are providing good models of spoken English. With primary children, the objective of nurturing fluency should take precedence over forcing correctness.

Recommendations for Parents

The members of the English committee expressed concern about the data revealing a systematic relationship between television watching and low achievement scores. After some discussion of the findings, members of the committee made the following recommendations to parents.

1. Promote selective television watching.

2. Strive to nurture evaluative and critical thinking skills in conjunction with television watching.

3. Encourage children to watch television with adults and older persons so that television programs can be discussed, and comprehension and thinking skills stimulated.

Written Language Results for Grade Three

Test Scope

The written language section of the Survey of Basic Skills: Grade 3 consists of 390 questions. The items were designed to assess third grade students' achievement of a broad array of objectives compiled by the English Language Assessment Advisory Committee and published in Survey of Basic Skills: Grade 3--Rationale and Content (Sacramento: California State Department of Education, 1980). The written language items assess eight major skill areas: word forms, standard English usage, language choices, sentence recognition, paragraphs, capitalization, punctuation, and spelling. The relative degree of emphasis assigned to each of the written language skill areas in the Survey is presented graphically in Figure 4. For additional information about the rationale and test development process underlying the new third grade test, see Chapter II.

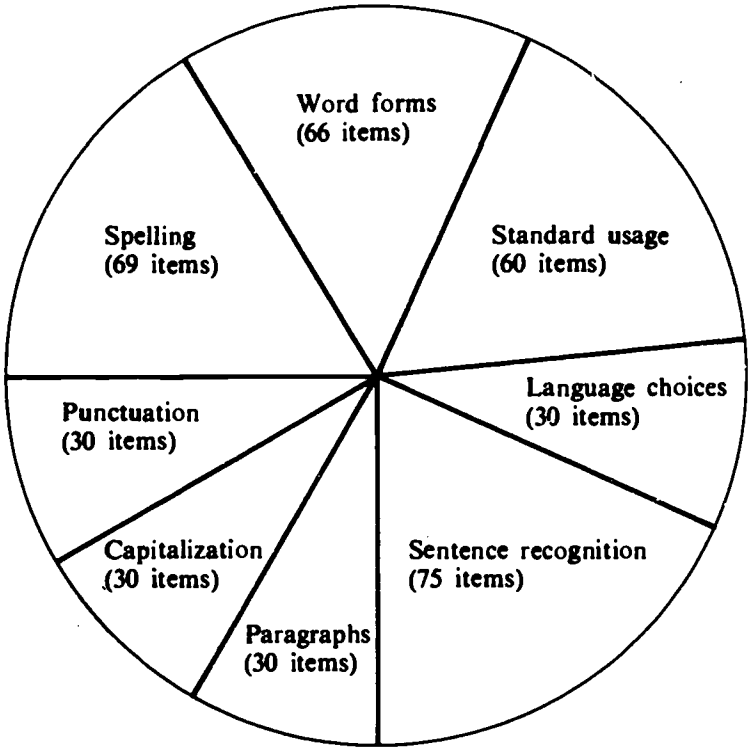


Fig. 4. Number of questions, by skill area, in the written language portion of the *Survey of Basic Skills: Grade 3*

Written Language Scores for Grade 3

The results of third grade performance on the total written language test and in each of the skill areas for 1979-80 are presented in Table 6.

Table 6

Written Language Scores of California Third Grade Students on the Survey of Basic Skills: Grade 3, 1979-80

Skill area	Number of questions	Average Percent Correct
WRITTEN LANGUAGE, TOTAL	390	74.8
Word forms	66	74.7
Prefixes	14	78.1
Inflectional suffixes	12	76.3
Derivational suffixes	11	76.3
Irregular noun plurals	14	65.1
Contractions	15	77.8
Standard usage	60	74.2
Irregular verbs	15	76.7
Pronouns	15	73.5
Subject-verb agreement	16	69.3
Noun determiners	14	78.0
Language choices	30	65.4
Sensory words	15	70.6
Specific words	15	60.1
Sentence recognition	75	78.4
Statements and questions	15	74.1
Complete sentences	60	79.5
supplying subject	30	80.3
supplying verb	30	78.8
Paragraphs	30	69.6
Topic sentence	15	68.4
Details and sequence	15	70.9
Capitalization	30	88.1
Persons	10	90.9
Places	10	87.2
Days/months	10	86.0
Punctuation	30	72.0
Periods/question marks	10	77.8
Commas	10	62.4
Apostrophes	10	75.7
Spelling	69	73.0
Predictable words	39	80.4
Words with suffixes	16	55.5
Demons and homophones	14	72.4

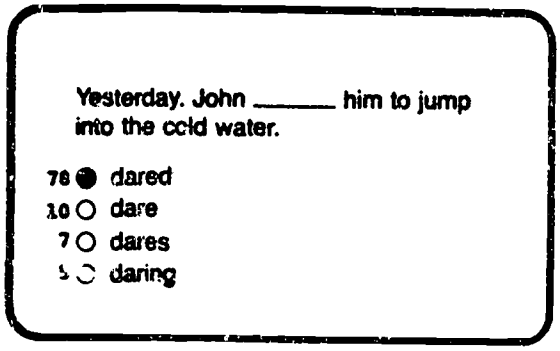
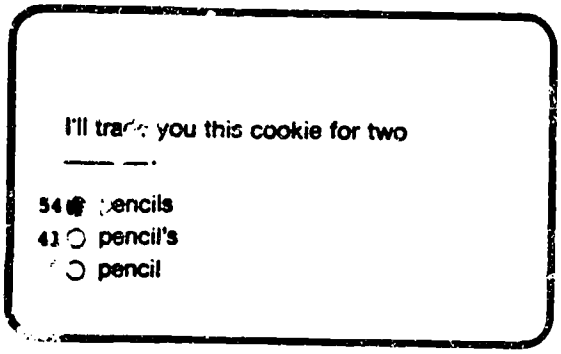
Analysis and Interpretation of Skill Area Results, Grade Three

Members of the English Language Assessment Advisory Committee analyzed, interpreted, and evaluated the 1979-80 written language results. In this process they considered the inherent difficulty of the skill areas and particular items in light of their knowledge of curriculum and language development.

The substance of their skill area analysis is presented on the following pages with skill area descriptions and items in the left column and committee judgments in the right column.

Guided by an understanding of the kinds of errors students are making, the committee members concluded their analysis with recommendations for instruction.

Skill area descriptions and illustrative questions	Committee's observations and judgments
I. WORD FORMS The student will select the appropriate prefix or suffix for a blank in a sentence, will form the plural of an irregular noun, and will form the contraction from two underlined words in a sentence.	In general, the committee members concluded that children's performance (74.7) on the 66 word form questions was consistent with their expectations of the language development of third grade children.
A. Prefixes The student will select a prefix (such as un-, pre-, and dis-) for a word in a sentence which provides a context clue for the appropriate prefix.	Of the five word form skill areas, prefixes registered the highest mean score (78.1 percent correct). Example 1 is illustrative of the high success rate on the prefix items. Members of the committee were pleased with the results in this area.
Example 1 My brothers usually like the same movies, but they ___agree about books. 7 ○ pre 11 ○ re 4 ○ ex 78 ● dis	

Skill area descriptions and illustrative questions	Committee's observations and judgments
B. Inflectional suffixes The student will select the appropriate inflectional suffix (-s, -'s, -ed, -ing, -er, -est) for a word in a given sentence. Example 2  Example 3  	Members of the committee were also pleased with the level of performance (76.3) on the 12 inflectional suffix questions. Example 2 illustrates the typically high scores on these items. The committee observed that when third graders are given a choice between an -s and an 's, many will always select the 's even though only a simple plural is needed. Example 3 illustrates this phenomenon.

Skill area descriptions and illustrative questions	Committee's observations and judgments
C. Derivational suffixes The student will select the appropriate suffix (-ly, -er, -ful, -ness, -less) for a word in a given sentence. Example 4 He started dancing as a begin___. 79● ner 7○ ness 5○ able 9○ ful Example 5 Judy thinks her big sister acts mother___. 79○ er 7○ ness 5○ ful 9● ly	The average score for the 11 derivational suffix items was 76.3 percent correct. Item scores were above the mean for written language on most of the derivational suffix questions, as illustrated in Example 4. Members of the committee noted that performance seemed to correspond to the oral language habits of young children, with scores dropping only on those items in which a suffix was used in a fairly adult way, as in Example 5.

Skill area descriptions and illustrative questions	Committee's observations and judgments
D. Irregular noun plurals The student will select the appropriate irregular noun plural (such as children, mice, knives) for a blank in a sentence. Example 6 The valley race was won by two _____ 65 ● women 10 ○ woman 9 ○ womans 16 ○ womens	The 14 irregular noun plural items proved to be the most difficult word form skill area for third graders with an average of 65.1. Scores varied considerably from item to item, ranging from 38 to 86 percent correct. Example 6 is a typical item on irregular noun plurals. The difficulty of the items seemed to be related to the familiarity of the particular irregular noun plurals being tested. While 81 percent knew how to form the plural of "man," only about 50 percent knew how to pluralize "goose." Words such as "knives" and "elves" also caused considerable difficulty.
E. Contractions The student will select the correct way of writing a contraction for two words presented and underlined in a sentence. Example 7 There is a short way to write the underlined words in the sentence. Choose the correct one. Jill has not been home all day. 10 ○ has'not 76 ● hasn't 12 ○ has'nt 2 ○ hasnt	Scores on the 15 contraction items proved to be uniformly strong and homogeneous, with an average of 77.8 and a range from 64 to 85 percent correct. A typical contraction item is shown in Example 7. Members of the committee were satisfied with third grade performance in this area.

Skill area descriptions and illustrative questions	Committee's observations and judgments
II. STANDARD ENGLISH USAGE The student will select the appropriate irregular verb, pronoun, or noun determiner for a blank in a sentence and will achieve agreement in number between the subject and verb of a sentence.	The 60 usage questions registered an average score of 74.2 percent correct. Members of the committee concluded that California's third graders are doing well with standard English usage, especially in light of what is known about children's language development. Some members commented that an emphasis on writing should help children with their fluency, which is always, of course, a goal of language instruction. Committee members also stressed that besides providing children with opportunities for appropriate practice, teachers should also be sure to provide a model of clarity, fluency, and precision in their own speech.
A. Irregular verbs The student will select the appropriate form of an irregular verb for a blank in a sentence. Example 8 Last summer this plant _____ in my garden. 8 ○ grown 12 ○ growed 3 ○ growed 77 ● grew	The average percent correct score for irregular verbs was 70.7. On 12 of the 15 items, scores of 70 percent or above were registered. Example 8 is illustrative of typical performance in this area. Students apparently encountered more difficulty with the past participle of some of the irregular verbs than with just the past tense. For example, 29 percent selected "Joel has took" and 41 percent chose "Joe and Ruby have always went" on two items involving the use of the past participle.

Skill area descriptions and illustrative questions	Committee's observations and judgments
B. Pronouns The student will select the correct pronoun for a blank in a sentence. Example 9 Maria and ___ went to the store. 20 ○ me 76 ● I 2 ○ her 2 ○ him Example 10 The teacher took the papers from Cara and ___. 4 ○ he 24 ● him 10 ○ she 62 ○ I	On the 15 pronoun questions there was greater variation among scores than in any other section of the language test. The scores for some items approached 95 percent correct; for others they were as low as 14. The average of the two types of items was near the mean score for all items on the written language section; therefore, the following problem is "hidden." Scores were low on items that had both of these characteristics: 1. The pronoun to be chosen was part of a compound construction (Sam and I, Cara and her). 2. The pronoun to be chosen was separated from the verb. The score was high when the pronoun to be chosen was not part of a compound or when it was next to the verb. Examples 9 and 10 are illustrative of the results described above.

Skill area descriptions and illustrative questions	Committee's observations and judgments
C. Subject-verb agreement The student will select the verb form which agrees in number with the subject of the sentence. Example 11 Ken _____ his own shirts. 12 ○ iron 70 ● irons 13 ○ have ironed 5 ○ were ironing Example 12 Carol and Maria _____ at all my jokes. 4 ○ has laughing 45 ○ was laughing 34 ● laugh 17 ○ laughs	Students registered scores of 70 percent or above on agreement items. Example 11 is a typical item of this type. Those on which scores dipped below 70 percent appeared to involve items in which there was some extra difficulty in determining the number of the subject. For example, three items on which students registered the lowest percent correct scores involved either an irregular noun plural (such as "mice") or a compound subject, as in Example 12.

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Skill area descriptions and illustrative questions	Committee's observations and judgments
D. Noun determiners The student will select the appropriate noun determiner for a blank in a sentence. Example 13 ____ signals are from the ship. 9 ○ That 8 ○ This 78 ● Those 5 ○ One	Scores on the 14 noun determiner items were homogeneous, ranging from 66.6 to 87.6 percent correct and averaging 78.0. This high rate of success is illustrated in Example 13. Members of the committee were pleased with third grade performance in this skill area.
III. LANGUAGE CHOICES The student will select a word appealing to a given sense or the most specific word for a blank in a sentence.	Of the eight major written language skill areas, language choices proved to be the weakest area, with an average score of 65.4 percent correct. Members of the advisory committee expressed great interest in language choices, commenting that this skill area is a vitally important one for growth. Because of the importance of language choices and the relatively weak achievement on these questions, members of the committee concluded that they would like to see greater instructional emphasis in this area.

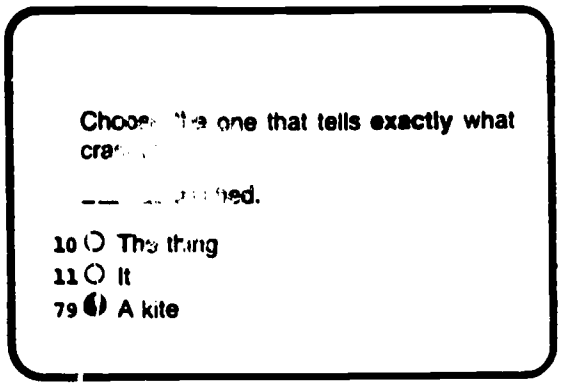
Skill area descriptions and illustrative questions	Committee's observations and judgments
A. Sensory words The student will select the word which appeals to a given sense for a blank in a sentence. Example 14 Choose the word that tells you how the clock sounded. The alarm clock was _____. 4 ○ red 9 ○ new 87 ● buzzing Example 15 Choose the word that tells you how the bread felt when touched. Carlo ate the _____ bread. 29 ○ white 23 ○ delicious 48 ● hard	The 15 questions assessing the use of sensory words proved to be a less difficult group of items (70.6 percent correct) than those involving the use of specific words (60.1 percent). As is shown in Example 14, the sensory word items required students to select the word appealing to a given sense in the context of a presented sentence. Scores on the items ranged from 47.9 to 89.4 percent correct. Examples 14 and 15 illustrate both an easy and a difficult question. Members of the committee concluded from the uneven performance in this important skill area that children should receive more instruction in the use of sensory words.

Skill area descriptions and illustrative questions	Committee's observations and judgments

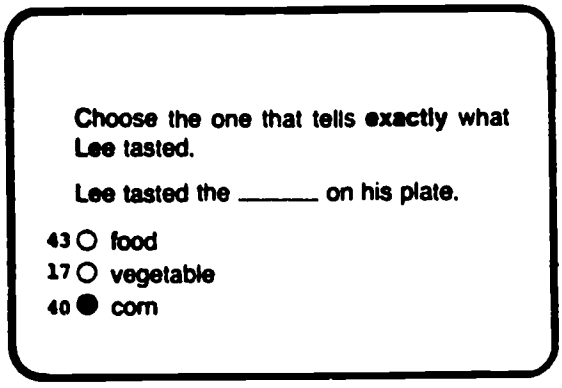
B. Specific words

The student will select the most specific word for a blank in a sentence.

Example 16



Example 17



The 15 questions requiring students to select the most specific word caused even more difficulty (60.1 percent correct). Again there was a considerable range in performance, depending apparently upon the fineness of the discrimination needed. For example, the first item (Example 16) involved fairly gross levels of discrimination between "The thing" "It," and "A kite"; and 79 percent correctly selected "A kite." On the other hand, Example 17 involved much finer levels of discrimination (between "food," "vegetable," and "corn"); and only 40 percent selected the correct response. Scores on the questions requiring students to select the most specific verb also varied considerably, as is shown by Examples 18 and 19. Members of the committee concluded that the concept of specificity in language needs greater emphasis at all levels. (See the discussion of the language choices skill areas for grades six and twelve, pages 100 and 113.)

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 18

Choose the one that tells **exactly** what the baby did.

The baby _____ across the kitchen.

14 ○ went
6 ○ moved
80 ● crawled

Example 19

12

Choose the one that tells **exactly** what the mouse did.

The mouse _____ the piece of cheese.

9 ○ had
68 ○ ate
23 ● nibbled

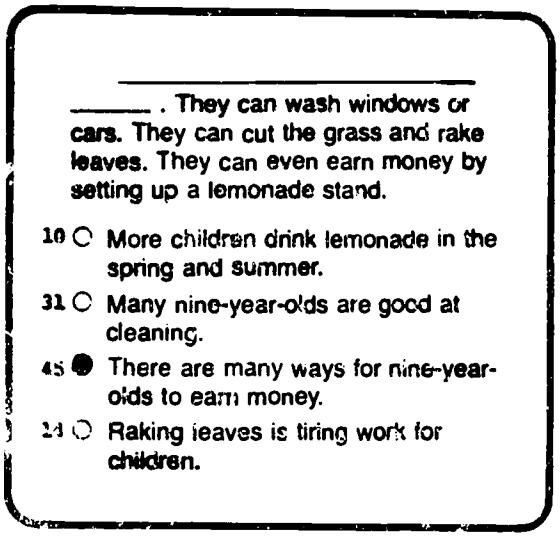
Skill area descriptions and illustrative questions	Committee's observations and judgments
IV. SENTENCE RECOGNITION The student will discriminate between statements and questions, and will supply essential elements (verbs or subjects) to form complete sentences.	Of the eight major language skill areas, sentence recognition was the area in which students registered the second highest score (78.4). Sentence recognition consists of the greatest number of items, a fact which reveals the importance assigned to this skill area in third grade instructional programs by California teachers who reviewed the Test Content Specifications and by the English Language Assessment Advisory Committee who tried to reflect this instructional emphasis on the test. Members of the committee concluded that third grade performance in sentence recognition is good.
A. Statements and questions The student will select the word ordering of a sentence which will form a question (or statement). Example 20 Choose the one which will make a **question**. _____ the bicycle 76 ● Can Mary ride 3 ○ Mary ride can 19 ○ Mary can ride	Scores on the 15 items requiring students to discriminate between questions and statements were quite high and homogeneous, with 11 of the 15 items registering scores over 70 percent, and the other 4 over 60 percent. Example 20 illustrates typical performance in this area which averaged 74.1. When students did fail to identify a question, most tended to select the corresponding statement rather than the scrambled word distractor. For example, in the illustrative item, of those who failed to select the "Can Mary ride," 19 percent selected "Mary can ride," whereas only 3 percent selected "Mary ride can." Members of the committee concluded that children are doing well in their ability to discriminate between questions and statements.

Skill area descriptions and illustrative questions	Committee's observations and judgments
B. Complete sentences 1. Supplying verbs The student will select the word group which supplies a verb needed to form a complete sentence. Example 21 The black bear _____. 17 ○ in the cave 76 ● was walking around 4 ○ from the mountain 3 ○ under the tree 2. Supplying subjects The student will select the word group which supplies a subject needed to form a complete sentence. Example 22 After the storm, _____ flooded. 81 ● streets were 8 ○ had been 5 ○ were not 6 ○ have been	Twenty-seven of the 30 items requiring students to supply a verb for a sentence, registered above 70 percent correct. Members of the committee concluded that third grade performance in this important skill area is uniformly strong (78.8). Similarly, on 28 of the 30 items requiring students to supply a subject for a sentence, students registered above 70 percent correct. Members of the committee were again pleased with the uniformly strong performance shown.

Skill area descriptions and illustrative questions	Committee's observations and judgments
V. PARAGRAPHS The student will select a relevant topic sentence, detail, or a sequential element for a blank in a paragraph.	The paragraphs skill area showed the second lowest score (69.6) of the eight language skill areas (second only to language choices). When the members of the committee studied the difficulty level of the items, however, they concluded that third graders were making satisfactory progress for their developmental level.
A. Topic sentences The student will select a topic sentence for a blank at the beginning of a paragraph. Example 23 _____. First, he got some boards. Then he asked his father for a hammer and nails. Next, he found an old blanket for the bed. 10 ○ Leroy wanted to build a fence. 75 ● Leroy wanted to build a dog house. 9 ○ Leroy wanted to build a shelf. 6 ○ Leroy wanted to build a race car.	The scores on the topic sentence questions ranged somewhat evenly from 45 to 89 percent correct. An analysis of the error pattern on many of these items suggested that students often were distracted by an option which was related in some general way to the first or second sentence following the blank in the paragraph but which failed to subsume the supporting details provided by all the sentences in the rest of the paragraph. For example, on the question in Example 23, nearly three-fourths of the students selected the correct option; however, of those who missed it, nearly 20 percent selected the first and third options, which make sense until the last sentence in the paragraph about "an old blanket" is considered. Example 24 illustrates the same sort of problem even more dramatically.

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 24

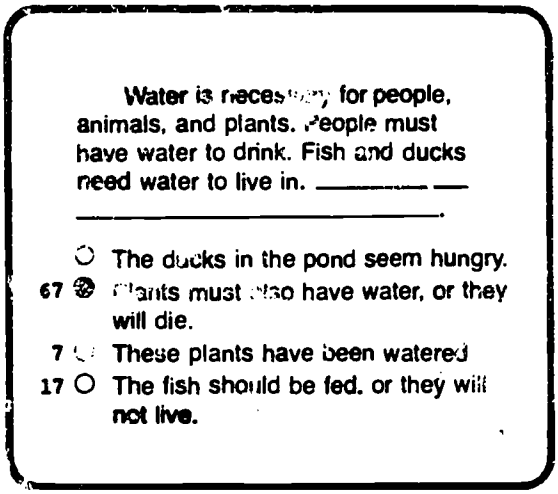


B. Details and sequence

The student will select a sentence which provides a relevant detail (or needed sequential element) for a blank in a paragraph.

The scores on the detail and sequence questions tended to be slightly higher on the average (70.9), than the scores on the topic sentence questions. Members of the committee were quite pleased with the strength of third grade performance on these questions. Examples 25 and 26 illustrate a detail item and sequence item, respectively. On Example 25, about two-thirds of the students selected the correct answer. Of those who missed it, 17 percent selected the fourth distractor, suggesting that they had merely miscued on the word "fish" and had apparently missed the main point of the paragraph. On Example 26, about 16 percent of the students selected the first option, which makes sense if the last sentence is ignored.

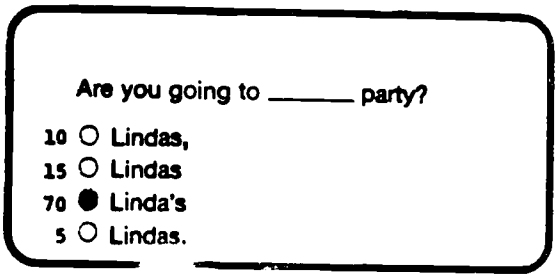
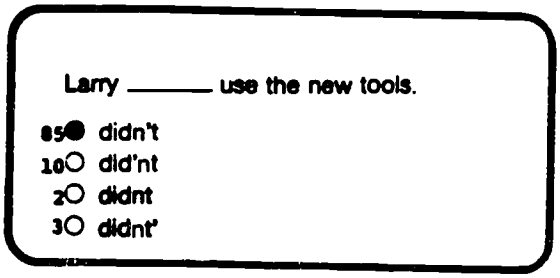
Example 25

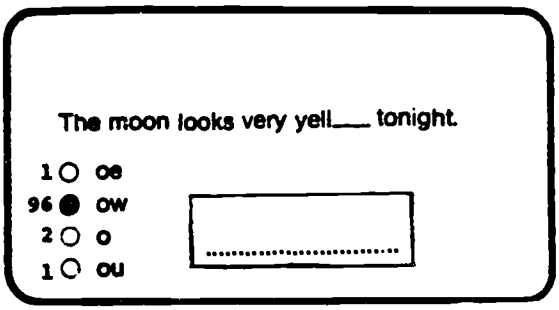
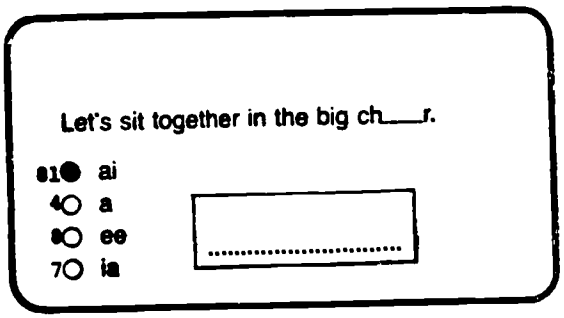


Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 26 Carl had a beautiful pet. It was a green parrot that he kept in a cage. _____ _____. Carl was so unhappy that he cried for almost an hour. 16 ○ Every day he talked to and played with his parrot. 75 ● One day the parrot escaped from the cage and flew away. 9 ○ Suddenly, he had an idea that made him stop crying.	This recurring error pattern suggests that many students would benefit from experience in fitting <u>all</u> the detail and sequential elements together in a paragraph.
VI. CAPITALIZATION The student will select the correctly capitalized words for the blanks in a sentence. Example 27 There are many whales in the _____. 90 ● Pacific Ocean 5 ○ Pacific ocean 3 ○ pacific ocean 2 ○ pacific Ocean	Capitalization was by far the easiest skill area on the third grade test, with an average score of 88.1 percent correct. Example 27 illustrates the format used for assessing capitalization, which was apparently very simple and straightforward for children. Members of the committee concluded that third grade performance in capitalization approaches mastery on these items.

Skill area descriptions and illustrative questions	Committee's observations and judgments
VII. PUNCTUATION The student will select the correct punctuation mark for a given place in a sentence.	The average score on the punctuation questions (72.0) was the third lowest on the language test and was fairly close to the overall mean for written language (74.8). Knowing how difficult this skill area is and how instruction has just begun at the third grade, members of the committee were extremely pleased with the strength of third grade performance in this difficult area.
A. Periods and question marks The student will select the word with the correct punctuation (involving periods and question marks) for the blank in a sentence. Example 28 They heard a loud ___ 4 ○ cry 12 ○ cry, 7 ○ cry' 77 ● cry.	Scores on the period and question mark items were uniformly high, ranging from 73.3 to 84.9 percent correct and averaging 77.8. Example 28 illustrates typical performance on a typical item. Members of the committee were quite pleased with the performance in this subskill area.
B. Commas The student will select the word with the correct punctuation (involving commas in dates and items in a series) for the blank in a sentence.	Scores on the comma items also tended to be quite homogeneous; however, they were considerably lower than those on periods and question marks. In fact, of the 26 subskills on the language test, the comma questions proved to be the third most difficult area. On the questions involving commas between items in a series, the most common error was leaving out punctuation

Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 29 We ate _____ crackers, and cheese. 7 ○ apples? 68 ● apples, 19 ○ apples 6 ○ apples.	altogether, as is shown in Example 29, where 19 percent selected the third option. On the items involving placement of commas within dates, the two most common errors were (1) inserting one comma after the month; and (2) inserting a comma after the month and after the day, as is shown in Example 30.
Example 30 My little brother was born on _____ 1976. 6 ○ December 24 22 ○ December, 24 16 ○ December, 24, 56 ● December 24,	
C. Apostrophes The student will select the correctly punctuated word (involving apostrophes in contractions and singular possessives) for the blank in a sentence.	On the apostrophe item (as on the period and questions mark items), students registered an average score (75.7) which was above that for the total written language content area (74.8). The scores were quite homogeneous, ranging from 64.3 to 87.1 percent correct. On the items involving singular possessive nouns, the most common error was simply omitting the needed apostrophe, as is shown in Example 31. On the contraction items a variety of errors was made, including misplacement of

Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 31  	the apostrophe and omission of the apostrophe (depending on the contraction tested). Members of the committee were extremely pleased with third grade performance on the apostrophe items.
Example 32  	

Skill area descriptions and illustrative questions	Committee's observations and judgments
VIII. SPELLING A. Predictable words The student will (1) write the word; and (2) select the letter(s) needed to spell a predictable word correctly. Example 33  Example 34  	Most of the 69 spelling items assessed the predictable spelling patterns occurring commonly throughout written English. On these items, third graders performed very well. Examples 33, 34, and 35 illustrate high, middle, and low performance levels within the range of scores among the predictably spelled words. Members of the committee were satisfied with the results in this area.

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 35

At the beach, Julie put water in her red bu___et.

69 ● ck
6 ○ ch
20 ○ k
5 ○ kc

B. Words with suffixes

The students will (1) write the word; and (2) select the letters needed to form a word with a predictably spelled suffix.

Example 36

The rain stop___ after a few minutes.

59 ○ ed
35 ● ped
1 ○ eed
5 ○ ted

The items testing the spelling of words with suffixes showed the lowest score of all skill areas on the test (55.5). As Example 36 reveals, many third grade students have not learned to use the spelling generalizations which apply to hundreds of words when suffixes are added. These difficulties include such common patterns as the following: (1) dropping the final "e" in words such as "biting"; (2) changing the "y" to "i" and adding "es" (or "ed") as in "parties"; and (3) doubling the final consonant in words such as "bigger." The only items on which students registered high scores were those involving the addition of "s" or "es" to form a plural, as in "toys" and "kisses." Members of the committee concluded that more instructional emphasis is needed on the rules and regular patterns which govern the spelling of words when combined with common suffixes. (See the spelling skill area results for grades six and twelve.)

Skill area descriptions and illustrative questions	Committee's observations and judgments
C. Demons and homophones The student will (1) write the word; and (2) select the letters needed to spell an unpredictable word correctly; or the student will select the correct homophone for a blank in a sentence. Example 37 Bonnie was s___e that I was right. 8 ○ hir 18 ○ hur 9 ○ ir 65 ● ur Example 38 Andy looked in the closet for his snake, but it wasn't _____. 80 ● there 17 ○ their 3 ○ they're	Performance on the spelling demons varied considerably from item to item, depending upon the difficulty of the test word. Example 37 illustrates an item with a middle level of difficulty. On most of the homophone items, students registered percent correct scores of 80 or above. Example 38 illustrates a typical score on a typical homophone item. (Scores dropped to about 45 percent on two items, revealing confusion among two sets of homophones: "to" vs. "too" and "led" vs. "lead.")

Attitudes Toward Writing

One of the chief concerns of the English Language Assessment Advisory Committee members has always been that students have many different kinds of successful writing assignments throughout their school experiences so that they will develop positive attitudes toward writing as well as written expression skills. Members of the committee were, therefore, very interested in reviewing the data collected for the first time in 1979-80 by the California Assessment Program on student attitudes toward writing.

At the end of each Survey of Basic Skills: Grade 3 test booklet, students were asked the following question:

How much do you like to write your own stories?

- Very much
- A little
- Not at all

The data resulting from this survey are shown in Table 7.

Table 7

Percent of Third Grade Students and Their Written Language Scores by Attitude Toward Writing

How much do you like to write your own stories?	Percent of Students	Percent Correct Score
Very much	49.9	75.8
A little	33.7	76.0
Not at all	14.4	71.2
Non-respondents	2.0	36.3

Almost half of the students (49.9 percent) reported that they liked to write their own stories "very much." These students achieved an average written language score of 75.8. The top scoring group, however, was the 33.7 percent who said they liked to write their own stories "a little." This group achieved a score of 76.0 percent correct. The lowest scoring group (other than the non-respondents) were the 14.4 percent who said they did not like to write stories at all. This group achieved an average score of 71.2.

Members of the committee observed that more students reported liking reading and math "very much" than those that reported liking to write their own stories "very much." While the committee members would have liked more students to report a strong positive attitude toward writing, they remarked that writing is a difficult skill to acquire.

Summary of Committee's Analysis

The members of the English Language Assessment Advisory Committee were pleased to see the high scores throughout most of the language skill areas on the new Survey of Basic Skills: Grade 3.

They noted high achievement levels in all areas except language choices and spelling words with suffixes. The third grade pattern of strengths and weaknesses is summarized below.

Committee Judgments of Third Grade Skill Area Results

Area of strength	Area in need of improvement
Word forms (Examples 1-7)	Language choices
Standard English usage (Examples 8-13)	Sensory words (Examples 14 and 15)
Sentence recognition (Examples 20-22)	Specific words (Examples 16-19)
Paragraphs (Examples 23-26)	Spelling words with suffixes (Example 36)
Capitalization (Example 27)	
Spelling predictable words (Examples 33-35)	

Guided by an understanding of the difficulties students were having, the English Language Assessment Advisory Committee offered the following recommendations for instruction:

1. Devote more focused instruction to language choices. Such instruction should stimulate students to think about careful word choices and consider such factors as degree of specificity, the emotion conveyed by a particular word, and the communication needs of the audience. As stated in the English Language Framework, "Students should recognize varying degrees of abstraction in words as well as degrees of generality in words by being exposed to continued experience in understanding that a

word like "car" is more general than "Pinto," and that abstract words like "love," "honor," and "truth" are emotion-arousing, highly abstract, and general; therefore, meaning different things to different people."[1]

2. Devote more instructional emphasis to the spelling of words with suffixes. Children should be exposed to homogeneous groups of words following similar spelling patterns so they can more easily internalize several useful rules which apply to many other words as well.

[1] English Language Framework for California Public Schools. Sacramento: California State Department of Education, 1976, p. 48.

Written Expression Results for Grade Six

Test Score

The written expression section of the Survey of Basic Skills: Grade 6 consists of 128 questions. The items were selected to assess the students' achievement of a broad array of objectives compiled by the English Language Assessment Advisory Committee and published in Test Content Specifications for the Survey of Basic Skills: Written Expression and Spelling, Grades Six and Twelve (Sacramento: California State Department of Education, 1975). Both the objectives and the items used to assess the objectives fall into one of eight major skill areas: word forms, language choices, standard usage, sentence recognition, sentence manipulation, capitalization, and punctuation. The relative degree of emphasis assigned to each of the written expression skill areas on the Survey of Basic Skills: Grade 6 is presented graphically in Figure 5.

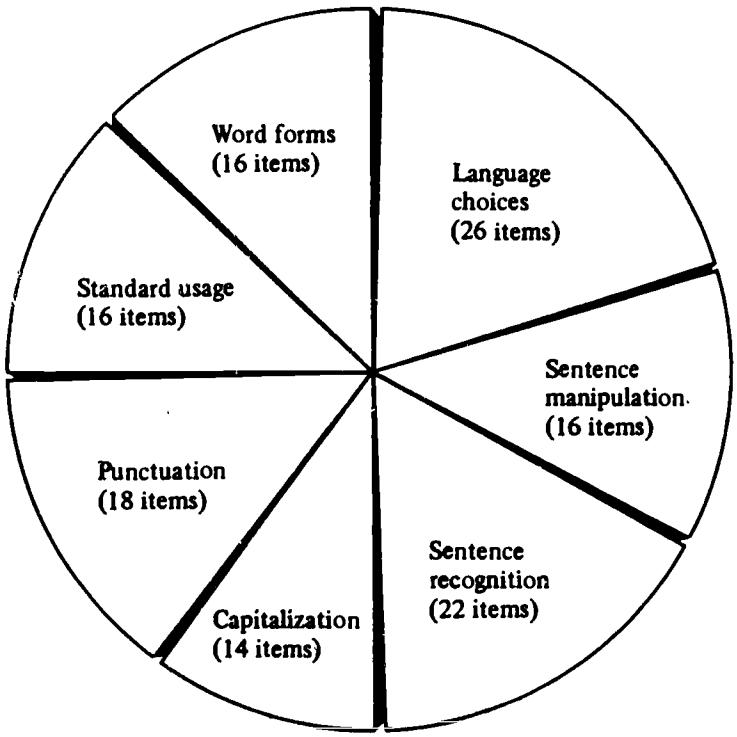


Fig. 5. Number of questions, by skill area, in the written expression section of the *Survey of Basic Skills, Grade 6*

Written Expression Scores for Grade Six

The results of sixth grade performance on the total written expression test and in each of the skill areas for 1975-76 through 1979-80 are presented in Table 8. Year-to-year changes in overall performance and in skill area performance are also shown in the table.

Table 8

Written Expression Scores of California Sixth Grade Students on the Survey of Basic Skills: Grade 6, 1975-76 Through 1979-80

Skill area	Number of questions	Average percent correct					Change			
		1975-76	1976-77	1977-78	1978-79	1979-80	1975-76 to 1976-77	1976-77 to 1977-78	1977-78 to 1978-79	1978-79 to 1979-80
WRITTEN EXPRESSION, TOTAL	128	62.5	63.6	64.1	64.6	65.4	+1.1	+0.5	+0.5	+0.8
Word forms	16	82.4	82.3	82.9	83.0	83.4	-0.1	+0.6	+0.1	+0.4
Standard usage	16	75.3	75.3	75.8	75.9	76.3	-0-	+0.5	+0.1	+0.4
Language choices	26	54.4	56.5	55.2	55.7	56.1	+2.1	-1.3	+0.5	+0.4
Sentence recognition	22	62.3	63.0	63.7	64.4	65.1	+0.7	+0.7	+0.7	+0.7
Sentence manipulation	16	61.7	62.6	63.1	63.8	64.2	+0.9	+0.5	+0.7	+0.4
Capitalization	14	57.4	58.4	59.8	61.0	62.4	+1.0	+1.4	+1.2	+1.4
Punctuation	18	52.4	52.5	54.4	55.1	56.8	+0.1	+1.9	+0.7	+1.7
SPELLING, TOTAL	64	63.6	63.6	64.1	64.5	64.9	-0-	+0.5	+0.4	+0.4
Relationships	35	58.1	58.1	58.6	59.1	59.8	-0-	+0.5	+0.5	+0.7
Word forms	29	70.2	70.3	70.8	71.0	71.0	+0.1	+0.5	+0.2	-0-

The following conclusions are apparent from an examination of the data in Table 8:

- For the fourth consecutive year, sixth grade performance in written expression improved. Since 1975-76, when the Survey was first administered, the average percent correct score has increased from 62.5 to 65.4, yielding an overall gain of 2.9 percent correct.

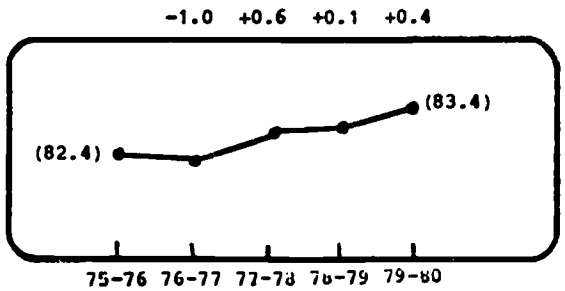
- From 1978-79 to 1979-80, gains were made in all skill areas. The skill areas in which the largest increases were registered during this time span were punctuation (1.7) and capitalization (1.4). The only skill area which showed no improvement was the word forming category within the area of spelling. Likewise, when overall changes from 1975-76 to 1979-80 were tabulated, capitalization showed the largest total gain (5.0),

and punctuation the second largest (4.4). Word forming within spelling showed the smallest gain (0.8). All other written expression categories showed an improvement of at least 1.0 over the four-year period.

Analysis and Interpretation of Skill Area Results, Grade Six

Members of the English Language Assessment Advisory Committee analyzed, interpreted, and evaluated the 1979-80 written expression results, as they have done in previous years. In judging the adequacy of student performance, they considered such factors as the inherent difficulty of the skills, the particular items that were used to measure each skill, and changes in performance since 1975-76. Guided by an understanding of the kinds of errors students are making, the committee members concluded their analysis with recommendations for instruction.

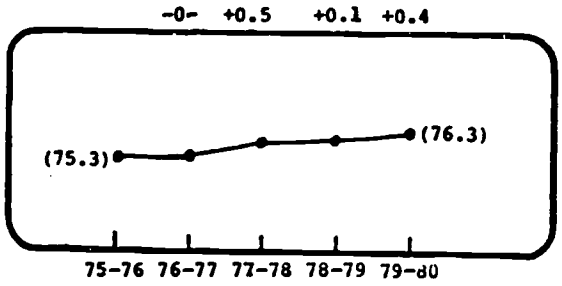
Their analysis is presented on the following pages with skill area descriptions and illustrative examples in the left column and the committee's observations and judgments in the right column.

Skill area descriptions and illustrative questions	Committee's observations and judgments
I. WORD FORMS (See "Morphology," Test Content Specifications.) The student must select the appropriate suffix (-ed, -ing, -s, -ly, -er, -est, -'s) for a word in a given sentence. Example 39 She was _____ extreme pain until yesterday. 3 ○ suffer 11 ○ suffered 84 ● suffering 2 ○ suffers	The average score on the 16 word form questions was 83.4 in 1979-80, registering a gain of .4 percent correct from the previous year. The changes in average percent correct from 1975-76 are shown in the graph below. 

Skill area descriptions and illustrative questions	Committee's observations and judgments
	This skill area continued to be the easiest written expression area on the test. (See Table 8 for skill area percent correct scores.) Example 39 is illustrative of the high success rate on these items. While most pupils can select the correct form of a word for a sentence, they seem to have more difficulty spelling words with suffixes (see spelling area, page 106 for grade 6 this section). The English Language Assessment Advisory Committee was pleased with both the overall level of performance and gains made in the word forms skill area.
II. STANDARD USAGE The student must select the verb or pronoun in a sentence which reflects standard English usage. Example 40	The 16-item standard usage category registered a gain of .4 percent correct from 1978-79 to 1979-80 resulting in an average score of 76.3. The following graph shows year-to-year changes in this area since 1975-76.

The doctors_____everything possible.

84 ● did
16 ○ done

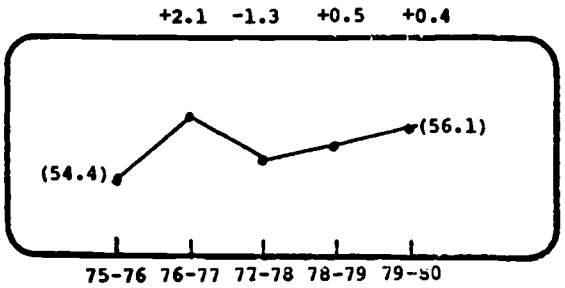


Skill area descriptions and illustrative questions	Committee's observations and judgments
	Standard usage continues to be the second easiest skill area on the written expression test. (See Table 8 for skill area percent correct scores.) Example 40 is a typical standard usage item. Members of the committee were pleased with the overall scores and progress made in standard usage.
III. LANGUAGE CHOICES The student must select the most specific and vivid word for a sentence or select a word reflecting a particular emotional tone in a given context. Example 41	In 1979-80 the 26-item language choices area replaced punctuation as the written expression skill area with the lowest average percent correct score (56.1) (after being the second lowest skill area for the previous four years). The following graph shows the changes in language choices from 1975-76 to 1979-80.

Which of the following best shows that John's attitude was unfriendly?

"Where are my bat and ball?"_____ John.

8 ○ called
20 ○ said
57 ● grumbled
15 ○ exclaimed



Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 42 **Pretend that you are writing a story. Fill in the oval next to the word or words that will give your reader the clearest, most specific, and concrete picture.** **EXAMPLE:** **At the bottom of her lunch sack she found _____.** **o some food** **● a carrot** **o a snack** **o a vegetable** I gave my _____ a bath. 52 ● poodle 36 ○ dog 1 ○ animal 11 ○ pet	Examples 41 and 42 are typical language choice items. While the committee was pleased with a second year of growth in this skill area, they continued to express concern about the overall level of sixth grade performance, considering the importance of the language choices skill area. Committee members pointed out that sensitivity to word choices is an essential part of critical thinking which provides a basis for detecting stereotypes and understanding metaphor. They recommended focused instruction that would require students to make word choices on the basis of degrees of specificity and particular emotional effect. As is stated in the English Language Framework, "Practice in making the best word choice for precision and clarity should be regarded as important to each writing experience."[2]

[2] English Language Framework for California Public Schools: Kindergarten Through Grade Twelve. Sacramento: California State Department of Education, 1976, p. 45.

Skill area descriptions and illustrative questions	Committee's observations and judgments

IV. SENTENCE RECOGNITION

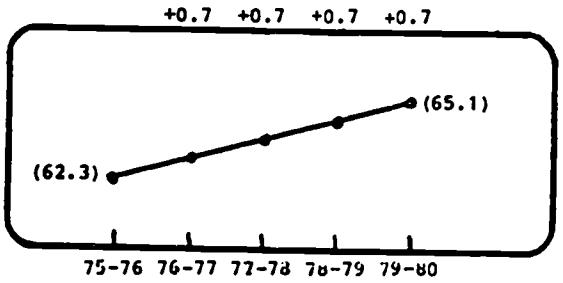
The student must recognize complete sentences, fragments, run-ons, and normal English word order in sentences.

Example 43

Fill in the oval next to the group of words which needs more words to make it a complete sentence.

11 ○ They brought a present.
17 ○ We are happy.
9 ○ Barry is not here.
63 ● In the dark of the night.

For the fourth consecutive year, the 22 sentence recognition items registered a gain of .7 percent correct resulting in an average score of 65.1 for 1979-80. The graph below shows this very consistent trend.



Example 43 illustrates both a typical sentence recognition item and an average score in the area. Committee members observed that many pupils appeared to rely more heavily upon the length and sound of a word grouping than upon its structure in determining the completeness of a sentence, as is evident from the example. This was consistent with the expectations of the committee, since concentrated grammar instruction is often delayed until junior high.

Skill area descriptions and illustrative questions	Committee's observations and judgments

V. SENTENCE MANIPULATION

The student must select the most effective sentence or sentence element.

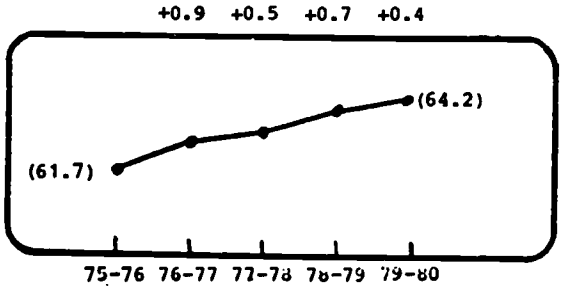
Example 44

Beneath each sentence you will find four ways of writing the underlined part. Choose the answer that would make the best sentence, and fill in the oval next to it. The first answer is always the same as the underlined part and is sometimes the correct answer.

Besides selling candy, flowers and greeting cards are also sold by Mr. Grog.

15 ○ Besides selling candy, flowers and greeting cards are also sold by Mr. Grog.
24 ○ Not only candy, but Mr. Grog sells flowers and greeting cards too.
7 ○ Candy as well as flowers and greeting cards, too, all of these are sold by Mr. Grog.
54 ● Mr Grog sells not only candy, but flowers and greeting cards as well.

The 16 sentence manipulation items registered a positive gain for the fourth consecutive year, resulting in an average score of 64.2 in 1979-80. The positive upward trend is shown in the graph below.



The sentence manipulation items involved recognizing the most concise and direct way of expressing a statement. Example 44 is a typical item of this type. Since these questions tend to be relatively subtle and sophisticated, members of the committee were satisfied with the overall level of performance and extremely pleased with the consistent gains made in the area over the last four years.

Skill area descriptions and illustrative questions	Committee's observations and judgments

VI. CAPITALIZATION

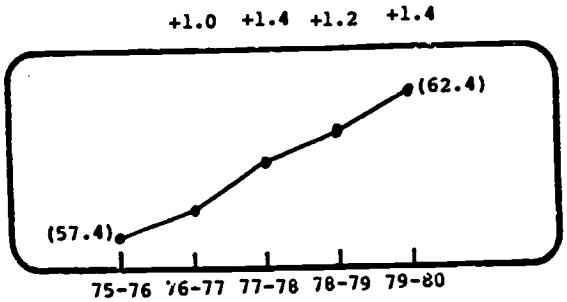
The student must recognize words in a sentence which should be capitalized, such as the beginning word of a sentence, names of persons and places, days of the week, and months of the year.

Example 45

In the following sentences you are to look for mistakes in capitalization. When you find a mistake, fill in the oval next to the line with the mistake. If there is no mistake, fill in the fourth oval.

68 ● On monday my
3 ○ brother always rides
3 ○ his bicycle to school.
26 ○ (No mistakes)

Of all the written expression skill areas, the 14 capitalization items showed the largest total increase since 1975-76, with an overall gain of 5.0 percent correct. This resulted in an average score of 62.4 for 1979-80. The upward trend is shown in the graph below.



While members of the committee were pleased to see the overall improvement, they judged that scores are still disappointing on capitalization questions involving days of the week and months of the year, illustrated in Example 45. Members of the committee also observed that many sixth graders capitalized only the first word of a proper noun involving more than one word, a fact which suggests that many students need a better grasp of the concept of a proper noun.

Skill area descriptions and illustrative questions	Committee's observations and judgments

VII. PUNCTUATION

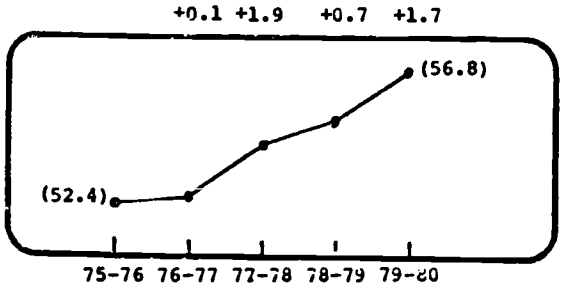
The student must identify errors in the use of the period, question mark, exclamation point, comma, apostrophe, and quotation marks.

Example 46

The following sentences may have a mistake in punctuation (periods, commas, apostrophes, etc.). When you find a mistake, fill in the oval next to the line with the mistake. If there is no mistake, fill in the fourth oval.

6 ○ This summer we are
57 ● going to Hollywood California
2 ○ for at least three days.
35 ○ (No mistakes)

Like capitalization, the 18-item skill area of punctuation registered strong, consistent gains since 1975-76, resulting in an average score of 56.8 percent correct in 1979-80. This upward trend is presented in the graph below.



Example 46 illustrates an average score on a typical punctuation item. Members of the committee were pleased with the progress shown in punctuation because, as they concluded in earlier reports, "Mastery of such basic skills is important if students are to punctuate and proofread their own writing effectively."

Skill area descriptions and illustrative questions	Committee's observations and judgments

VIII. SPELLING

A. Relationships

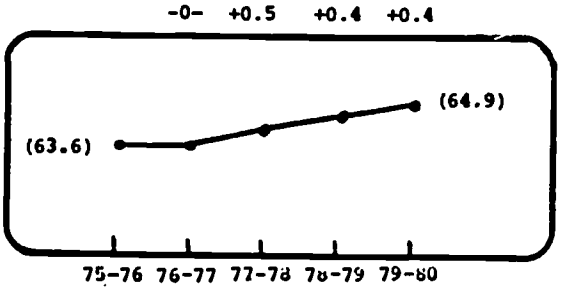
From a list of three or four words, the pupil must recognize any misspelled words.

Example 47

Fill in the oval next to the MISSPELLED word in each group. If there is no misspelled word, the answer is "All correct."

1 ○ treat
70 ● streat
7 ○ fleet
22 ○ All correct

A gain of .4 percent correct from 1978-79 to 1979-80 resulted in an average score of 64.9 for the 64 item spelling category. The changes in scores on these items are presented in the graph below.



B. Word forming

The pupil must select the correct spelling pattern used in a variety of common word forms.

Example 48

Pairs of words are given below. In each pair, one word is spelled correctly, and the other is spelled incorrectly. Fill in the oval next to the CORRECT SPELLING.

35 ○ careing
65 ● caring

Members of the committee were satisfied with the results and progress in the area of spelling relationships. Example 47 is illustrative of the average level of performance on most of the spelling items. However, in the word forming category of spelling, members of the committee continue to be disturbed by the percent correct scores on a number of test words involving the addition of a suffix to a base word, as in Examples 48 and 49. The committee judged that scores on these and similar items were unnecessarily low, since each of these words represents a highly regular and predictable generalization about how a word is spelled when a suffix is attached to it. Their concern was underscored by the fact that the word forming category

Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 49 **Pairs of words are given below. In each pair, one word is spelled correctly, and the other is spelled incorrectly. Fill in the oval next to the CORRECT SPELLING.** 59 ● requirement 41 ○ requirment	of spelling is the written expression skill area in which students registered the least gain since 1975-76, and the only one in which they showed no progress at all from 1978-79 to 1979-80 (as shown in Table 8).

Summary of Committee's Findings and Recommendations

Members of the English Language Assessment Advisory Committee were gratified to see a fourth year of increasing sixth grade written expression scores. While they were pleased to see the progress made in all skill areas, the committee members identified a pattern of strengths and weaknesses which is summarized on the following page.

Committee Judgments of Sixth Grade Skill Area Results

Area of strength	Area in need of improvement
Selecting the correct form of a word for a sentence (Example 39)	Spelling words with suffixes (Examples 48 and 49)
Selecting the correct verb or pronoun in accordance with standard English usage (Example 40)	Capitalizing the days of the week and months of the year (Example 45)
Discriminating between complete and incomplete sentences (Example 43)	Identifying the most specific or general word in a group of words (Example 42)
	Selecting a word which is most likely to convey a particular feeling or attitude (Example 41)

Guided by an understanding of sixth graders' strengths, weaknesses, and most frequent mistakes, members of the committee offered the following instructional recommendations:

1. A more efficient approach to teaching spelling is needed at the elementary level. Children should be exposed to homogeneous groups of words following similar spelling patterns so that they can more easily internalize generalizations that apply to many other words as well. Such instruction should include more emphasis in the generalizations pertaining to the spelling of words with suffixes. If students fail to form such basic generalizations in the third and fourth grades, where they are first introduced, these lessons should be retaught, reviewed, and practiced in the fifth and sixth grades.

2. Some of the simplest capitalization rules pertaining to days of the week and months of the year need to be retaught and reinforced in the fourth, fifth and sixth grades. Intermediate students also need more specific instruction in the skill of identifying all the words in a multiple-word proper noun and recognizing that all of them must be capitalized.

3. Focused instruction and skill-building practice are needed in the language choices skill area to help students understand some of the issues related to effective word choices. Such instruction should encourage students to think about word choices in terms of degrees of specificity and particular emotional effects. For example, students should recognize that "Pinto" communicates with greater precision than "car" and that "grumbled" and "stated" convey different emotions. Students need this sensitivity to language if they are to write effectively, read critically, and be alert to propaganda devices in all the media.

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Written Expression Results for Grade Twelve

Test Scope

The written expression section of the Survey of Basic Skills: Grade 12 consists of 142 questions. The items were selected to assess the students' attainment of a wide variety of objectives compiled by the English Language Assessment Advisory Committee and published in Test Content Specifications for the Survey of Basic Skills: Written Expression and Spelling, Grades Six and Twelve. Both the objectives and the items used to assess the achievement of the objectives fell into one of six major skill areas: word forms, language choices, sentence recognition, sentence manipulation, paragraphs, and capitalization and punctuation. The emphasis placed on each of the written expression skill areas in the Survey of Basic Skills: Grade 12 is shown in Figure 6.

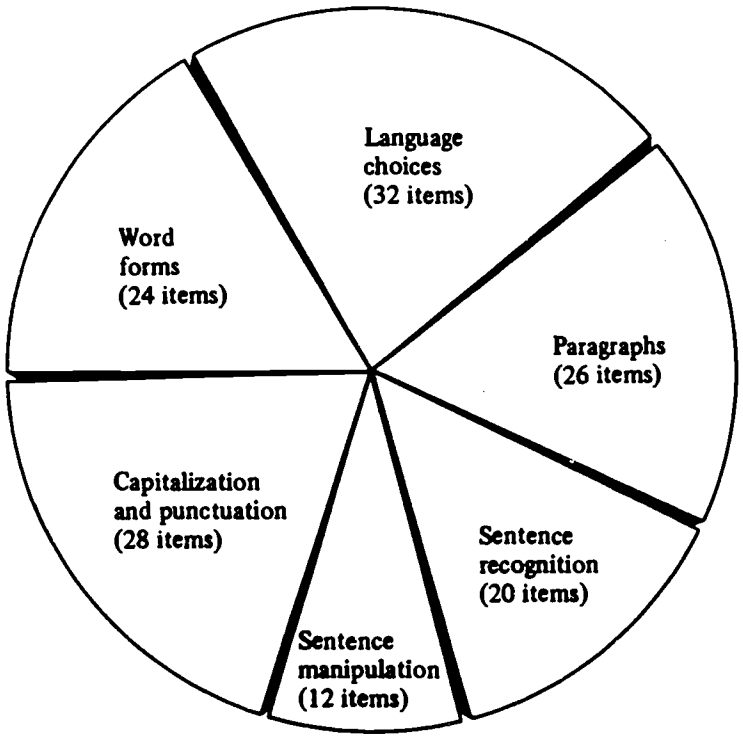


Fig. 6. Number of questions, by skill area, in the written expression section of the *Survey of Basic Skills: Grade 12*

Written Expression Scores for Grade Twelve

The results of twelfth grade performance on the total written expression test and in each of the skill areas for 1975-76 through 1979-80 are presented in Table 9. Year-to-year changes in overall performance and in skill performance are also shown in the table.

Table 9

Written Expression Scores of California Twelfth Grade Students on the Survey of Basic Skills: Grade 12

Skill area	Number of Questions	Average percent correct					Change			
		1975-76	1976-77	1977-78	1978-79	1979-80	1975-76 to 1976-77	1976-77 to 1977-78	1977-78 to 1978-79	1978-79 to 1979-80
WRITTEN EXPRESSION, TOTAL	142	62.3	61.9	62.1	62.4	62.4	-0.4	+0.2	+0.3	-0-
Word Forms	24	72.6	72.1	72.1	71.9	72.2	-0.5	-0-	-0.2	+0.3
Language choices	32	66.9	66.7	66.6	66.6	66.3	-0.2	-0.1	-0-	-0.3
Sentence recognition	20	67.3	67.7	68.4	68.8	69.0	+0.4	+0.7	+0.4	+0.2
Sentence manipulation	12	42.9	42.9	43.4	43.7	43.7	-0-	+0.5	+0.3	-0-
Paragraphs	26	59.9	59.1	59.3	59.7	59.7	-0.8	+0.2	+0.4	-0-
Capitalization and punctuation	28	54.6	54.3	54.7	55.4	55.4	-0.3	+0.4	+0.7	-0-
SPELLING, TOTAL	72	68.0	67.9	68.4	68.4	68.8	-0.1	+0.5	-0-	+0.4

The following observations about changes in performance are apparent from an examination of the results in Table 9.

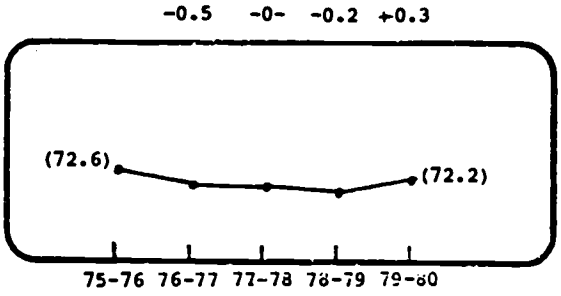
- The overall twelfth grade written expression score remained the same from 1978-79 to 1979-80. Since the Survey was first administered, the written expression score has shown minor fluctuations, yielding a very slight overall gain of 0.1 percent correct since 1975-76.

- From 1978-79 to 1979-80, gains were registered in only three written expression skill areas: word forms (0.3 percent correct), sentence recognition (0.2 percent correct) and spelling (0.4 percent correct). Language choices showed a decline of 0.3 percent correct, and all other skill areas remained the same.

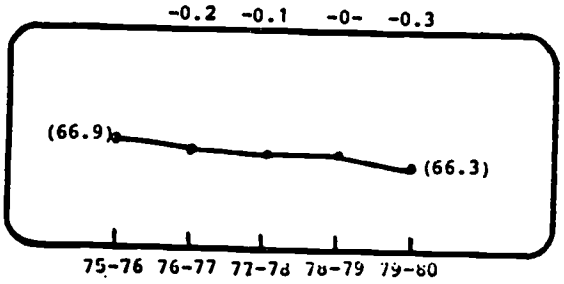
- When specific skill area changes were calculated from 1975-76 to 1979-80, slight positive gains were noted in all skill areas except language choices which showed a loss of 0.6 percent correct. Sentence recognition showed the most consistent and largest gain (1.7 percent correct) over the years.

Analysis and Interpretation of Skill Area Results, Grade Twelve

Members of the English Language Assessment Advisory Committee analyzed, interpreted, and evaluated the 1979-80 written expression results, as they have done in previous years. In judging the adequacy of student performance, they considered such factors as the inherent difficulty of the skills, the particular items that were used to measure each skill, and changes in performance since 1975-76. Their analysis is presented on the following pages with skill area descriptions and illustrative items in the left column and committee observations and judgments in the right column. Guided by an understanding of the kinds of errors students are making, the committee members concluded their analysis with recommendations for instruction.

Skill area descriptions and illustrative questions	Committee's observations and judgments
I. WORD FORMS (See "Morphology," Test Content Specifications.) The student must select the appropriate inflectional suffix (-ed, -ing, -s, -ly, -er, -est) for a given sentence, must discriminate between form class words (such as nouns and verbs) and structure words (such as prepositions), and must demonstrate dictionary skills for a variety of purposes. Example 50 Select the form of the word which is grammatically correct in the sentence. Some methods of teaching have been found _____; others have not. 2 ○ education 89 ● educational 2 ○ educate 7 ○ educationally	The 24 item word form category on the Survey was one of the few written expression skill areas to show a gain from 1978-79 to 1979-80 (.3 percent correct), resulting in an average score of 72.2. The score changes in word forms since 1975-76 are displayed in the graph below. 

Skill area descriptions and illustrative questions	Committee's observations and judgments
	Most of the 24 word form questions on the Survey required students to select the correct form of a word for a sentence and to demonstrate a variety of dictionary skills for different purposes. On the whole, this category continued to be the easiest one for twelfth graders. Example 50 illustrates the typically high scores in this area. Members of the committee were pleased to see an increase in the score of word forms, especially in light of previous years' declines.
II. LANGUAGE CHOICES The student must identify attitude-conveying words and phrases, must differentiate between specific and general sets of words, and must identify the audience of a prose passage.	Of all the written expression skill areas, language choices has shown the greatest overall decline since 1975-76, (0.6 percent correct). The average score for the 32 item category is now 66.3 percent correct. The downward trend over the previous five-year period is shown in the graph below.



Example 51

Which of the following words or groups of words is most SPECIFIC?

33 ○ current events magazine
5 ○ publication
56 ● *Newsweek*
6 ○ magazine

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 52

Dr. Henry J. Heimlich, _____ at Jewish Hospital in Cincinnati, described the technique in the journal *Emergency Medicine* and invited physicians to try it in real emergencies.

Which of the following terms is most respectful in the context of the above sentence?

62 ● director of surgery
1 ○ chief blade
17 ○ practitioner
20 ○ head doctor

Example 53

The *amount* of electricity flowing in a circuit is measured in amperes. Electrical *pressure* is measured in volts. It is this pressure which forces current to flow from one point to another.

For which of the following groups of people is this passage most likely to have been written?

54 ○ master electricians
42 ● high school students
2 ○ astronauts
2 ○ television announcers

Members of the committee continued to express concern about both the low performance level in language choices and the consistent downward trend since 1975-76. The committee members were particularly disturbed by the continuing low level of performance on questions like the one shown as Example 51. This kind of skill is one of considerable interest to the committee, since student writing typically suffers from a lack of specificity. It is doubtful that students are making vivid, specific word choices in their writing if they can't even recognize them in lists. Moreover, sensitivity to word choices is an essential part of critical thinking which provides a basis for detecting stereotypes and understanding metaphor.

As is stated in the English Language Framework, "Students should recognize varying degrees of abstraction in words as well as degrees of generality in words by being exposed to continued experience in understanding that a word like car is more general than Pinto, and that abstract words like love, honor, and truth are emotion-arousing, highly abstract and general; therefore, meaning different things to different people."[3]

The committee recommended more focused instruction in language choices at all levels. Such focused instruction should require students to make careful word choices based upon such factors as the degree of specificity, the emotion conveyed by a particular word, and the communication needs of the intended audience.

[3] English Language Framework for California Public Schools: Kindergarten Through Grade Twelve. Sacramento: California State Department of Education, 1976, p. 48.

Skill area descriptions and illustrative questions	Committee's observations and judgments

III. SENTENCE RECOGNITION

The student must recognize complete sentences, sentence parts, sentence patterns, and appropriate subject-verb relationships.

Example 54

Identify the group of words which is incomplete or needs additional words to complete the meaning.

71● The barking dog in the driveway.
6○ It is humid.
18○ Peace continues.
5○ There is the mail.

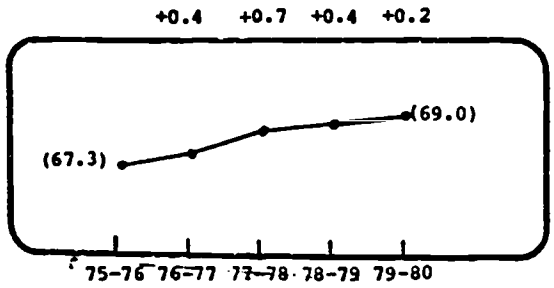
Example 55

The _____ man seems very _____.

The part of speech that will usually fill both blanks in the sentence above is:

11○ a noun
65● an adjective
17○ a verb
7○ a pronoun

Of the seven written expression skill areas, sentence recognition showed the second highest score 69.0, and is the only skill area to have gains every year since 1975-76, registering an overall change of 1.7 percent correct. This consistent upward trend is displayed in the graph below.



Members of the committee have speculated that these increases may reflect a renewed focus on the sentence in the return to the basics. Example 54 illustrates a typical sentence recognition item and average score. Over two-thirds of the students were able to identify the incomplete sentence in this example, however, the error pattern suggests that many students relied more heavily upon the length of a word group than upon its structural components in determining the completeness of a sentence. The responses to Example 55 also indicate that over one-third of the twelfth graders are confused about some of the basic grammatical elements of a sentence.

Skill area descriptions and illustrative questions	Committee's observations and judgments

IV. SENTENCE MANIPULATION

The student must select the most economical, effective sentence and must be able to recognize effective coordination and subordination within sentences.

Example 56

Below are four sentences expressing the same general thought. Mark the sentence which expresses the thought MOST EFFECTIVELY.

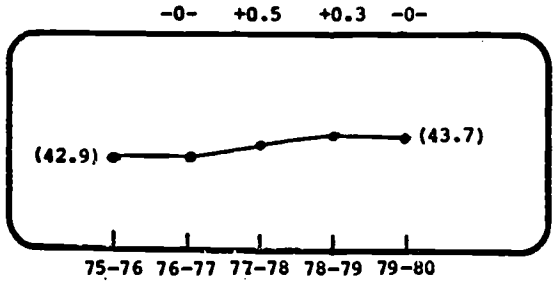
49 ○ She spoke to me in a very cool manner when we met each other yesterday.

12 ○ When we met yesterday, I was spoken to in a very cool manner by her.

13 ○ Her manner was very cool when meeting and speaking to me yesterday.

26 ● Yesterday she greeted me coolly.

Of all the written expression skill areas, sentence manipulation showed the lowest average percent correct (43.7), a score which reflected no progress from 1978-79 to 1979-80. The score changes in sentence manipulation from 1975-76 to 1979-80 are displayed in the graph below.



The 12 sentence manipulation questions required students to perform a variety of mental operations with sentences. Six questions required students to select the most effective statement of an idea. Twelfth graders consistently rejected terse, economical statements in favor of wordy expressions of the same idea, as shown in Example 56. Twelfth grade students also encountered difficulty on a variety of items that required them to identify the sentence that most effectively combined several pieces of information. This type of question is illustrated by Example 57 in which about 50 percent of the students failed to select the most effective sentence. Members of the committee stressed that California's

Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 57 In the next item, Part I expresses ideas in choppy, repetitious sentences. Decide which sentence Part II expresses these same ideas MOST EFFECTIVELY. I. There were some loose boards. They were laid on the railroad ties. They supplied a footing for the man. They also supplied a footing for his executioners. 11 ○ Laid on the railroad ties, the man stood on some loose boards which supplied a footing for him and his executioners. 49 ● Some loose boards laid on the railroad ties provided a footing for the man and his executioners. 10 ○ Some loose boards laid on the ties supporting the rails provided a footing for the man and his executioners. 30 ○ On the railroad ties were some loose boards, and they provided a footing for the man and his executioners.	twelfth graders need more experience with sentence manipulation activities (such as the type of exercise in Example 57) in order to help them (1) achieve greater effectiveness and economy of expression; and (2) gain control of more complex sentence structure in their own writing.

Skill area descriptions and illustrative questions	Committee's observations and judgments

V. PARAGRAPHS

The student must identify irrelevant material in a paragraph, recognize inconsistent time development, select the logical sequence of a group of sentences, select the sentence which best summarizes the ideas presented in one or more related paragraphs, and identify transitional elements within a paragraph.

Example 58

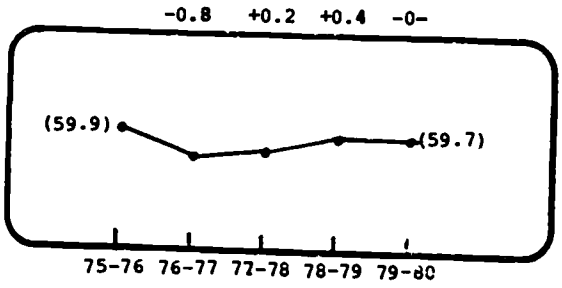
The seven sentences below are in a scrambled order. Some of them can be put together to make a single, unified paragraph. Before attempting to answer any questions, read all of the sentences carefully.

A 1 It probably received its name from its
2 copper-colored head which is triangular
3 in shape.
B 4 Like the rattlesnake, it is a member of
5 the pit viper family having a hollow or
6 pit between the eye and the nostril.
C 7 The copperhead was once the most common
8 and widely distributed of all venomous
9 snakes in the United States.
D 10 This may be the reason that Democrats in
11 the North who sympathized with the South
12 in the Civil War were called "copperheads,"
13 for they were suspected of treachery.
E 14 Unlike the rattlesnake, it has no rattles
15 and strikes without warning.
F 16 Augustus Thomas wrote a full-length drama
17 that he called *The Copperhead*.
G 18 Today, however, it is most frequently
19 found in sparsely settled areas of the
20 South.

Which sentence most logically follows Sentence C?

18 ○Sentence A 14 ○Sentence E
10 ○Sentence B 58 ●Sentence G

Scores on the 26 paragraph items averaged 59.7 percent correct, ranging widely from 27 to 92 percent correct. Score changes in paragraphs for the previous five-year period are shown in the graph below.



The paragraph questions tested a variety of skills, two of which are illustrated by Examples 58 and 59 based upon the same test paragraph. Members of the committee speculated that a weak grasp of sequence and transitional elements in paragraphs (illustrated by Examples 58 and 59) may be related to the loss of coherence reported by the National Assessment of Educational Progress in its most recent study of the writing of seventeen-year olds. They concluded that more emphasis is needed in paragraph construction skills at the high school level.

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 59

Which of the following words serves as a transitional word in the paragraph?

14 ○ which (line 2) 18 ○ copperhead (line 7)
12 ○ rattlesnake (line 4) 56 ● however (line 18)

VI. PUNCTUATION AND CAPITALIZATION

The student must identify punctuation and capitalization errors in a sentence.

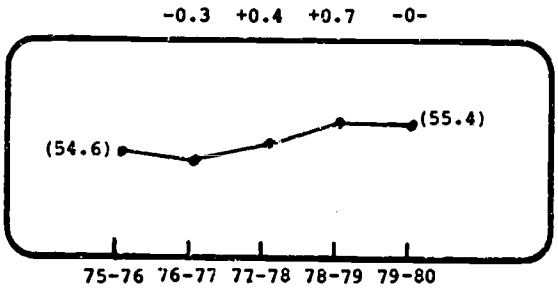
Punctuation and capitalization continued to be the second most difficult written expression skill area on the Survey for twelfth graders (55.4 percent correct). No change was registered in this area from 1978-79 to 1979-80. Score changes in punctuation and capitalization over the previous five year period are shown in the graph below.

Example 60

In the following sentence, which punctuation is needed?

•We visited Taliesen West Frank Lloyd Wright's famous home in the desert.

76 ● West, Frank
16 ○ visited, Taliesen
2 ○ famous, home
6 ○ home, in



Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 61

In each sentence there may be an error in captialization or punctuation. The error, if any, is underlined and lettered. If there is an error, select the one underlined part that must be changed to make the sentence correct. If there is no error, the answer is D.

"Will you make sure that all the boys turn in their uniforms, Steve?" asked Mr. Ross.
A B C

No error
D

38 ○A 22 ○B 3 ○C 37 ●D

Considerable variation was shown on the scores of the 28 punctuation and capitalization questions.

Members of the committee observed that many more students performed successfully on questions where punctuation coincided with the natural junctures of spoken English, as in Example 60. However, where students had to use knowledge of one or more conventions as a guide, the percent correct scores dropped substantially, as is illustrated in Example 61.

VII. SPELLING

The student must decide whether an underlined word in a given sentence is spelled correctly.

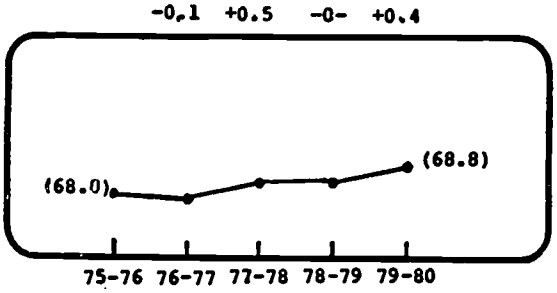
Example 62

In the following sentence, one word is underlined and is written in bold type. Fill in the oval next to "right" if the word is spelled correctly or next to "wrong" if the word is spelled incorrectly.

This is only a temperary job.

30○ Right 70● Wrong

The 72 spelling items registered an average score of 68.8 percent correct for 1979-80. Changes in spelling during the previous five year period are presented in the graph below.



Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 63 In the following sentence, one word is underlined and is written in bold type. Fill in the oval next to "right" if the word is spelled correctly or next to "wrong" if the word is spelled incorrectly. Are we eating in the dinning room tonight? 52○ Right 48● Wrong Example 64 In the following sentence, one word is underlined and is written in bold type. Fill in the oval next to "right" if the word is spelled correctly or next to "wrong" if the word is spelled incorrectly. After cutting the grass, I trimed the hedge. 33○ Right 67● Wrong	Example 62 illustrates a typical score and a typical spelling item on the Survey. Members of the committee were generally satisfied with twelfth-grade performance on most spelling items of this type. However, the committee observed the same kind of spelling problem in the twelfth grade results as they had reported in those for the sixth grade, namely difficulties with the spelling of a word once a suffix had been attached. Examples 63 and 64 illustrate this difficulty. Members of the committee were disturbed to see that so many twelfth graders had failed to learn some of the most common patterns for adding suffixes (such as "-ed" and "-ing") to words. On the basis of these and similar data, the committee recommended a skill maintenance program in spelling for junior high and high school students. Such a program might well employ a highly structured approach to spelling instruction which would introduce words grouped on the basis of spelling generalizations, particularly generalizations which apply to the formation of new words when suffixes are attached to a base word. This kind of structure coupled with appropriate practice should enable students to internalize a number of highly useful generalizations which can be applied to many other words. The committee members added that a spelling series with emphasis on these basic word-forming generalizations is needed at the junior high level. Thus, more time and especially more efficient and specific instruction should be devoted to the spelling needs of junior high and high school students.

Summary of Committee's Findings and Recommendations

Members of the committee had mixed reactions to the various trends in the twelfth grade written expression scores, as expressed in the following:

At the twelfth grade level, scores for the mechanical, or "basic," skills have risen over the past four years: e.g., spelling up 0.8 percent; capitalization and punctuation up 0.8 percent; sentence recognition up 1.7 percent. On the other hand, scores for the more fundamental language skills, those related more closely to the student's cognitive development, have not risen, but instead have declined slightly over the four years: e.g., language choices down 0.6 percent; paragraphs down 0.2 percent.

The improvement in mechanical skills is gratifying, but the lack of improvement in the more fundamental skills is a cause for concern. Sensitivity and discrimination with respect to words and their meanings need greater emphasis, both in reading and in writing; the same is true with respect to coherence between sentences in a paragraph and between paragraphs. Furthermore, these skills are not the private domain of the English teacher. They can and should be taught continually in all disciplines.

The pattern of skill area strengths and weaknesses discerned by the committee is presented below:

Committee Judgments of Twelfth Grade Skill Area Results

Area of strength	Area in need of improvement
Selecting the correct form of a word for a sentence (Example 50)	Spelling words with suffixes (Examples 63 and 64)
Discriminating between complete and incomplete sentences (Example 54)	Inserting punctuation in sentences where knowledge of a rule or convention is necessary (Example 61)
Inserting punctuation in sentences where the sound of spoken English could be used as a guide (Example 60)	Recognizing the most specific or general word in a group of words (Example 51)
	Selecting a word which is most likely to convey a particular attitude or emotion (Example 52)
	Identifying basic grammatical elements in sentences (Example 55)
	Recognizing the most effective and concise statement of an idea (Example 56)
	Achieving coherence in paragraphs (Examples 58 and 59)

Guided by an understanding of the difficulties students are having, the English Language Assessment Advisory Committee offered the following recommendations for teaching:

1. Spelling. A skill maintenance program in spelling for junior high and high school students is needed. Such a program should involve a highly structured approach to spelling instruction which would introduce words grouped on the basis of spelling generalizations, particularly generalizations which apply to the formation of new words by the addition of suffixes to a base word. This kind of structure coupled with appropriate practice should enable students to learn a number of highly useful generalizations which can be applied to many other words. More time and especially more efficient and specific instruction should be devoted to the spelling needs of junior high and high school students.

2. Language choices. Elementary and secondary students should have more experience and more focused instruction in a number of dimensions which relate to effective language choices in writing. These factors include the degree of specificity of a word (see Example 51) and the emotional tone conveyed by a given word in a particular context (see Example 52). The Reading Assessment Advisory Committee which found that many twelfth grade students displayed confusion on some of the reading questions requiring them to detect the author's emotion or attitude in a selection, concurred that students need more focused instruction in the language choices skill area.

3. Paragraphs. Specific and sequential instruction in a variety of paragraphs skills (include stating ideas in a logical sequence, using transitions, and achieving consistency of verb tense and pronoun reference) is needed at the secondary level. Such instruction in the paragraph skills should be reinforced by the detailed examination and discussion of written material through sustained classroom discussions. Members of the Reading Assessment Advisory Committee concurred with the English Language Assessment Advisory Committee in feeling that the intensive study of paragraphs skills is likely to increase reading comprehension as well as improve coherence in student writing.

4. Sentence manipulation. High school students need more experience with sentence manipulation activities (as in Example 57) in order to help them (1) learn to equate effectiveness with economy of expression, and (2) gain control of sentence structure in their own writing.

V. Mathematics Achievement for Grades Three, Six, and Twelve

Synopsis of Findings and Recommendations

In the spring of 1980, California's third grade students were assessed for the first time in mathematics with the Survey of Basic Skills: Grade 3. The third grade students registered a percent correct score of 74.0, which translates into the 51st percentile on one publisher's national norm (Comprehensive Tests of Basic Skills, 1973). This is 1 percentile point above the national average.

California's sixth grade students continued to show improvement in mathematics achievement in 1979-80. From 1978-79 to 1979-80, the overall mathematics achievement score of sixth grade students increased 0.7 percent correct, resulting in an increase of one percentile point on a publisher's national norms--those associated with the Comprehensive Tests of Basic Skills. The score of the median sixth grade student now stands at the 55th percentile on that set of national norms. Since the introduction of the new test--Survey of Basic Skills: Grade 6--five years ago, math scores have shown steady improvement. Over the five-year period, the overall mathematics achievement of sixth grade students improved 2.3 percent correct, resulting in an increase of five percentile points on the publisher's national norms.

For the second year the mathematics achievement scores of California's twelfth grade students improved. The scores increased 0.3 percent correct from 1978-79 to 1979-80. This score increase resulted in an increase of one percentile point on a publisher's national norms--Iowa Tests of Educational Development; the score of the median twelfth grade student now stands at the 44th percentile.

Skill Area Strengths and Weaknesses

The members of the Mathematics Assessment Advisory Committee reviewed the statewide results on a skill-by-skill area basis to determine strengths and weaknesses in the mathematics achievement of students in California. They concluded their analyses with recommendations that are directed toward classroom teachers, developers of instructional materials, counselors, persons responsible for developing high school proficiency standards and programs in mathematics, professional mathematics organizations, and units within the Department of Education. While the following display of skill area strengths and weaknesses is based on the committee's judgments, the Department of Education accepts full responsibility for the content and conclusions in this report. The strengths and weaknesses are summarized on the accompanying chart, "Committee Judgments on Grades Three, Six and Twelve Skill Area Results."

Committee Judgments of Grades Threes, Six, and Twelve
Skill Area Results

	Area of strength	Area in need of improvement
GRADE 3	• Knowing basic facts • Counting by 1s, 2s, 5s, and 10s • Recognizing place value • Adding whole numbers • Subtracting without renaming • Recognizing money values • Recognizing two-dimensional geometric figures	• Developing the concept of place value • Subtracting with renaming • Multiplying whole numbers • Developing skills in problem analysis and modeling
GRADE 6	• Adding, subtracting, and multiplying whole numbers and simple fractions • Adding and subtracting decimals • Recognizing common geometric shapes • Reading a simple bar graph	• Developing the concept of place value • Dividing decimals and applying decimals • Developing geometry concepts, such as: the sum of the interior angles of a triangle is 180°, a square contains four right angles, a plane divides space with two regions, two intersecting lines intersect at a point, and similarity • Using formulas, such as those for perimeter, area, and volume, and having an intuitive understanding of the Pythagorean Theorem • Understanding mean, median, and range and computing probability of simple events • Developing skills in problem analysis and modeling
GRADE 12	• Adding, subtracting, multiplying and dividing whole numbers • Performing applications with whole numbers • Solving equations in one unknown • Reading line and bar graphs • Recognizing common geometric terms and shapes • Computing with denominate numbers	• Computing with mixed fractions, decimals, ration, and percents • Performing applications involving fractions and decimals • Setting up algebraic equations for word problems • Solving equations in two unknowns • Interpreting data from tables and graphs requiring two-step analysis • Comprehending geometric relationships • Understanding median and range and computing probability of events • Developing skills in problem analysis and modeling

Committee Recommendations

The committee made the following general recommendations on the basis of its analysis of the mathematics results for grades three, six, and twelve:

- In elementary classrooms (grades one through six) the use of manipulatives and models should be increased to improve the students' understanding of place value concepts and to help them develop spatial visualization skills in two and three dimensions.

- At all grade levels more instructional time should be spent in learning to recognize cues for selecting correct operations in application questions (as recommended by the Addendum to the California Mathematics Framework (1980), rather than more drill and practice on computation skills. Although drill and practice on basic computational skills remain important. Such techniques should be balanced with the development of skills in problem solving.

- Teachers and developers of instructional materials should strive to use those materials that help students at all ability levels to consistently develop the skills in problem analysis and modeling (as recommended by the Addendum to the California Mathematics Framework, 1980). This kind of instructional emphasis will not detract from the development of other skills but, in fact, should improve computation and application skills by giving students a clearer understanding of the mathematical processes involved in problem solving.

- Teachers should be provided with in-service staff development opportunities and with instructional materials that will help them be comfortable in helping students model and solve multiple-step problems. Teacher's guides should include practical examples or suggestions that will help teachers involve students in classroom activities that lead to opportunities for students to create and solve "real" multiple-step problems.

- Beginning with the junior high school and continuing through high school, greater emphasis should be placed on encouraging girls to pursue mathematics courses. Teachers and counselors should encourage all students to take more mathematics courses in high school, reflecting the findings presented in the 1977-78 version of this report that, in comparison to other states, a considerably smaller proportion of California students take higher level courses in math.

- The high school proficiency programs must go beyond arithmetic operations and simple applications. The programs should be enriched by including the study of skills that will make students good problem-solvers in life. For example, a good math proficiency skill program should include a focus on computing with decimals, ratios, percents; setting up and solving algebraic equations for word problems; interpreting data from tables and graphs requiring two steps; comprehending geometric relationships; understanding basic statistical concepts; and developing skills in problem analysis and modeling.

Test Scope

The Survey of Basic Skills: Grade 3 was developed to assess the levels of mathematics skills of third grade students in California. A test development and review process that spanned a period of two and a half years included many California teachers, students, and schools. The result of this process was a comprehensive set of test specifications and the 360 items on the Survey.

The 360 items on the Survey were designed to assess students' skills in the area of arithmetic, geometry, measurement, patterns and graphs, and problem analysis and models. In each area, with the exception of problem analysis and models, items include skills in computation and knowledge of terminology as well as items in word problems.

Figure 7 illustrates the emphasis placed upon each skill area in the total test. It shows how the skill area of arithmetic on the test is subdivided

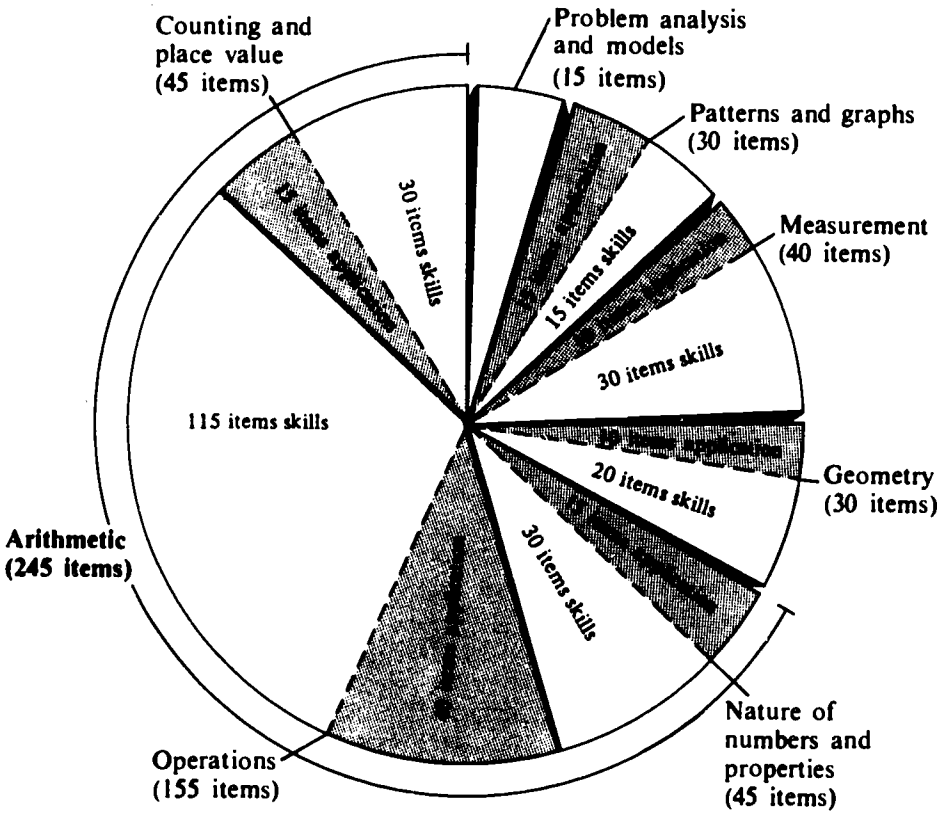


Fig. 7. Number of questions, by skill area, in the mathematics section of the *Survey of Basic Skills: Grade 3*

Table 10

Mathematics Scores of California Third Grade Students
on the Survey of Basic Skills: Grade Three

Skill area	Number of questions	Average Percent Correct
MATHEMATICS, TOTAL	360	74.0
Arithmetic	245	74.5
Counting and place value	45	79.3
Skills	30	79.2
Applications	15	78.5
Operations	155	72.7
Basic facts	25	85.9
Addition	30	82.6
Subtraction	30	69.9
Multiplication	30	63.7
Applications	40	65.7
Basic facts	13	68.0
Addition/subtraction	15	75.0
Multiplication	12	51.4
Nature of numbers and properties	45	75.8
Properties and relationships	15	76.0
Money and fractions	15	80.2
Applications	15	71.1
Geometry	30	74.3
Skills	20	75.4
Applications	10	72.0
Measurement	40	73.3
Linear measures	15	69.7
Other measures	15	78.3
Applications	10	71.4
Patterns and graphs	30	72.6
Skills	15	63.2
Applications	15	82.3
Problems analysis and models	15	68.8
Problem solving/applications*	120	71.5

*Questions in this category are an aggregate of 105 application questions and 15 questions in problem analysis and models.

into counting and place value, operations, and nature of numbers and properties. Also, the arithmetic section of the test comprises approximately two-thirds of the test; the other third is composed of questions on geometry, measurement, patterns and graphs, and problem analysis and models. In terms of mathematical processes, two-thirds of the test assesses skills in computation; the other third involves story problems (problem solving). The emphasis on each area in the test is consistent with the typical mathematics curriculum of most California schools and the recommendations in the Mathematics Framework for California Public Schools: Kindergarten Through Grade Twelve. A detailed description of the skills assessed in the Survey is given in the document Survey of Basic Skills: Grade 3 -- Rationale and Content (Sacramento: California State Department of Education, 1980).

Mathematics Results for Grade Three

The results of the third grade mathematics assessment for 1979-80 are shown in Table 10. Since this was the first year of the assessment of mathematics in grade three, no longitudinal comparison results are available with this year's results. The results presented in Table 10 provide an initial profile of statewide student performance in California.

The average California third grade student correctly answered 74.5 percent of the questions in arithmetic skills; 74.3 percent in geometry; 73.3 percent in measurement; 72.6 percent in patterns and graphs; 68.8 percent in problem analysis and models; and 71.5 percent in problem solving/applications. Overall, the average third grade student answered 74.0 percent of the questions correctly.

The following overall conclusions are apparent from Table 10.

- In the area of arithmetic, the score of 85.9 percent correct in basic facts skills was the highest score, followed by the scores in addition; and counting and place value. In arithmetic, the score was lowest (51.4 percent correct) in application questions related to multiplication.

- The scores of students on application questions were always lower than the scores on skill questions. The discrepancy between the scores on skill and application questions was least for counting and place value, geometry, and measurement.

- On the 18 matched pair questions in arithmetic (the pairs of skill and application questions involving the same number and same arithmetic operation), the score on skill questions was 75.5 percent correct, and the score on application questions was 63.1 percent correct.

Analysis and Interpretation of Skill Area Results

Members of the Mathematics Assessment Advisory Committee conducted an in-depth review of the mathematics results, by skill area. The committee members judged the adequacy of student performance in light of the difficulty of the questions and the relative instructional level of each skill in the typical classroom.

The instructional level data were provided by teachers who reviewed the test questions during the test construction phase of the third grade Survey. The teachers indicated whether a particular skill in that school was emphasized very much, much, some, or not at all, and whether the level of skill was considered as mastery, maintenance, developmental, or exploratory.* Furthermore, the special design of the test provided valuable insights to committee members in judging student performance on the story problems. The design involved, for example, asking an addition question as a computation skill as well as an application question. The "matched pair" of questions involved the same numbers and the same operations except that as a computation skill the problem was already set up and in application the student was required to understand what was being asked and then set up his or her own problem.

The results of the committee's review on a skill area-by-skill area basis are summarized below. The left-hand column includes descriptions of the skills assessed within each skill area, illustrative test questions, and student performance on those questions. The right-hand column contains descriptions of the judgments of the members of the Mathematics Assessment Advisory Committee based upon their analysis of the third grade results.

Skill area descriptions and illustrative questions	Committee's observations and judgments
I. ARITHMETIC The arithmetic portion of the test consists of questions on counting and place value, operations, and nature of numbers and properties. Each of these skill areas has been further divided into two or more subskills, including an application component for each skill.	On the 245 questions in arithmetic, the overall percent correct score in 1979-80 was 74.5. This score is slightly higher than the score of 74.0 on the total mathematics test.

(continued on next page)

* Exploration: The student is being introduced with some degree of guidance to new concepts, materials, or skills.

Developmental: The student is in the process of learning a concept or skill.

Mastery: The student is functionally competent and able to apply skills and knowledge in an organized and effective way.

Maintenance: The student takes part in a consistent program of review of mastered skills.

Skill area descriptions and illustrative questions	Committee's observations and judgments

A. Counting and place value

1. Skills

The student must identify ordinal positions; identify the word form of a standard numeral; count by 1s, 2s, 5s, or 10s; recognize equivalent numbers in standard numeral form and in expanded notation; and find the place value of a given digit in a numeral, or identify the digit of a given place value.

Example 1

Which is two hundred forty-three?

4 ○	2403
12 ○	20043
81 ●	243
3 ○	234

On the 45 questions in counting and place value, the percent correct score in 1979-80 was 79.3.

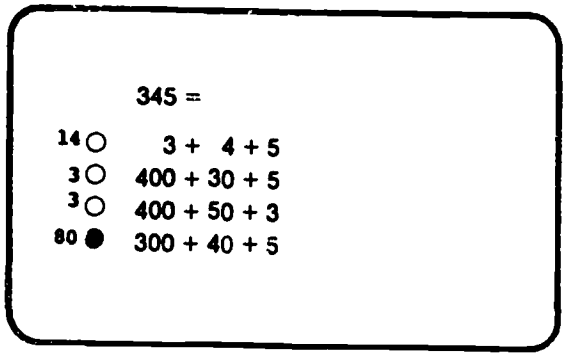
Examples 1 through 3 show the variety of questions included within the skill area of counting and place value. Typically, students perform better in this area (79.3 percent correct) than on the test as a whole (74.0 percent correct.)

During the test construction phase, the teachers were asked to judge whether skills in this category were considered as mastery, maintenance, developmental, or exploratory. Items were rated at the mastery or maintenance level by 95 percent of the teachers for questions involving ordinal positions, writing of numbers, and place value; by 98 percent for questions involving counting by 1s, 2s, 5s, or 10s; by 82 percent for questions involving "100 less" or "100 more"; and by 78 percent for questions involving expanded notation.

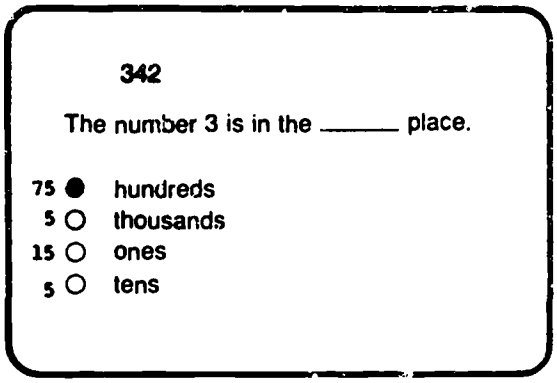
In the opinion of the committee, the score indicated that the third grade students have a good understanding of the concepts involved in counting and place value. They judged the score of 79.3 in counting and place value as an excellent score. The pattern of errors indicated by student responses shows that those students who missed the items did so because of their inability to comprehend the place value concept. In Example 1, the most frequent

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 2



Example 3



incorrect response chosen was "20043" instead of "243"; in Example 2 the most frequent incorrect response chosen was "3+4+5" instead of "300+40+5"; and in Example 3 the most frequent incorrect response chosen was "ones" instead of "hundreds."

The committee felt that although the scores were good, the concept of place value needs additional reinforcement for all students at this grade level. The place value concept is the key to understanding arithmetic operations, especially when students confront renaming as they progress in their math curriculum. The committee strongly emphasized the use of concrete manipulatives in the teaching of the place value concept. The committee also felt that teachers know that students need periodic reminders about following the convention of right to left when working with place values.

Skill area descriptions and illustrative questions	Committee's observations and judgments
2. Application The student must apply his or her knowledge of place value skills in the context of word problems.	On the 15 question in counting and place value application, the percent correct score in 1979-80 was 78.5. The committee noted that the difference between student performance on skills (79.2 percent correct) and applications (78.5 percent correct) was very small. In the opinion of the committee, the closeness of these scores indicates a good understanding by third grade students of the skills and concepts involved in counting and place value. Example 4 is a typical item in the application category that shows good performance by third grade students. The committee did feel that more instructional emphasis was needed on the role of zero as a place holder in numeration and on the acceptability of zero as an answer for a problem. Example 5 requires the skill of using zero as a place-holder in numeration. In the opinion of the committee, the overall student performance in this skill area and the teacher ratings of the items indicate that this area should be an integral part of the mathematics instructional program in grades K-3 -- and that instructional materials should reflect this emphasis.

Example 4

Jenny was saving pennies.
She put them in bags of 10's and 100's.

How many pennies does Jenny have?

5 ○ 423
3 ○ 342
87 ● 324
5 ○ 304

Example 5

There were 4203 beans.
John counted beans by thousands, hundreds, tens, and ones.

How many **tens** did he have?

59 ● 0
23 ○ 4
8 ○ 3
10 ○ 2

Skill area descriptions and illustrative questions	Committee's observations and judgments
B. Operations The operations portion of the test consists of questions in five areas -- basic facts, addition, subtraction, multiplication, and applications involving basic facts, addition/subtraction, and multiplication.	On the 155 questions on operations, the percent correct score in 1979-80 was 72.7. The committee judged the overall score of 72.7 as good.
1. Basic facts The student must identify the basic facts in addition, subtraction, multiplication, and division.	On the 25 questions on basic facts, the percent correct score in 1979-80 was 85.9. In basic facts, 99 percent of the teachers surveyed rated the items involving addition or subtraction at either the mastery or maintenance level. The average percent correct for addition facts was 95.4, and for subtraction facts it was 90.0. For multiplication facts, 94 percent of the teachers surveyed rated the items at either mastery or maintenance level. The average percent correct for multiplication facts was 85.2. For division facts, 75 percent of the teachers surveyed rated the items at either the mastery or maintenance level, while 25 percent rated these items at the developmental or exploratory level in the third grade. Student performance in division facts was 71.9 percent correct. Considering the ratings of teachers and student performance, it was the opinion of the committee that third grade students showed a good knowledge of basic facts (an overall average percent correct score of 85.9). The committee observed that students do appear to understand both the horizontal and vertical forms for addition, subtraction,

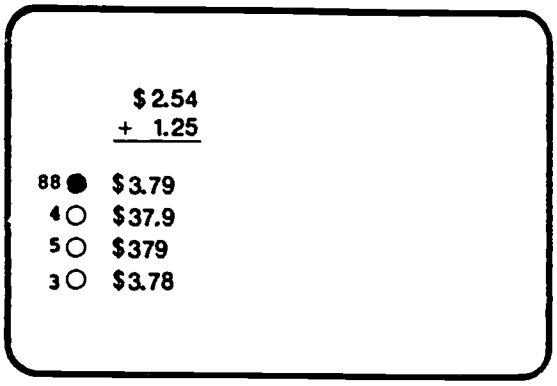
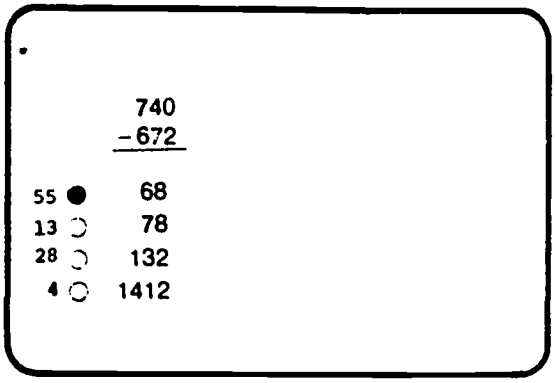
Example 6

$$\begin{array}{r} 6 \\ +\,9 \\ \hline \end{array}$$

1○	3
97●	15
1○	16
1○	17

Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 7 4 - 0 = 9○ 0 1○ 3 89● 4 1○ 40	and multiplication facts. Also it appears that division facts are being taught and learned by the end of third grade (Example 8). From the patterns of errors, the committee concluded that students have some difficulty in subtracting zero from a number (Example 7). Example 6 is a typical item in basic facts that shows good performance by third grade students.
Example 8 9 ÷ 3 = 16○ 27 7○ 12 8○ 6 69● 3	

Skill area descriptions and illustrative questions	Committee's observations and judgments
2. Addition The student must identify the sum of two or three numbers. Example 9 256 +132 5 ○ 124 2 ○ 378 1 ○ 384 92 ● 388 Example 10 20 69 +67 5 ○ 30 87 ● 156 5 ○ 157 3 ○ 201	On the 30 questions in addition, the percent correct score in 1979-80 was 82.6. For items involving addition of two numbers without renaming, 100 percent of the teachers surveyed rated those items at the mastery or maintenance level. Student performance on these items (Example 9) was an average percent correct score of 92.9. Items involving the addition of three numbers wihout renaming were rated at the mastery or maintenance level by 99 percent of the teachers surveyed. The average percent correct for these items was 91.6. The committee considered these results to be excellent. Example 10 illustrates the performance of students on a typical question in this skill area. For addition of two numbers with renaming, 99 percent of the teachers surveyed rated these items at the mastery or maintenance level. Student performance on these items was an average percent correct score 80.8. On items involving addition of three numbers with renaming, 85 percent of the teachers surveyed rated them at the mastery or maintenance level. Student performance was an average percent correct score of 75.0. Items involving the addition of two decimals displayed as money were rated by 59 percent of the teachers surveyed at either the mastery or maintenance level. Forty percent of the teachers surveyed rated these items at

Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 11  	either the developmental or exploratory level. Overall, student performance in addition was an average percent correct score of 82.6. The committee felt that this performance was good. Furthermore, the committee felt that any increase in instructional emphasis in this skill area would not result in any significant increase in the overall score.
3. Subtraction The student must determine the difference of two numbers. Example 12  	On the 30 questions in subtraction, the percent correct score in 1979-80 was 69.9. On items involving subtraction without renaming, 99 percent of the teachers surveyed rated these items at the mastery or maintenance level. Student performance on these items was an average percent correct score of 90.0. The committee regarded this performance as excellent. On items involving subtraction with renaming, 98 percent of the teachers surveyed rated these items at the mastery or maintenance level. Student performance on these items was an average percent correct score of 57.4. The committee noted that many of the errors occurred because students simply subtracted the smaller digit from the larger digit regardless of its position in the

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 13

$3.85
- 1.72

5○ $2.14
18○ $213
5○ $21.3
72● $2.13

problem. The committee recommended that more instructional emphasis be given to developing the understanding of the algorithm of subtraction with renaming and to developing skill in its use. On Example 12, 27.9 percent of the students chose 132 as the correct response. This response, found simply by subtracting the smaller digit from the larger, was chosen by 18 to 33 percent of the students on similar items in this subskill. Example 12 is illustrative of the typical student performance in this skill area.

For items involving subtraction of decimals without renaming (the decimals were displayed as money), 59 percent of the teachers surveyed rated these items at the mastery or maintenance level for third grade, and 41 percent rated them at the developmental or exploratory level. Student performance on these items was an average percent correct score of 68.2. Example 13 is illustrative of the typical student performance in this skill area.

The overall student performance in subtraction was an average percent correct score of 69.9. The committee felt that some improvement was possible in this subskill and urged that teachers be made aware of students' weaknesses in the use of the subtraction algorithm.

Skill area descriptions and illustrative questions	Committee's observations and judgments

4. Multiplication

The student will find the product of two or three numbers.

Example 14

100 × 17 =

7 ○	107
22 ○	117
13 ○	170
58 ●	1700

Example 15

$$\begin{array}{r} 123 \\ \times \quad 4 \\ \hline \end{array}$$

14 ○	127
17 ○	132
62 ●	492
7 ○	501

On the 30 questions in multiplication the percent correct score in 1979-80 was 63.7.

On items involving multiplication by 10 or 100, 51 percent of the teachers surveyed rated these items at either the mastery or maintenance level, and 49 percent rated them at either the developmental or exploratory level. Student performance on these items was an average percent correct score of 54.6. The most common error made by students in this subskill appeared to be in choosing to add rather than multiply. The committee suspected that this error was due to the fact that some students have been told to add zeros to find the answer to multiplication problems involving 10 or 100. In the opinion of the committee, greater instructional emphasis that leads to a better understanding of the concepts involved should help students avoid this error. Example 14 is illustrative of the typical student performance in this skill area.

Items involving the multiplication of two numbers without renaming were rated by 66 percent of the teachers surveyed at the mastery or maintenance level, and 34 percent rated them at either the developmental or exploratory level. Overall student performance on these items was an average percent correct score of 73.4.

Items involving the multiplication of three numbers without renaming were rated by 64 percent of the teachers surveyed at either the mastery or maintenance level, and

Skill area descriptions and illustrative questions	Committee's observations and judgments
	66 percent rated them at either the developmental or exploratory level. Overall student performance on these items was an average percent correct score of 64.6. Items involving multiplication with renaming were rated by 52 percent of the teachers surveyed at either the mastery or maintenance level, and 48 percent rated them at either the developmental or exploratory level. Student performance on these items was an average percent correct score of 61.2. The overall student performance on items in multiplication was an average percent correct score of 63.7. The committee recognized that this skill is commonly developed, but not completely mastered, by the end of the third grade. However, in the opinion of the committee, good instruction is taking place in this skill, and adequate student learning has been achieved. Also, the committee noted that "more able" students apparently were receiving more instruction in this skill and were scoring higher. Example 15 is illustrative of the typical student performance in multiplication with renaming.
5. Applications The word problems in this category involved the skills of basic facts, addition and subtraction of whole numbers or fractions in money form, and multiplication. A few simple two-step problems were also included in the last category.	The overall percent correct on the 40 questions in this category was 65.7.

Skill area descriptions and illustrative questions	Committee's observations and judgments

(a) Basic facts

The student must be able to apply his or her knowledge of addition, subtraction, multiplication, and division basic facts in the context of word problems.

Example 16

$2 \times 7 =$

3○ 41
2○ 16
90● 14
5○ 9

Example 17

Ron had 7 peanuts.
Sue had 2 times as many peanuts as did Ron.
How many peanuts did Sue have?

11○ 21
3○ 16
51● 14
35○ 9

The overall student performance on the 13 items involving applications of basic facts was an average percent correct score of 68.0. However, the overall drop from an average percent correct score of 85.9 on basic facts computation questions to 68.0 on basic facts applications items indicates that students are not as capable of applying their basic skills as perhaps they could be. In the opinion of the committee, more instructional time should be spent on learning to recognize cues for selecting correct operations in application skills (as recommended in the Addendum to the Mathematics Framework) rather than on more drill and practice on basic facts computation skills. The advisory committee also felt that it was important for teachers to know that students tended to add the numbers given in the application items even though the operations called for were either subtraction or multiplication. The committee felt that teachers and schools should look at instructional materials and programs carefully to be sure that they do not promote this student reaction by mostly presenting application problems involving only the operation of addition. Examples 16 and 17 show a typical basic fact computation item and its paired application item.

Skill area descriptions and illustrative questions	Committee's observations and judgments
(b) Addition/subtraction The student will apply his or her knowledge of addition/subtraction skills in the context of word problems.	The overall student performance on the 15 application items involving addition or subtraction was 75.0 percent correct. The committee felt that the overall performance on these application items was good. The committee observed that the most difficult questions in this category of applications were those in which students had difficulty in understanding the correct algorithm under the skill category. The most frequent error made by students is in renaming, particularly subtracting the smaller digit from the larger digit. The two paired items in Examples 18 and 19 show the student performance in a typical subtraction skill involving renaming.

Example 18

$$\begin{array}{r} 531 \\ -412 \\ \hline \end{array}$$

4 ○ 118
60 ● 119
30 ○ 121
6 ○ 129

Example 19

Abe had 531 baseball cards.
Hal had 412.

How many more cards did Abe have?

9 ○ 118
50 ● 119
26 ○ 121
15 ○ 129

Skill area descriptions and illustrative questions	Committee's observations and judgments
(c) Multiplication The student must be able to apply his or her knowledge of multiplication skills or the skill of performing two-step operations in the context of word problems.	The overall performance on the 12 application items involving multiplication was an average percent correct score of 51.4. As was the case with the items involving applications of basic facts, the most frequent error made was in adding all of the numbers given in the question. On the seven paired application and computation items involving multiplication, there was an average difference of 17.8 in the percent correct scores. Examples 20 and 21 illustrate this difference in performance in computation and application.

Example 20

$$\begin{array}{r} 34 \\ \times\ 2 \\ \hline \end{array}$$

5 ○	342
83 ●	68
8 ○	36
4 ○	32

Example 21

There were 2 rows of children.
Each row had 34 children.

How many children were there?

5 ○	342
63 ●	68
28 ○	36
4 ○	32

Skill area descriptions and illustrative questions	Committee's observations and judgments
C. Nature of numbers and properties This skill area consists of three subskills -- properties and relationships, money and fractions, and applications involving counting patterns, properties, coins, and fractional parts of figures.	On the 45 questions on nature of numbers and properties, the overall percent correct was 75.8.
1. Properties and relationships The student must be able to identify counting patterns; use the commutative and associative properties; multiply a number by 0; compare numbers with the signs $<$, $>$, and =; and recognize even and odd numbers.	On the 15 questions on properties and relationships, the percent correct score in 1979-80 was 76.0. For the items in this category, 61 percent of the teachers surveyed rated the skills at either the mastery or maintenance level. The other 49 percent of the teachers rated the skills at the developmental or exploratory level. Examples 22 and 23 illustrate the typical performance of students in the skills of multiplication by zero and use of the associative property. The committee was pleased with the performance of students in this skill area, especially in view of the emphasis placed on these skills.

Example 22

$23 \times 0 =$

3 ○	230
1 ○	203
12 ○	23
84 ●	0

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 23

(3 + 2) + 4 is the same as:

78● 3 + (2 + 4)
4○ (3 + 4) + 1
4○ 4 + (3 + 3)
14○ 3 × (2 × 4)

2. Money and fractions

The student must be able to identify names of coins, recognize the value of one or several coins, identify decimal notation from words for money, identify equivalent coins for cent notation of money, and identify fractional parts of geometric figures.

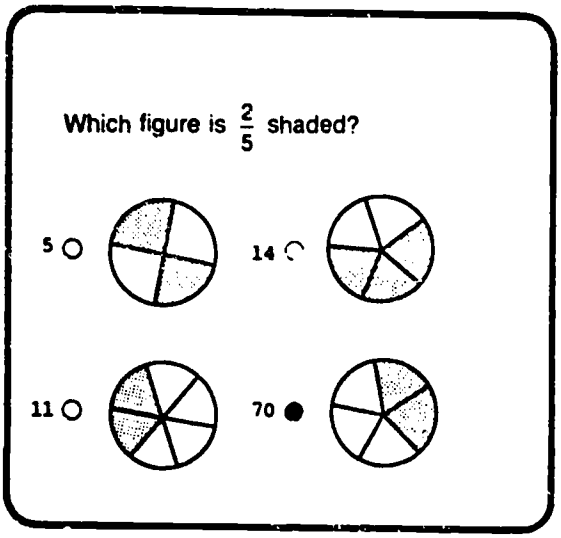
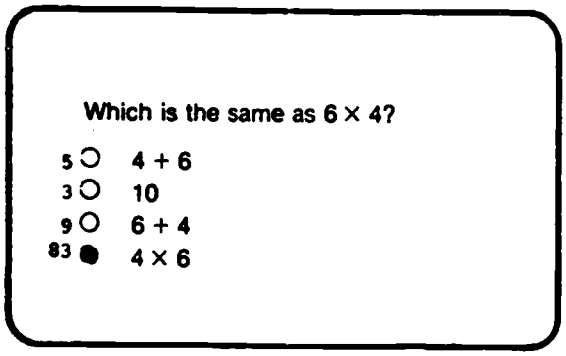
On the 15 questions on money and fractions, the percent correct score in 1979-80 was 80.2.

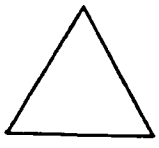
For the money items in this category, 70 percent of the teachers surveyed rated the skills at either the mastery or maintenance level. Thirty percent of the teachers rated the skills at the developmental or exploratory level. For the items on fractions, 61 percent of teachers surveyed rated the skills at the developmental or exploratory level, and 39 percent rated them at the mastery or maintenance level. The score of students on the nine questions involving money was 87.3 percent correct, and the score on the six questions on fractions was 69.6 percent correct. Examples 24 and 25 illustrate the typical performance of students on money and fraction questions.

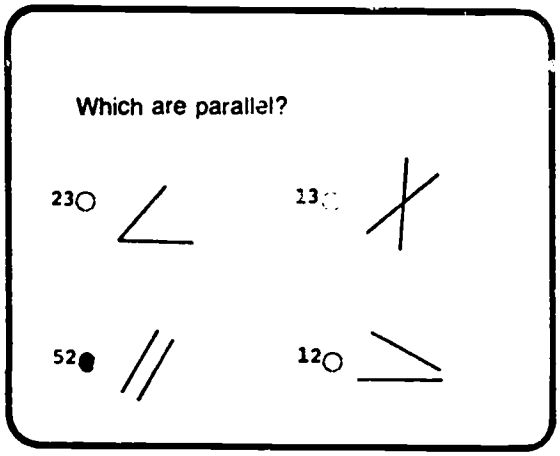
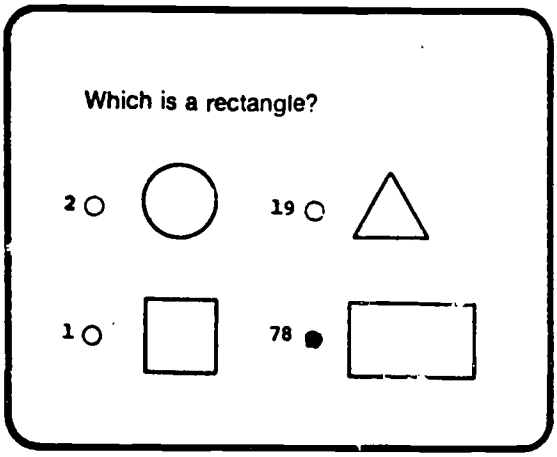
Example 24

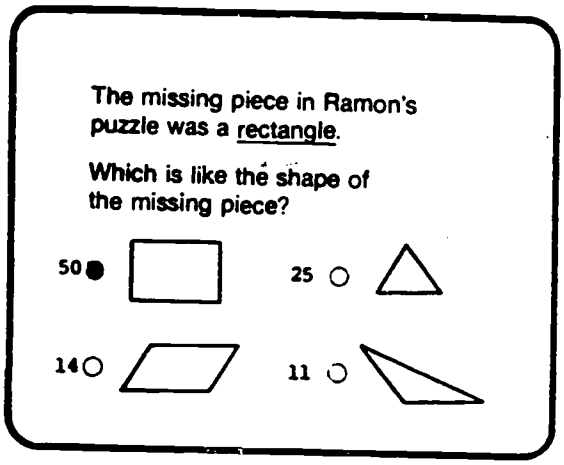
How much is this?

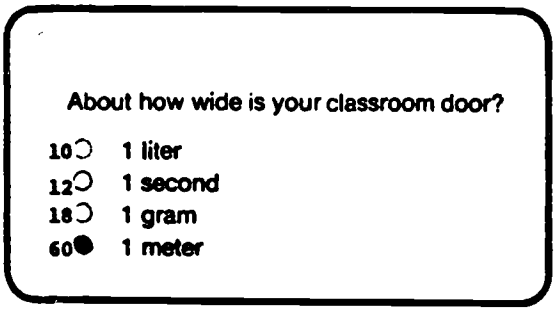
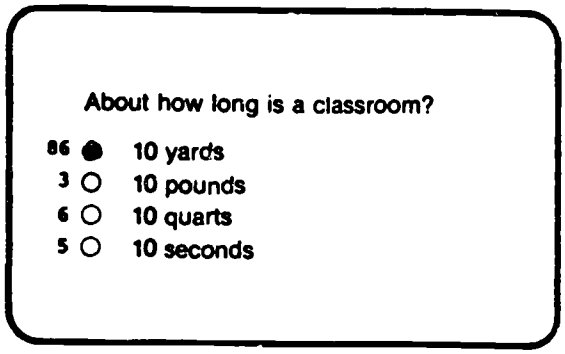
1○ 18¢
5○ 82¢
87● $1.00
7○ $1.20

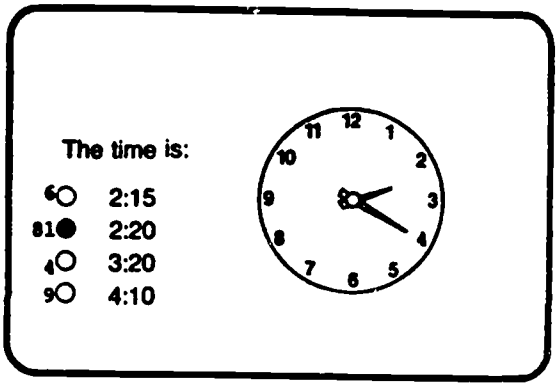
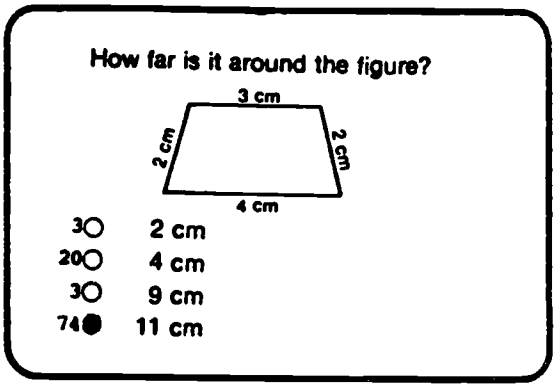
Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 25  	The committee felt that students did well on money questions. However, the committee felt a need for greater instructional emphasis on skills related to pictorial representation of fractions.
3. Applications The student must be able to apply his or her knowledge of the nature of numbers and properties in the context of word problems.	The average percent correct score on the 15 application items in this skill was 71.1. On the five matched application items, the average percent correct score was 86.7, while the average percent correct score for the five corresponding computation/ comprehension items was 86.4. Examples 26 and 27 show the two matched items related to the commutative property of multiplication. The differences in the skill and application scores were generally small. In fact, the students did better in some money questions when the task was presented as a word problem rather than a straightforward recognition of money value.
Example 26  	

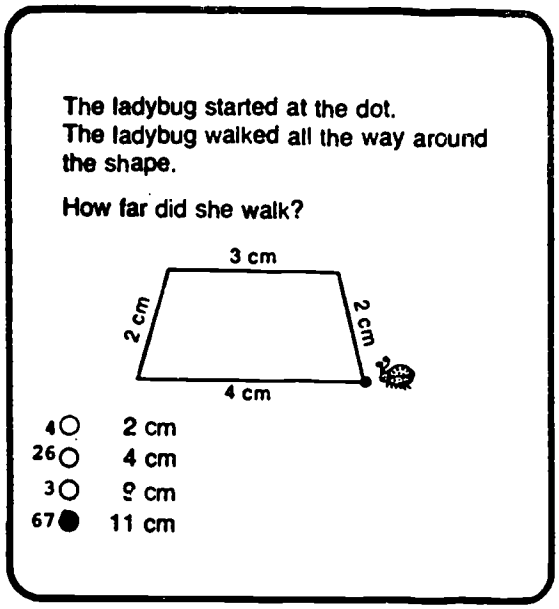
Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 27 There are 6 cats. Each cat has 4 feet. The teacher wrote this down as 6 × 4. Which other way could he write it? 6 ○ 4 + 6 5 ○ 10 9 ○ 6 + 4 80 ● 4 × 6	Overall, the committee felt that students did well on items dealing with money. However, the committee recommended that more instructional emphasis be given to application of fractions in simple problem-solving situations and to conversion from written language to mathematical symbols in problems involving money.
II. GEOMETRY The items in geometry are subdivided into skills, or concepts, and applications.	On the 30 questions on geometry, the overall percent correct score in 1979-80 was 74.3.
A. Skills The student must be able to recognize two- and three-dimensional basic shapes, parallel lines, line segments, right angles, diagonals of quadrilaterals, diameters of circles, and congruent figures.	The average percent correct score for the 20 items on recognition of basic geometric shapes was 74.3. This score was slightly higher than the average percent correct score (74.0) for the whole math test. The committee felt that students are doing an excellent job of recognizing and selecting common two-dimensional geometric figures. Example 28 is illustrative of student performance in this skill.
Example 28 This shape is: 2 ○ a circle 2 ○ a square 89 ● a triangle 7 ○ a rectangle 	

Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 29 	The committee, however, observed that students seem to have some difficulty recognizing and/or identifying simple geometric components, such as parallel lines, diagonals, line segments, right angles, and diameters. This may be the direct result of the fact that from 89 to 94 percent of the grade three teachers surveyed indicated that these skills are treated as developmental or exploratory during the third grade school year. Example 29 is illustrative of student performance in this skill.
B. Applications The student must be able to identify the coordinates of points of a coordinate grid and apply his or her knowledge of geometric skills in the context of word problems. Example 30 	On the ten questions on geometric application, the percent correct score in 1979-80 was 72.0. The committee noted that third grade students, on the average, scored slightly higher on geometric skills (75.4) than on geometric applications (72.0). On the matched geometric skills and geometric applications items, the average percent correct score for skills was 67.0, and for applications it was 63.6. In the skills, students demonstrated a good knowledge of two- and three-dimensional shapes and the concept of similarity. When questions involved the application of two- and three-dimensional shapes, the scores dropped markedly. Examples 30 and 31 illustrate student performance in this situation.

Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 31  	In the opinion of the committee, grade three students are able to relate words to pictures better than they do pictures to their word representations. The committee felt that such information should have importance for textbook authors and teachers.
III. MEASUREMENT The questions in this category are classified in three sub-categories: linear measures, other measures, and applications.	On the 40 questions on measurement, the overall average percent correct score in 1979-80 was 73.3. In the opinion of the committee, this performance was adequate.
A. Linear measures The student must be able to measure objects linearly--using nonstandard or standard units, estimate lengths of objects or parts of the body, change one standard unit to another within the system, identify the most appropriate unit of length, and determine the perimeter of a polygon.	On the 15 items involving linear measures, the average percent correct score was 69.7. This skill contained six subskills as described in the left-hand column. On items involving the use of nonstandard and standard linear measures, the average percent correct score was 75.8. On items involving the estimation of length, using both metric and U.S. customary units, and perimeter, the average percent correct score was 65.7. The advisory committee anticipated that instruction in measurement skills is perhaps not developed at the third

Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 32  	grade; however, the scores do indicate that more and more classrooms are including metrics in their instructional programs. The committee also felt that perhaps U.S. customary units are emphasized relatively more in the classrooms than are metric units. Examples 32 and 33 illustrate the student performance in these two skills.
Example 33  	
B. Other measures The student must be able to identify the most appropriate unit of mass, determine the area of a polygon, identify the correct time, identify the correct order of days of the week and months of the year, read and interpret a calendar and a thermometer, determine the volume of a three-dimensional object in nonstandard units, and determine the heavier of two masses.	On the 15 items involving other measures, the average percent correct score was 78.3. This skill contained eight subskills as shown in the first column. On the items involving area and volume, the average percent correct score was 83.2. On items involving time, day and month, reading a calendar, and reading a thermometer, the average percent correct score was 81.1. On items involving the estimation of mass, the average percent correct score was 68.5. Example 34 is an illustration of typical questions involving time.

Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 34  	Since only a few third grade curricula highlight the teaching of temperature, volume, or mass, the opinion of the advisory committee was that the student performance on these items was very good. However, the committee did feel that increased instructional emphasis should be given to teaching students to discriminate between standard units of length, volume, mass, and temperature and to know when to apply them in the measurement of some common object or quantity.
C. Applications The student will apply his or her knowledge of measurement skills in the context of word problems. Example 35  	On the ten items involving measurement applications, the average percent correct score was 71.4. This skill contained six subskills -- linear measures, area measures, time, day and month, calendar, and temperature. On items involving the application of linear and area measures, the average percent correct score was 75.0. On items involving time, day and month, and calendar, the average percent correct score was 72.7. Examples 35 and 36 illustrate the student performance on a matched linear measurement skill item and a linear measurement application item.

Skill area descriptions and illustrative questions	Committee's observations and judgments
Example 36  	The committee felt a need for more development of measurement concepts at the third-grade level. The committee members suggested that instruction in measurement applications can be made rewarding for students by using games and activities that provide real life experiences in nonstandard and standard units of linear, area, and volume measures.
IV. PATTERNS AND GRAPHS This category has been further divided into two parts.	The overall percent correct score on the 30 questions in patterns and graphs was 72.6 in 1979-80.
A. Skills The student will identify the function rule, complete a function table, identify a geometric pattern, and recognize a number pattern.	On the 15 total questions in this skill area, the percent correct score was 63.2. On the five items involving the completion of number patterns, the average percent correct score was 69.7. In this subskill 44 percent of the teachers surveyed classified this skill as either at the mastery or maintenance level, and 56 percent rated it at either the developmental or exploratory level.

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 37

What is missing?

1, 4, 7, ___, 13

9 ○ 8
72 ● 10
12 ○ 11
7 ○ 12

Example 38

The missing number is ___.

Ladybugs	Legs
0	0
1	6
2	12
3	
4	24
5	30

15 ○ 15
7 ○ 17
71 ● 18
7 ○ 36

Example 37 illustrates the typical performance of students in this skill. In the opinion of the advisory committee, student performance in this subskill was adequate.

On the six items involving identification of a function rule and completion of a function table, the average percent correct score was 58.6. Students had considerably more difficulty in identifying the function rule (average percent correc for these items was 44.1) than in completing a function table (average percent correct score of 73.2), although only 28 percent of the teachers surveyed rated these items as either mastery or maintenance level. Example 38 is illustrative of student performance in this subskill.

On the four items involving geometric patterns, the average percent correct score was 62.0. The committee observed that students could easily identify simple patterns (80.2 percent correct) but had difficulty in identifying other more complex patterns (38.4 percent correct). The committee judged these performances as adequate in light of the complexity of skills.

Skill area descriptions and illustrative questions	Committee's observations and judgments
B. Applications The student will read and interpret simple bar graphs and pictographs. Example 39	The average percent correct score on the 15 items in reading and interpreting bar graphs and pictographs was 82.3 -- substantially above the average for the total test (74.0 percent correct). Of the teachers surveyed, 49 percent rated these items at either mastery or maintenance level. Fifty-one percent of the teachers rated these items as either developmental or exploratory. On the four items involving the reading of bar graphs the average percent correct score was 77.4. On the four pictograph items involving money, the average percent correct score was 87.4. On the pictograph items involving other symbols, the average percent correct score was 82.2. In the opinion of the advisory committee the student performance in this skill was excellent. Example 39 is illustrative of student performance in this applications section.

Look at the graph.

LIBRARY BOOKS READ	
NAME	BOOKS READ
Alice	
Ben	
Lisa	
Norm	

Each means one book read.

How many books have Alice and Ben read?

4 ○ 3
8 ○ 4
83 ● 7
5 ○ 8

Skill area descriptions and illustrative questions	Committee's observations and judgments
V. ANALYSIS AND MODELS The student will read a story and find the facts in the story, missing information, or the question being asked; and the student will match a picture model with a mathematical sentence or a statement. Example 40 The bus went 20 miles. Then it went 12 miles. How many miles in all? How do you find the answer? 9○ 32 − 12 = 20 9○ 20 × 12 = 240 6○ 20 − 12 = 8 76● 20 + 12 = 32	On the 15 questions in analysis and models the percent correct score was 68.8. These items, although not presently typical of current instructional materials, do follow the guidelines set forth in the California Mathematics Framework Addendum (September, 1980). In the opinion of the advisory committee, the student performance on the questions in analysis and models was good, particularly in light of the fact that regular instruction in these skills apparently does not take place. In fact, the average percent correct scores for seven of the 15 items were above 70, and only one score was below 50. Example 40 is illustrative of student performance in this skill. The committee strongly recommended that more instruction be given to students of all ability levels in the skills of problem analysis and modeling. This instructional emphasis should not detract from the development of other skills, but in fact should help improve application and computation test scores by giving students a clearer understanding of the mathematical processes involved in problem solving.

Skill area descriptions and illustrative questions	Committee's observations and judgments

VI. PROBLEM SOLVING

This analysis is based upon the 105 application questions in other sections of the Survey of Basic Skills: Grade 3 and the 15 questions in the problem analysis and model section.

Example 41

```
   439
 - 216
```

92● 223
4○ 224
1○ 283
3○ 655

Example 42

The giant's wife made 439 cookies. The giant ate 216 of them.

How many were left?

82● 223
8○ 224
4○ 283
6○ 655

The 120 question in problem solving are the aggregate of all application questions (105) under arithmetic, geometry, measurement, and patterns and graphs and 15 questions in analysis and models.

In the opinion of the committee, third grade students showed good understanding of application skills. In particular, students were able to apply addition skills, such as addition of basic facts and addition without renaming very well. The average percent correct scores on problems involving division were particularly high, given the introductory nature of division instruction at the third grade level. The average percent correct score for these items was 53.4.

Some areas of difficulty in application skills were observed. Students often chose an addition answer when subtraction or multiplication was the indicated operation in a problem. In a typical example, 90.7 percent of the students knew that 15-8=7, but only 72.2 percent were able to use this fact correctly in a story problem. The answer found by adding together the numbers in the problem was selected by 16.3 percent of the students. In the opinion of the committee, more instructional emphasis should be given in kindergarten through grade 3 to identifying correct operations necessary to solve given problems.

In the construction of the Survey of Basic Skills: Grade 3, 32 application items were designed to be paired with computation and concept items. These application items involved the same numbers and the

Skill area descriptions and illustrative questions	Committee's observations and judgments
	same operations as the paired skills items. The average of the differences between the scores on these paired skills and application items was 10.2. The greatest differences occurred in items involving subtraction facts and in items involving multiplication of all types. In the opinion of the committee, these differences are greater than should be expected and should decline as the recommendations of the new California Mathematics Framework Addendum are implemented in California's public schools. Examples 41 and 42 show matched skills and application items involving subtraction in which the percent of students choosing the incorrect answers doubled or more than doubled from the skill item to the application item.

Student Attitudes toward Mathematics

At the end of each Survey of Basic Skills: Grade 3 test booklet, students were asked to respond to the following question:

How much do you like math?

- o Very much
- o A little
- o Not at all

The results from the statewide student responses are shown in Table 11.

Table 11

How much do you like math?	Percent of students	Percent correct score
Very much	56.5	76.2
A little	31.5	73.5
Not at all	10.0	66.8
Non-respondents	2.0	56.4

As shown by the data in Table 11, 56.5 percent of the third grade students responded that they like mathematics very much. Also, 31.5 percent of the students responded that they like mathematics a little, and ten percent responded that they did not like mathematics at all.

Table 11 also shows that those students who seemed to like mathematics score the highest (76.2 percent correct), and those who do not seem to like math score the lowest (66.8 percent correct). Those students who responded that they like math "some" scored near the statewide average of 74.0.

Members of the mathematics advisory committee felt that the characteristics of the students who responded that they did not like math at all need to be examined in further detail. The committee recommended that school experiences in general, and math instruction in particular, should stimulate a

positive attitude toward mathematics. Encouraging the development of math skills by fostering awareness of discovery and curiosity at the proper level may allow a young student to pursue math activity constructively. The committee suggested that math games, manipulatives, charts, bulletin board ideas, and parent involvement should be used effectively to provide pleasant and enriched learning experiences in mathematics.

Summary of Committee's Observations, Conclusions, and Recommendations

Members of the Mathematics Assessment Advisory Committee were very pleased with the performance of California's third grade students. Since the new third grade test was designed to be comprehensive, it allowed the committee members to make an in-depth analysis of the relative strengths and weaknesses in California's instructional programs. In reviewing the results of the test, the committee members reached the following conclusions about the strengths of third grade students:

- The third grade students do very well in remembering the basic facts and in performing addition operations on whole numbers, both with and without renaming, and subtraction operations without renaming.

- The students do quite well in the skills of counting and place value, recognizing money values, and recognizing two-dimensional geometric figures.

- The third grade students showed a good understanding of application skills measured by 105 questions spread across six strands of mathematics. In particular, students were able to apply very well such skills as addition of basic facts and addition without renaming.

- The third grade students did unexpectedly well on analysis and model questions which the committee thought were not typical of the current instructional materials. [The Addendum to California Mathematics Framework (September, 1980) does provide the guidelines for instruction in the skills of problem analysis and models.]

After investigating in depth the patterns of errors that students made, members of the committee observed the following weaknesses and made recommendations for instructional emphasis.

- Although third grade students do quite well on place value, the place value concept needs more development at the third grade level. More instructional emphasis is needed in teaching the role of zero as a placeholder in numeration and in teaching that zero can be an acceptable answer for a problem.

- The third grade students show much weakness in subtraction operations where renaming was involved. The most common error made by students was subtracting the smaller digit from the larger digit regardless of its position in the problem. The advisory committee recommended that more instructional emphasis be given to developing the understanding of the algorithm of subtraction with renaming and to developing skill in its use.

- The committee recommended that more instructional time be spent in helping students to learn to recognize cues for selecting correct operations in application questions (as recommended by the Addendum to the California Mathematics Framework), rather than more drill and practice on basic facts computation skills. The committee also felt that it is important that teachers know that students tended to add the numbers in the application items even though the operations called for were either subtraction or multiplication. The committee felt that teachers and other school personnel should look carefully at instructional materials and programs to be sure that the materials and programs do not promote this student reaction by presenting mostly application problems involving only the operation of addition.

- The committee strongly recommended that instructional materials and instructional programs in schools be selected and used consistently to help students at all ability levels develop the skills in problem analysis and modeling (as recommended by the Addendum to the California Mathematics Framework). This kind of instructional emphasis should not detract from the development of other skills, but in fact should help improve application and computation skills by helping students to develop a clearer understanding of the mathematical processes involved in problem solving. The committee emphasized that the drill and practice on basic computational skills remains important, but its exclusive use will show diminishing returns, especially in the development of student problem-solving skills.

Test Scope

The Survey of Basic Skills: Grade 6 was developed specifically to assess the students' attainment of mathematics skills taught through the sixth grade level in most California schools. The 160 questions on the Survey were designed to assess students' skills in the areas of arithmetic, geometry, measurement, and probability and statistics. Figure 8 is an illustration of the emphasis placed on each skill area in the total test. In the figure the skill area of arithmetic is subdivided into number concepts, whole numbers, fractions, and decimals. The emphasis on each area in the test is consistent with the general mathematics curriculum of most California schools and the recommendations in the Mathematics Framework for California Public Schools. A detailed description of the skills assessed in the Survey is given in Test Content Specifications for the Survey of Basic Skills: Mathematics, Grades Six and Twelve (Sacramento: California State Department of Education, 1975).

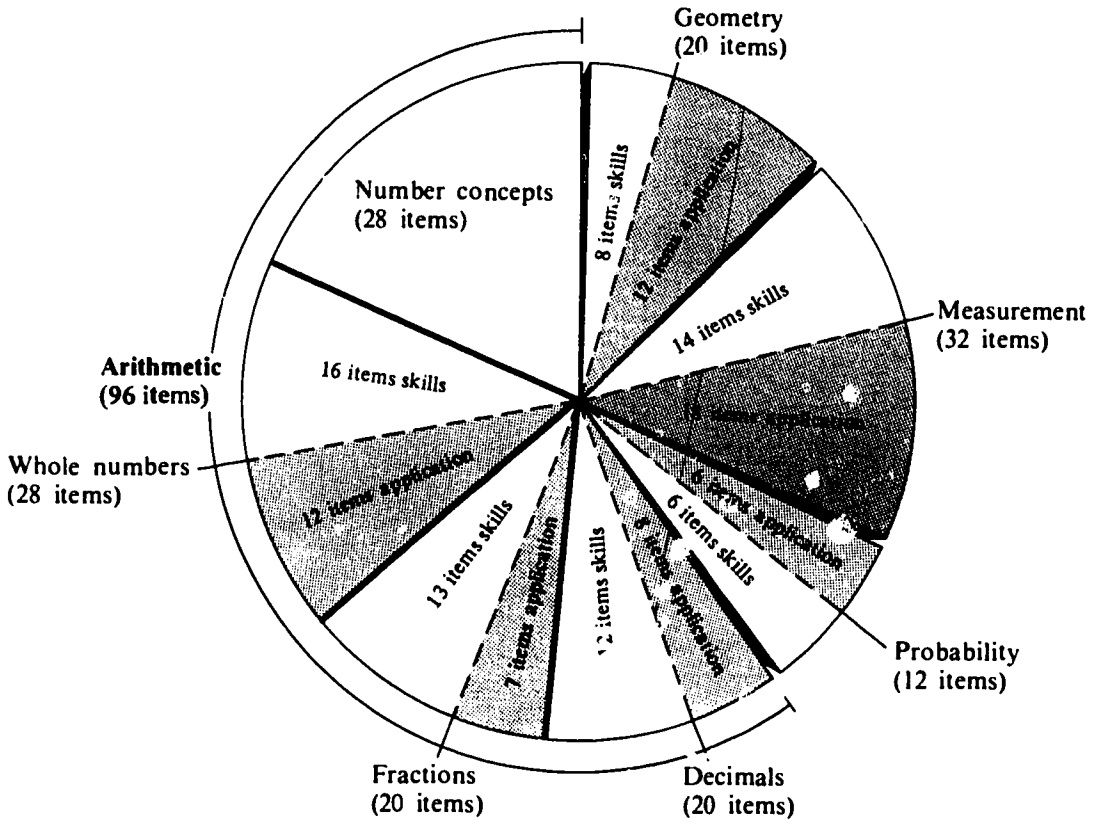


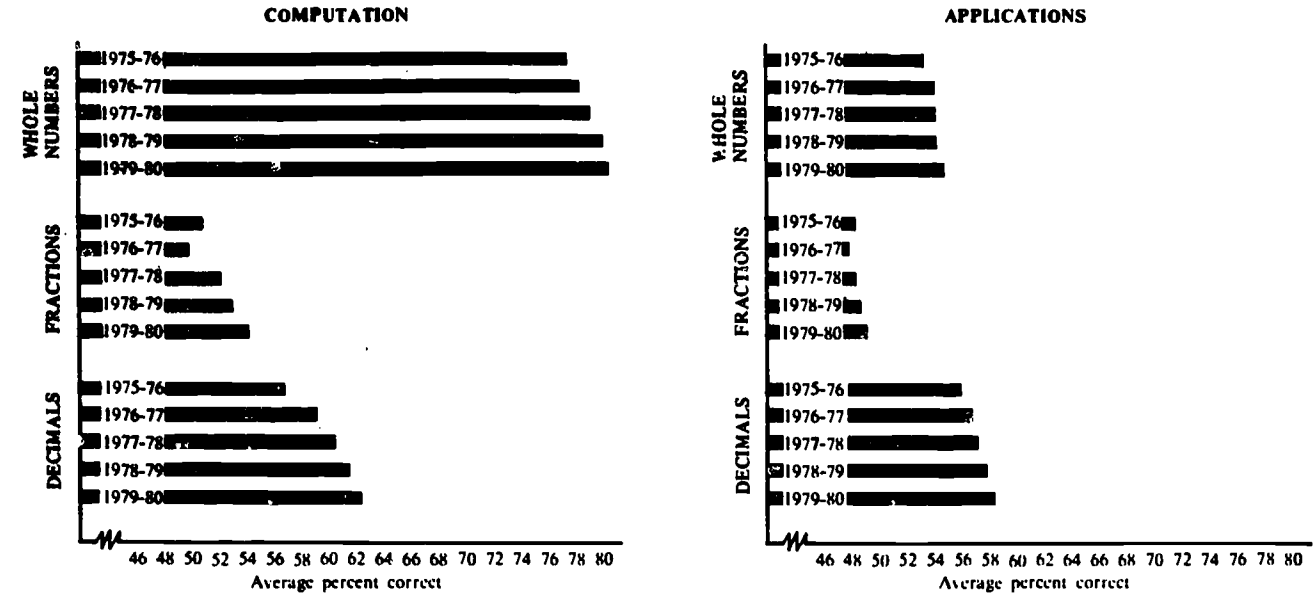
Fig. 8. Number of questions, by skill area, in the mathematics section of the *Survey of Basic Skills: Grade 6*

Table 12

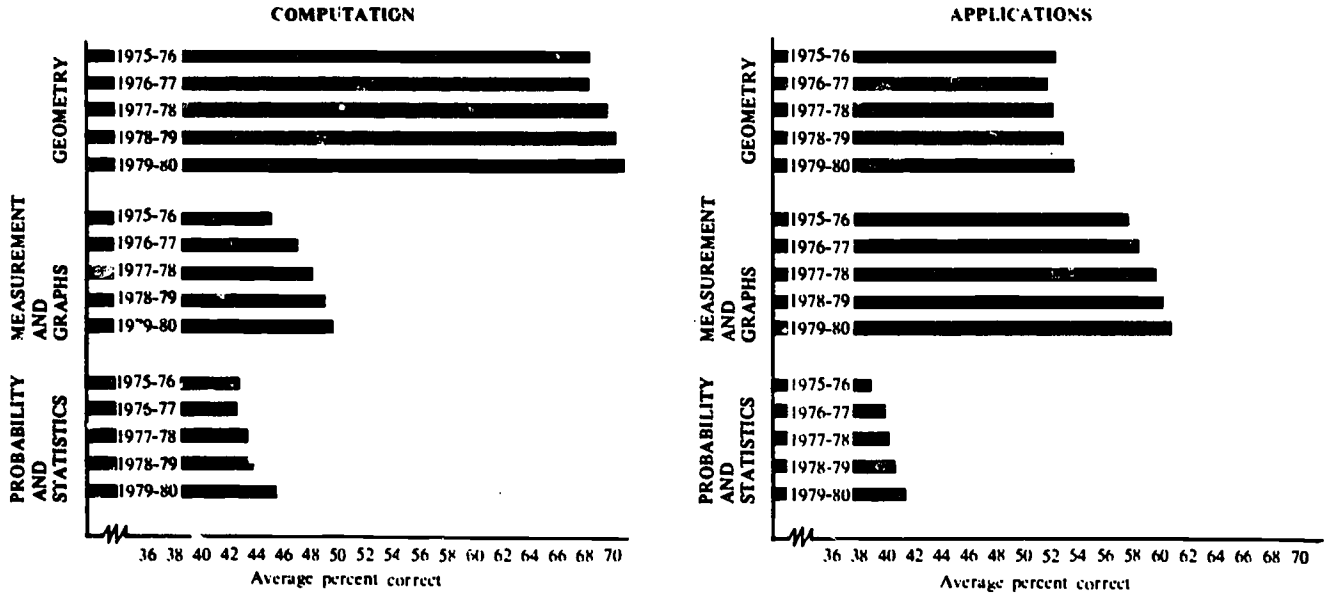
Mathematics Scores of California Sixth Grade Students
on the Survey of Basic Skills: Grade 6

Skill area	Number of questions	Average percent correct					Change			
		1975-76	1976-77	1977-78	1978-79	1979-80	1975-76 to 1976-77	1976-77 to 1977-78	1977-78 to 1978-79	1978-79 to 1979-80
MATHEMATICS, TOTAL	160	57.4	57.7	58.5	59.0	59.8	+0.3	+0.8	+0.5	+0.7
Arithmetic	96	61.0	61.0	61.8	62.3	63.0	-0-	+0.8	+0.5	+0.7
Number concepts	28	65.4	65.5	65.6	65.8	66.3	+0.1	+0.1	+0.2	+0.5
Number and numeration	13	75.0	75.6	76.3	77.2	77.8	+0.6	+0.7	+0.9	+0.6
Number theory	9	56.1	56.1	56.0	56.4	57.0	-0-	-0.1	+0.4	+0.6
Number properties	6	58.6	57.8	56.6	55.4	55.4	-0.8	-1.2	-1.2	-0-
Whole numbers	28	66.9	67.5	68.0	68.4	68.9	+0.6	+0.5	+0.4	+0.5
Computation	16	77.4	77.9	78.8	79.4	79.9	+0.5	+0.9	+0.6	+0.5
Application	12	52.9	53.6	53.7	53.6	54.2	+0.7	+0.1	-0.1	+0.6
Fractions	20	49.6	49.0	50.6	51.3	52.5	-0.6	+1.6	+0.7	+1.2
Computation	13	50.5	49.8	52.0	52.9	54.5	-0.7	+2.2	+0.9	+1.6
Application	7	48.0	47.5	47.9	48.3	48.8	-0.5	+0.4	+0.4	+0.5
Decimals	20	65.3	57.8	59.0	59.9	60.7	+1.5	+1.2	+0.9	+0.8
Computation	12	56.6	58.9	60.6	61.6	62.6	+2.3	+1.7	+1.0	+1.0
Application	8	55.8	56.2	57.7	57.4	57.9	+0.4	+0.5	+0.7	+0.5
Geometry	20	58.8	58.5	57.3	59.8	60.4	-0.3	+0.8	+0.5	+0.6
Knowledge of facts	8	68.7	68.4	69.7	70.2	70.8	-0.3	+1.3	+0.5	+0.6
Application	12	52.2	51.9	52.3	52.9	53.4	-0.3	+0.4	+0.6	+0.5
Measurement and graphs	32	52.1	53.5	54.4	55.1	55.7	+1.4	+0.8	+0.7	+0.6
Knowledge of facts	14	44.8	47.2	48.0	48.5	49.2	+2.4	+0.8	+0.5	+0.7
Application	18	57.8	58.4	59.5	60.1	60.8	+0.6	+1.1	+0.6	+0.7
Probability and statistics	12	40.9	40.9	41.6	41.7	43.2	+0.5	+0.7	+0.1	+1.5
Computation	6	42.3	42.3	42.9	43.0	45.1	-0.1	+0.6	+0.1	+2.1
Application	6	39.6	39.6	40.2	40.4	41.2	+1.1	+0.6	+0.2	+0.8
Problem Solving	45	54.9	55.0	55.6	56.1	56.7	+0.1	+0.6	+0.5	+0.6
Arithmetic	21	52.9	52.8	53.1	53.4	53.9	-0.1	+0.3	+0.3	+0.5
Measurement	18	57.8	58.4	59.5	60.1	60.8	+0.6	+1.1	+0.6	+0.7

(a) Student Performance on Computation and Application Questions on Whole Numbers, Fractions, and Decimals



(b) Student Performance on Computation and Application Questions in Geometry, Measurement and Graphs, and Probability and Statistics



(c) Student Performance on Numeration, Number Theory, and Number Properties Questions

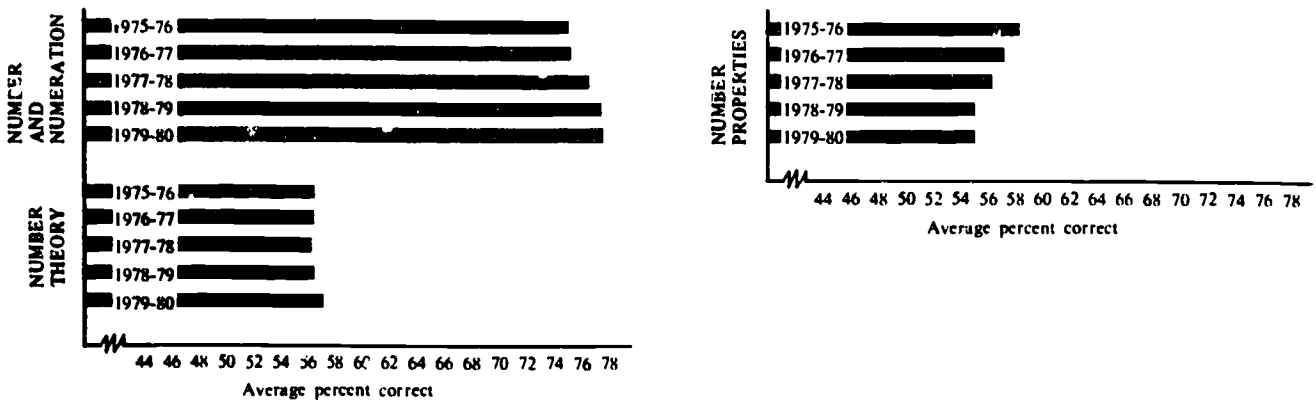


Fig. 9 Graphic representations of percent correct scores in skill areas of mathematics on the *Survey of Basic Skills: Grade 6*

Mathematics Results for Grade Six

Table 12 contains the sixth grade Survey results on the total test and the four major content categories of mathematics assessed on the Survey--arithmetic, geometry, measurement and graphs, and probability and statistics for 1975-76 through 1979-80. The results are presented for the computation and application portion of each category. The table also shows the change in scores over the five-year period.

A graphical representation of each skill area r[illegible] for the five-year period appears in Figure 9. The following overall conclusions are apparent from the data in Table 12 and Figure 9.

- The overall scores in mathematics have increased steadily over the past four years, registering a total gain of 2.3 percent correct.
- Computation/knowledge of facts, application, and number concept scores have increased steadily over the five-year period in the mathematics section of the Survey.
- The most dramatic increase in performance occurred on decimal computation items. During the five-year period, the percent correct score increased by 6.0 points.
- The scores in problem solving, an aggregate of scores in applications of all skill areas, showed a steady increase over the five-year period.
- The three-year decline of scores in number properties has now leveled off.

Analysis and Interpretation of Skill Area Results

Members of the Mathematics Assessment Advisory Committee conducted an in-depth review of the mathematics results by skill area. The committee judged the adequacy of student performance in the light of the difficulty of the questions, the relative emphasis on each skill in a typical classroom, and changes in student performance across several years. Particular attention was given to the performance of students in the applications portions of the Survey in this review.

The committee's review on a skill-by-skill area basis is summarized in the following chart. The left-hand column of the chart describes the skills assessed within a skill area, with illustrative test questions representing student performance; and in the right-hand column are the judgments of the California Mathematics Assessment Advisory Committee based upon its analysis of the sixth grade results.

Skill area descriptions and illustrative questions	Committee's observations and judgments

I. ARITHMETIC

The arithmetic portion of the Survey of Basic Skills: Grade 6 consists of questions in four skill areas--number concepts, whole numbers, fractions, and decimals.

The overall percent correct score on the 96 questions in arithmetic was 63.0 in 1979-80. This represented an increase of 0.7 percent correct over the score in 1978-79.

A. Number concepts

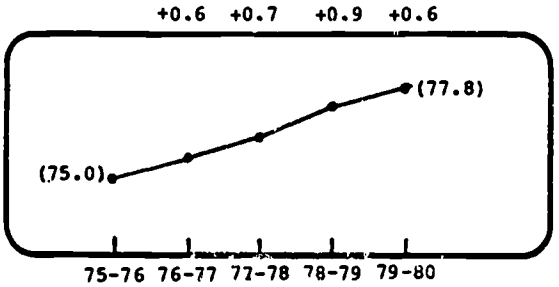
The number concepts portion of the Survey is subdivided into number and numeration, number theory, and number properties.

The overall percent correct score on the 28 questions in number concepts was 66.3.

1. Number and numeration

The student must identify whole numbers, fractions, and decimals; identify place value; and recognize points on a number line.

The percent correct score on the 13 items in number and numeration was 77.8, an increase of 0.6 percent correct from the score in 1978-79. The changes in score over a five-year period are shown in the chart below.



Example 43

How would you read 420,700?

65 ● Four hundred twenty thousand seven hundred
3 ○ Four million two hundred seven thousand
12 ○ Four million twenty thousand seven hundred
20 ○ Forty-two thousand seven hundred

Year	76-77	77-78	78-79	79-80
Percent correct	58.4	60.7	63.8	65.4

Over the five-year period, 1975-76 through 1979-80, the average percent correct score in number and numeration increased by 2.8 points. From 1978-79 to 1979-80, the score increased by 0.6 points. Example 43 is typical of the questions on which the scores increased. Of the three questions on which the scores decreased from 1978-79 to 1979-80, Example 44 is typical. In fact, for Example 44, the score over a four-year period decreased by 1.4 percent correct.

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 44

1

762 =

7 ○ 7 + 6 + 2
2 ○ 7 + 60 + 200
86 ● 700 + 60 + 2
2 ○ 70 + 60 + 20
3 ○ None of these

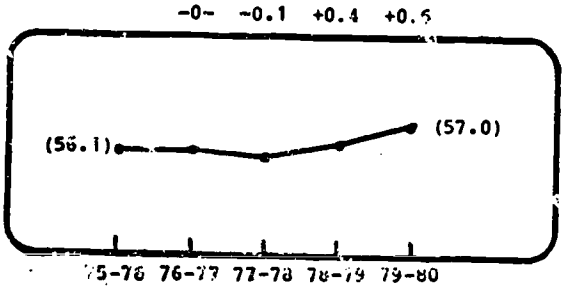
Year	76-77	77-78	78-79	79-80
Percent correct	87.7	87.0	87.0	86.3

The committee members were pleased with the student performance in the number and numeration skill area, particularly the increase of 2.8 percent correct over the five-year period. In the committee's judgment, more instruction is probably taking place in this skill in kindergarten through grade six classrooms. However, the committee members expressed their concern over the decline of scores in place value, as shown in Example 44. The committee recommended that students be given experiences with concrete manipulative objects that help them understand place value concepts and regrouping. An emphasis in this skill will help students to understand our numeration system and to perform computational algorithms.

2. Number theory

The student must recognize odd, even, prime, and composite numbers and choose the lowest common multiple or greatest common factor of several numbers.

The percent correct score on the nine number theory questions in 1979-80 was 57.0, an increase of 0.6 percent correct from the score in 1978-79. The changes in scores across the five-year period are shown in the chart below.



Example 45

If one of the two factors of 18 is 6, the other factor is:

65 ● 3
4 ○ 6
21 ○ 12
10 ○ 24

Year	76-77	77-78	78-79	79-80
Percent correct	63.4	64.2	65.0	65.2

Over the five-year period, the scores have shown an increasing trend in number theory. Example 45 is typical of the questions on which the scores increased consistently.

Skill area descriptions and illustrative questions	Committee's observations and judgments

3. Number properties

The student must recognize commutative, associative, and distributive properties of operations on numbers.

Example 46

Select the correct name for the missing number.

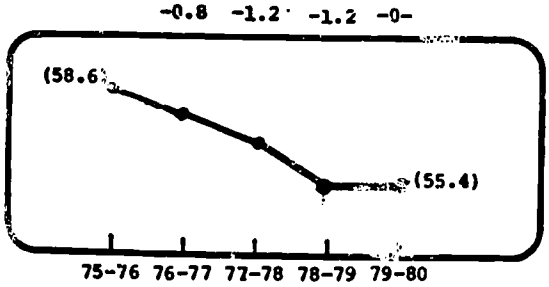
6 × 15 = □ × 6

3 ○ 9
54 ● 15
[illegible] ○ 90
[illegible] ○ 540
8 ○ None of these

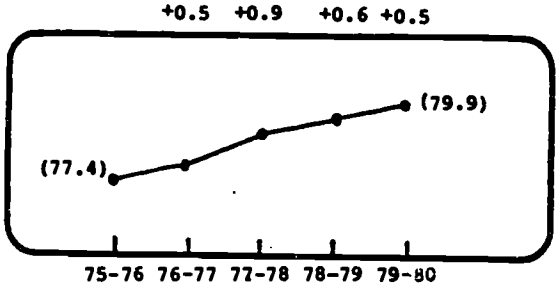
Year	76-77	77-78	78-79	79-80
Percent correct	58.6	56.6	54.8	54.3

The committee observed that students seem to have difficulty in distinguishing between concepts of "greatest common divisor" and "least common multiple." When asked to find the least common multiple of two numbers, a vast majority of students marked the answer corresponding to the greatest common divisor. The committee felt a need for more emphasis on the concept of prime factorization, common multiple, and common divisor.

The percent correct score on the six questions in number properties for 1979-80 was 55.4. The changes in scores in number properties skill over a five-year period are shown in the graph below.



Over the four-year period, 1975-76 through 1978-79, the percent correct score in number properties items decreased by 3.2 points and remained unchanged from 1978-79 to 1979-80. The decline over the four-year period was shown on each of the six items in this category. Example 46 illustrates the typical performance of students on questions in number properties.

Skill area descriptions and illustrative questions	Committee's observations and judgments
	In the opinion of the committee, teachers need to emphasize number properties as they arise during the math program to improve the students' understanding of mathematical concepts and skills. The committee also felt that a continued decrease in student understanding and skill in number properties will lead to serious difficulties in comprehending mathematical concepts and skills that are developed in later grades.
B. Whole numbers The questions in whole numbers are categorized as computation or applications questions.	The overall percent correct score on 28 questions in whole numbers in 1979-80 was 68.9, an increase of 0.5 percent correct from the score in 1978-79.
1. Computation in whole numbers The student must perform addition, subtraction, multiplication, and division involving whole numbers.	The percent correct score on the 16 questions in computation in whole numbers in 1979-80 was 79.9, an increase of 0.5 percent correct from the score in 1978-79. The changes in scores across the five-year period are shown in the chart below.
Example 47 27|8154 6 ○ 3,020 5 ○ 2,102 57 ● 302 17 ○ 32 15 ○ None of these	
Year 76-77 77-78 78-79 79-80 Percent correct 53.2 54.1 54.3 56.8	Over the five-year period, the scores in whole number computation have increased steadily, showing a gain of 2.5 percent correct. A closer look at the individual computation questions revealed that students are performing well in the basic skills of addition, subtraction, and

Skill area descriptions and illustrative questions	Committee's observations and judgments

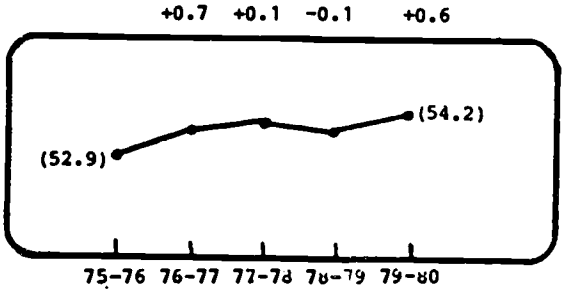
multiplication of whole numbers. Most division questions displayed a much smaller growth pattern or leveling off of scores. Example 47 is illustrative of student performance on a division question.

The committee observed that the majority of errors in whole number computation questions involved place value or "place holders." Example 47 is also illustrative of a whole number computation question in which 17.4 percent of the students omitted the use of a zero to "hold" the tens place in the answer.

2. Applications in whole numbers

   The student must apply the four arithmetic operations on whole numbers and solve problems presented in a daily life context.

The percent correct score on the 12 questions in application in whole numbers in 1979-80 was 54.2, an increase of 0.6 percent correct over the score in 1978-79. The changes in scores across the five-year period are shown in the chart below.



Example 48

Sue has 58¢. If apples cost 11¢ each, what is the greatest number of whole apples that Sue can buy?

17 ○ 47
7 ○ 6
11 ○ 4
2 ○ 3
63 ● None of these

Year	76-77	77-78	78-79	79-80
Percent correct	63.6	62.2	63.2	62.6

Over the five-year period, percent correct scores showed an increase of 1.3 points for whole number applications. The committee observed that the most common error in whole number applications involved student difficulty in recognizing the action indicated by the situation and therefore, choosing the wrong operation. This, in the opinion of

Skill area descriptions and illustrative questions	Committee's observations and judgments

the committee, indicates a need for instruction in problem analysis and modeling techniques, a recommendation that is also included in the California Mathematics Framework Addendum (1980). Example 48 is illustrative of student performance on this kind of item. In this question 17.3 percent of the students chose the subtraction operation to solve the problem. Another 11.2 percent failed apparently to read the problem carefully and chose 4 as the answer.

C. Fractions

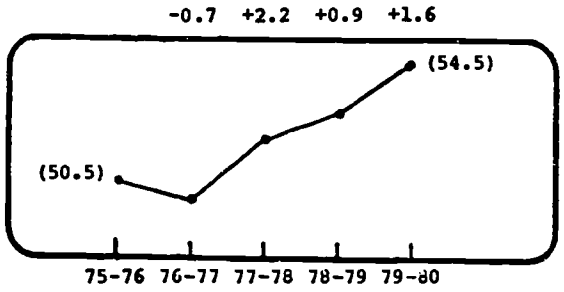
The questions in fractions are categorized as computation or application questions.

The overall percent correct score on the 20 questions in fractions in 1979-80 was 52.5, an increase of 1.2 percent correct from the score in 1978-79.

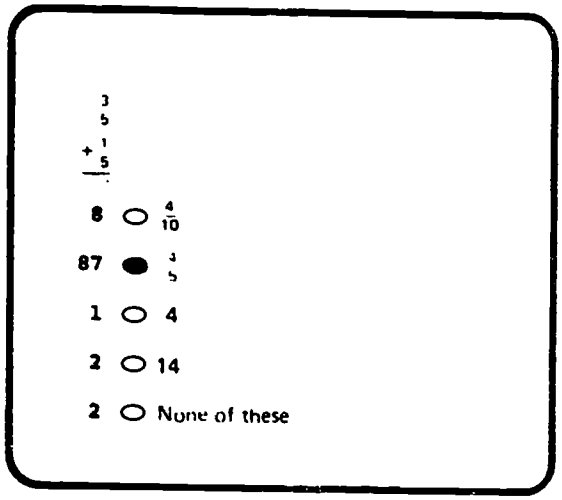
1. Computation in fractions

The student must perform addition, subtraction, multiplication, and division involving fractional numbers.

The percent correct score on the 13 questions in computation in fractions in 1979-80 was 54.5, an increase of 1.6 percent correct from the score in 1978-79. The changes in scores across the five-year period are shown in the chart below.



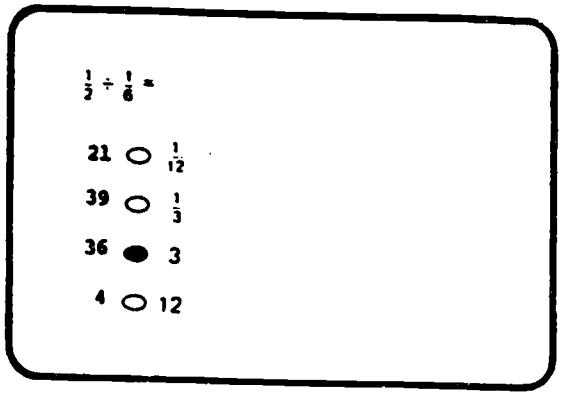
Example 49



Year	76-77	77-78	78-79	79-80
Percent correct	82.8	83.7	84.7	86.7

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 50



Year	76-77	77-78	78-79	79-80
Percent correct	30.4	33.6	34.7	35.5

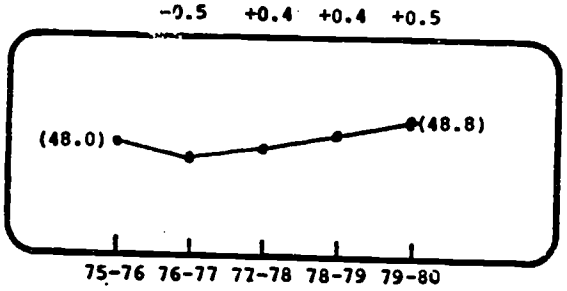
Over the five-year period, the percent correct scores showed an increase of 4.0 for fraction computation. In fact, the fraction computation skill area showed the second greatest gain over the five-year period. Decimal computation showed a gain of 6.0 percent correct during the same period.

The committee was particularly pleased with the fact that all of the 13 questions showed substantial gains during this period. Examples 49 and 50 illustrate the typical gain of scores on fraction computation questions. Example 49 shows that a majority of those who missed the question added the numerator and denominator independently. Clearly, these students did not have a conceptual understanding of nor skill with these operations. The conceptual problem in adding and subtracting is related to equivalence since fractions are converted to common denominator form. However, the committee remarked that because of the metric system, operations with fractions may be less important in the future at this grade level.

2. Applications in fractions

   The student must use the four arithmetic operations on fractions and mixed numbers to demonstrate comprehension or ability to solve problems in a daily life context.

In 1979-80 the percent correct score on the seven questions in application in fractions was 48.8, an increase of 0.5 percent correct from the score in 1978-79. The changes in scores across the five-year period are shown in the chart below.



Skill area descriptions and illustrative questions

Committee's observations and judgments

Example 51

Laurie has saved $5 to buy clothes that cost $15. What fraction of the total has she saved?

18 ○ $\frac{1}{15}$

11 ○ $\frac{1}{10}$

21 ○ $\frac{1}{5}$

50 ● $\frac{1}{3}$

Year	76-77	77-78	78-79	79-80
Percent correct	48.6	48.6	49.5	49.7

Example 52

John has 12 baseball cards. He gives $\frac{1}{3}$ of them to Jim. How many does John have left?

32 ○ 4

[illegible] ○ 6

[illegible] ● 8

27 ○ 9

Year	76-77	77-78	78-79	79-80
Percent correct	33.7	33.4	33.5	33.2

Over the five-year period, the scores in fraction computation increased by 0.8 percent correct. In fact, the percent correct score decreased by 0.5 percent correct from 1975-76 to 1976-77; however, over the last four-year period, it increased by 1.3 percent correct.

Although the percent correct scores of students in fraction applications were the second lowest, after probability and statistics, in view of the difficulty of the skill involved, the committee members judged the performance in this skill area as adequate. Example 51 illustrates the performance of students on fraction application questions involving one step. Example 52 illustrates the performance of students on a two-step fraction word problem. In example 52, 32 percent of the students chose "4" and 27 percent of the students chose "9" as the correct answer. The committee members were of the opinion that, as with whole number applications, students seem to have difficulty in recognizing the situation and in setting up the mathematical sentence that will result in correct solution.

Skill area descriptions and illustrative questions	Committee's observations and judgments

D. Decimals

The questions in decimals are categorized as computation or application questions.

1. Computation in decimals

The student must perform addition, subtraction, multiplication, and division involving decimal numbers.

Example 53

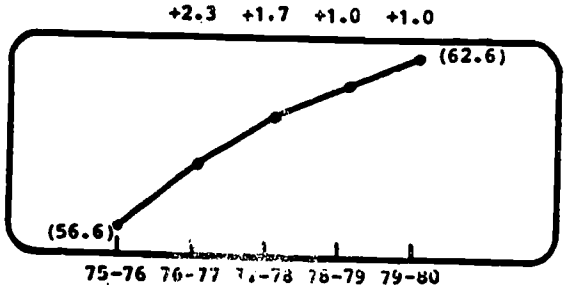
$8\overline{)487.2}$

7 ○ 609
65 ● 60.9
13 ○ 6.9
6 ○ 6.09
9 ○ None of these

Year	76-77	77-78	78-79	79-80
Percent correct	59.6	62.0	63.3	64.6

The overall percent correct score in decimals in 1979-80 was 60.7, an increase of 0.8 percent correct over the score in 1978-79.

In 1979-80 the percent correct score on the 12 questions in computation in decimals was 62.6, an increase of 1.0 percent correct from the score in 1978-79. The changes in scores across the five-year period are shown in the chart below.



The decimal computation skill area showed the greatest gain (6.0 percent correct) of all skill areas over the five-year period from 1975-76 to 1979-80. The scores increased consistently on all the questions. Example 53 illustrates the student performance on a typical decimal division computation question.

The committee judged the performance of students on operations with decimals as very acceptable. The committee members, however, felt a need for more emphasis in this skill area. They observed that students have difficulty with proper placement of the decimal point. This indicates a lack of applying estimation skills.

Skill area descriptions and illustrative questions	Committee's observations and judgments

2. Applications in decimals

The student must use the four arithmetic operations on numbers in decimal form to demonstrate understanding of principles and ability to solve problems in a daily life context.

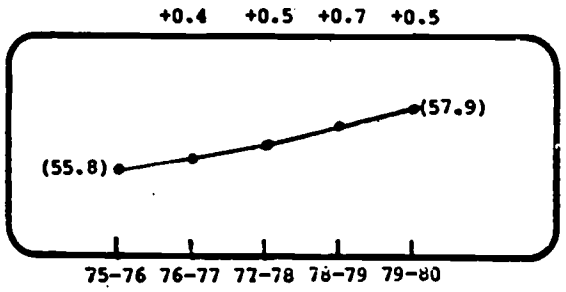
Example 54

Mrs. Jones has $158.62. She makes purchases of $5.25, $49.88, and $10.35. She earns $51.64. How much does she now have?

25 ○ $172.46
53 ● $144.78
15 ○ $ 41.50
7 ○ $ 13.84

Year	76-77	77-78	78-79	79-80
Percent correct	50.5	51.3	52.0	52.8

In 1979-80 the percent correct score on the 8 questions in applications in decimals was 57.9, an increase of 0.5 percent correct from the score in 1978-79. The changes in scores across the five-year period are shown in the chart below.



Over the five-year period, from 1975-76 through 1979-80, the percent correct score in decimal applications increased 2.1 percent correct. Example 54 is typical of the performance of students on questions in this skill area. As shown in the example, 25 percent of the students chose the answer that results from incorrectly applying the operations.

The committee observed that students are typically weak in isolating the mathematical operations that apply in a particular situation. The committee strongly recommended a need for instruction in classrooms in problem analysis and modeling techniques, a recommendation that is also included in the California Mathematics Framework Addendum (1980).

Skill area descriptions and illustrative questions	Committee's observations and judgments

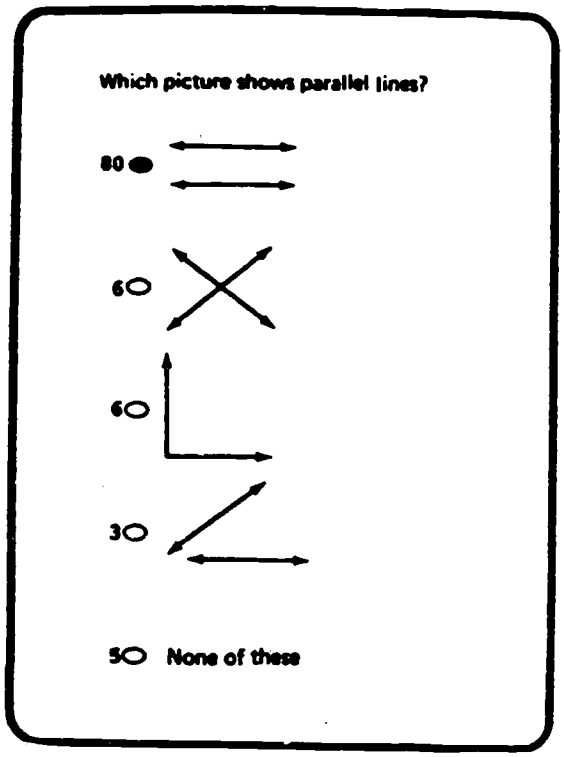
II. GEOMETRY

The questions in geometry are categorized as knowledge of facts or concept and application questions.

A. Knowledge of facts in geometry

The student must be able to identify basic geometric figures.

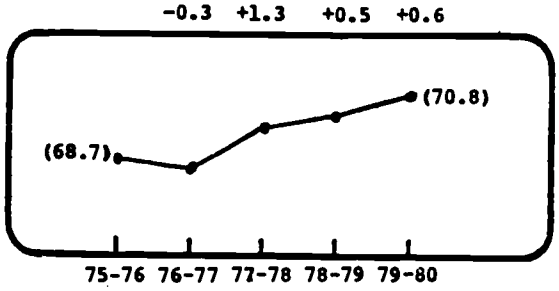
Example 55



Year	76-77	77-78	78-79	79-80
Percent correct	76.8	77.1	79.5	80.4

The overall percent correct score on 20 questions in geometry in 1979-80 was 60.4, an increase of 0.6 percent correct from the score in 1978-79.

In 1979-80 the percent correct score on the eight questions in knowledge of facts in geometry was 70.8, an increase of 0.6 percent correct from the score in 1978-79. The score changes across the five-year period are shown in the chart below.



The five-year trend in the percent correct score on knowledge of geometric facts shows a small decline in the second year and a continuous increase in later years, resulting in an overall increase of 2.1 percent correct. Example 55 is illustrative of good student performance on a typical knowledge-of-facts question as judged by the committee. The committee observed that sixth grade students scored approximately 30 percent correct points higher than those of third grade students on a similar question.

In the opinion of the committee, sixth grade students show less aptitude in geometric applications than in knowledge of geometric facts because of their lack of knowledge of required

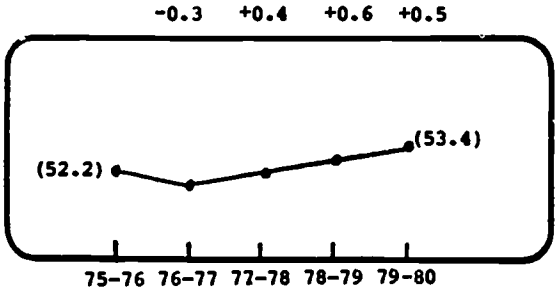
Skill area descriptions and illustrative questions	Committee's observations and judgments

geometric facts beyond the recognition of simple two- and three- dimensional geometric figures. The committee felt that sixth grade students should understand that a triangle contains angles whose sum is 180°, that a square contains four right angles, that a plane divides space into two regions, that two intersecting lines intersect in a point, and that congruent figures are the same size and shape.

B. Concepts and applications in geometry

The student must be able to comprehend and apply basic geometric knowledge and concepts.

In 1979-80 the percent correct score on the 12 questions in concepts and applications in geometry was 53.4, an increase of 0.5 percent correct from the score in 1978-79. The changes in scores across the five-year period are shown in the chart below.



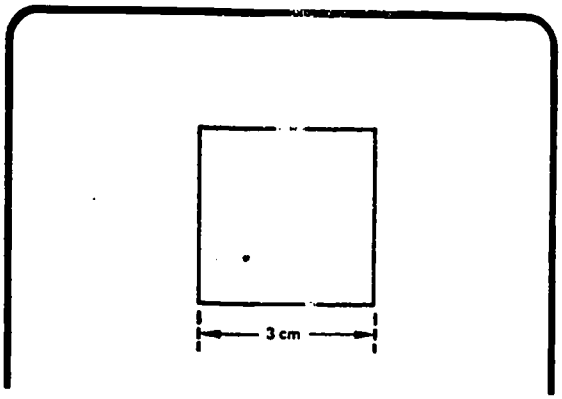
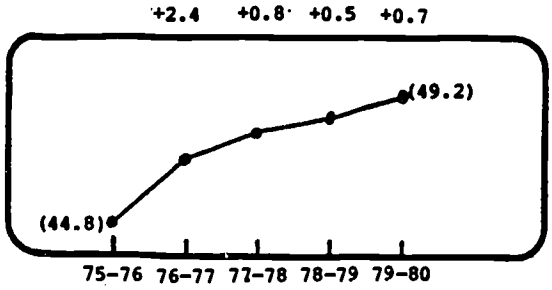
Example 56

If two different lines intersect, their intersection is:

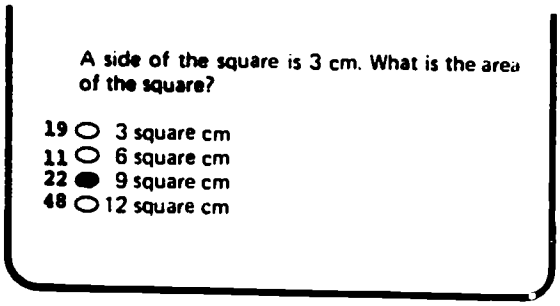
46 ○ a line segment
10 ○ a line
34 ● a point
7 ○ a triangle
3 ○ a square

Year	76-77	77-78	78-79	79-80
Percent correct	35.3	34.5	34.3	34.3

Over the five-year period, the trend in geometry concepts and applications parallels the trend in scores for knowledge of geometric facts. In the five-year period, from 1975-76 through 1979-80, the score in this skill area increased by 1.2 percent correct. Students showed an increase in percent correct scores on eight of the 12 questions. Example 56 is illustrative of student performance in this skill area on questions that have shown a steady decrease.

Skill area descriptions and illustrative questions	Committee's observations and judgments
	The committee felt that more emphasis should be placed on the development of geometric concepts in the elementary grades. Concept development in geometry can be facilitated by manipulating with models and putting more emphasis on spatial visualization in two- and three-dimension.
III. MEASUREMENT AND GRAPHS The questions in measurement and graphs are categorized as computation and knowledge of facts or application questions.	The overall percent correct score on the 32 questions in measurement and graphs in 1979-80 was 55.7 an increase of 0.6 percent correct from the score in 1978-79.
A. Knowledge of facts in measurement and graphs The student must be able to estimate length and volume; convert length, mass, volume, and time from one unit to another unit, and perform arithmetic operations on quantities of length, mass, volume, and time.	In 1979-80 the percent correct score on the 14 questions in measurement and graphs was 49.2, an increase of 0.7 percent correct from the score in 1978-79. The changes in scores across the five-year period are shown in the chart below.
Example 57  	 The scores of sixth grade students showed a continuous strong increase over the five-year period from 1975-76 through 1979-80, resulting in an increase of 4.4 percent correct.

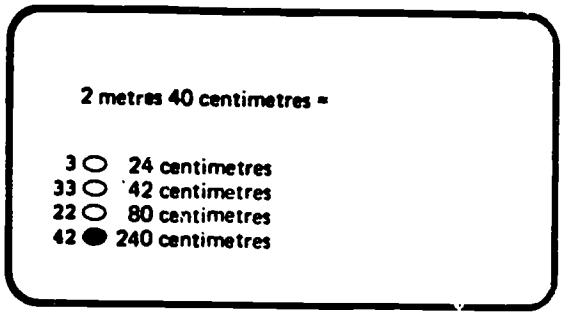
Skill area descriptions and illustrative questions	Committee's observations and judgments



Year	76-77	77-78	78-79	79-80
Percent correct	20.1	22.1	21.6	22.4

The committee was very pleased with the continuing score increases in this skill area. However, the committee noted that students continue to have difficulty distinguishing between perimeter and area. Example 57 illustrates that when asked to compute the area of a square, students most frequently selected the response that was the perimeter. In the opinion of the committee, sixth grade students also showed inadequate performance on items involving conversions within a measurement system. Example 58 is illustrative of student performance in this skill.

Example 58



Year	76-77	77-78	78-79	79-80
Percent correct	39.7	41.2	42.4	42.3

B. Applications in measurement and graphs

The student must be able to solve problems related to measurement of length, area, mass, and volume.

In 1979-80 the percent correct score on the 18 questions in applications in measurement and graphs was 60.8, an increase of 0.7 percent correct from the score in 1978-79. The changes in scores across the five-year period are shown on the following chart.

Skill area descriptions and illustrative questions

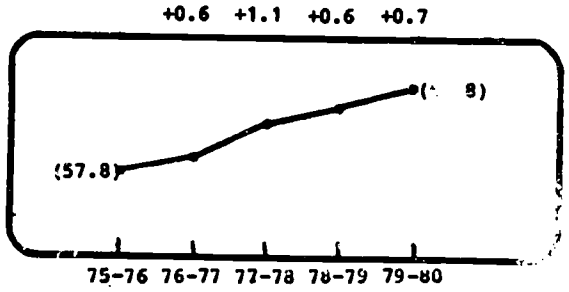
Committee's observations and judgments

Example 59

If a distance of 350 miles is represented by a segment of 14 inches on a map, then on the map 1 inch represents:

12 ○ 4 miles
61 ● 25 miles
13 ○ 40 miles
14 ○ 250 miles

Year	76-77	77-78	78-79	79-80
Percent correct	58.2	58.4	59.5	60.5



Over the five-year period, from 1975-76 through 1979-80, the scores in measurement and graph applications showed a steady growth pattern resulting in an overall gain of 3.0 percent correct. The scores increased over the five-year period on all questions except one. Example 59 typically shows the performance of students on questions on which the scores increased consistently. The one question on which the scores have shown consistent decline involves the Pythagorean theorem.

Example 60

How many square feet of linoleum are needed to cover a rectangular floor 15 feet long and 12 feet wide?

55 ● 180
7 ○ 90
10 ○ 54
28 ○ 27

Year	76-77	77-78	78-79	79-80
Percent correct	51.0	53.4	53.9	55.0

The committee felt a need for more emphasis on development of measurement concepts in elementary grade classrooms. The committee's conclusion was based on the observation that in problems involving the calculation of volume, 56 percent of all students simply add the dimensions. In problems involving area, students apparently just manipulate the numbers to obtain an answer without any understanding of the concept. Example 60 is illustrative of student performance on this type of problem.

The committee also observed that 60 percent of the student population does not know the Pythagorean theorem and cannot apply it to a simple problem. Problems involving more complex graph reading requiring estimation of results or involving increments marked in units greater than one are difficult for 50 percent to 70 percent of all students.

Skill area descriptions and illustrative questions	Committee's observations and judgments

IV. PROBABILITY AND STATISTICS

The questions in probability and statistics are categorized as computation or application questions.

A. Computations in probability and statistics

The student must be able to compute probability of simple events and compute the mean, mode, and median of a set of given numbers.

Example 61

Find the mean of the following set of numbers:

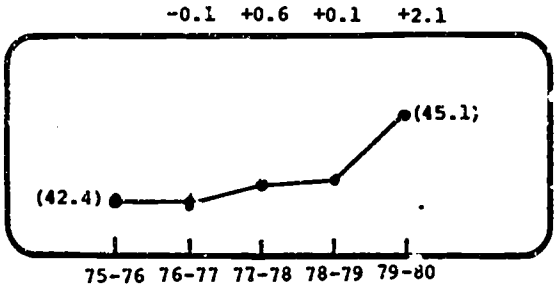
25, 45, 20, 30

11 ○ 25
46 ○ 30
21 ○ 35
17 ○ 40
10 ○ 45

Year	76-77	77-78	78-79	79-80
Percent correct	39.8	42.0	42.7	45.7

The overall percent correct score on the 12 questions in probability and statistics in 1979-80 was 43.2, an increase of 1.5 percent correct from the score in 1978-79.

In 1979-80 the percent correct score on the six questions in compuations in probability and statistics was 45.1, an increase of 2.1 percent correct from the score in 1978-79. The changes in scores across the five-year period are shown in the chart below.



Over the five-year period, from 1975-76 through 1979-80, the scores on probability and statistics have shown a trend of increasing scores. From 1978-79 to 1979-80, the gain in scores surpassed the gains in all three previous years combined. Example 61 is typical of student performance on questions in this skill area.

Skill area descriptions and illustrative questions	Committee's observations and judgments
	In the opinion of the committee, the average percent correct scores in this skill are too low. The committee recommended that classroom teachers continue to place increased emphasis on classroom instruction in probability and statistics.
B. Applications in probability and statistics The student must be able to solve problems related to elementary concepts in probability and statistics.	In 1979-80 the percent correct score on the six questions in applications in probability and statistics was 41.2, an increase of 0.8 percent correct from the score in 1978-79. The changes in scores across the five-year period are shown in the chart below.

Example 52

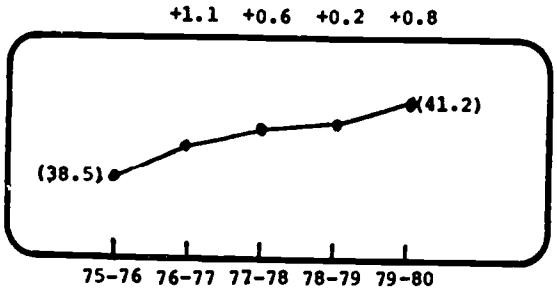
On a math test

Alice scored 25.
Betty scored 45.
Cindy scored 20.
Dotty scored 30.

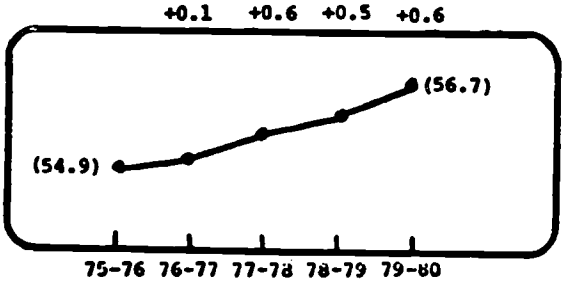
Who scored closest to the average of these scores?

9 ○ Alice
47 ○ Betty
7 ○ Cindy
38 ● Dotty

Year	76-77	77-78	78-79	79-80
Percent correct	34.4	35.2	36.9	38.1



In the opinion of the committee, the percent correct scores in this skill area are too low. The committee recommended that classroom teachers continue to place increased emphasis in probability and statistics application.

Skill area descriptions and illustrative questions	Committee's observations and judgments
V. PROBLEM SOLVING The questions in this category are an aggregate of arithmetic and measurement problem solving questions. The student must be able to solve word problems involving operations of addition, subtraction, multiplication, and division of whole numbers, decimals, and fractions and those involving concepts in measurement such as reading and interpreting line, bar and circle graphs.	The overall percent correct on the 45 questions in problem solving was 56.7 in 1979-80, an improvement of 0.6 percent correct from the score in 1978-79. The five-year trend in the scores is shown in the chart below.  The members of the committee were very pleased to observe an increasing trend of scores on the questions in this category. From 1975-76 to 1979-80 the percent correct increased 1.8 points. The committee observed that the scores in problem solving are not improving as fast as the improvement in scores for computation questions. The committee felt that an emphasis on problem analysis and modeling will help students to improve their scores in problem solving skills.

Summary of the Committee's Conclusions and Recommendations

The members of the mathematics advisory committee were very pleased with the steady growth pattern of sixth grade students' scores from 1978-79 through 1979-80. The growth pattern of increasing scores in 1979-80 was a continuation of trends noted during the previous three years.

The pattern of strengths and weaknesses discerned by the committee members in their analysis of the sixth grade math results is summarized below.

Areas of strength	Areas in need of improvement
Computing (+, −, x, ÷) whole numbers, numbers, and simple fractions	Understanding concepts in place value
Adding and subtracting decimals	Dividing decimals and applying decimals
Recognizing common geometric shapes	Applying proper mathematical operations in word problems
Reading a simple bar graph	Understanding geometric concepts, such as sum of the interior angles of a triangle is 180^{o}, a square contains four right angles, a plane divides space into two regions, two intersecting lines intersect at a point, and similarity
	Using formulas, such as those for perimeter, area, and volume and intuitive understanding of the Pythagorean theorem
	Understanding mean, median, and range and computing probability of simple events

The members of the mathematics advisory committee made the following recommendations after analyzing the test results of the sixth grade students and discerning the strengths and weaknesses in the student performance.

- The advisory committee recommended that classroom teachers increase the use of manipulatives and models to enhance student understanding of concepts in place value and to help students develop spatial visualization in two- and three-dimensional space.

- The advisory committee recommended that since computation skills have continued to show strong growth, teachers consider refocusing some instructional time to provide for greater use of computational skills for problem solving, as recommended by the Addendum to California Mathematics Framework (1980). Since application scores have not shown the same strong growth pattern, the opinion of the advisory committee was that some redirection of time and effort on applications would be beneficial.

- The advisory committee recommended that teachers be provided with in-service training opportunities and with instructional materials that would help teachers become comfortable in helping students model and solve multiple-step problems. Also, the advisory committee recommended that a teacher's guide include practical examples or suggestions that would help teachers involve students in classroom activities that lead to opportunities for students to create and solve "real" multiple-step problems.

Test Scope

The Survey of Basic Skills: Grade 12 was developed to assess the degree to which students have acquired "basic" mathematics skills by the end of the twelfth grade. A statewide committee compiled objectives and reviewed questions for inclusion in the test. The 198 questions on the Survey were designed to assess students' skills in the areas of arithmetic, algebra, geometry, measurement and graphs, and probability and statistics. Figure 10 is an illustration of the emphasis given to each skill area in the total test. In the figure the skill area of arithmetic is subdivided into the areas of number concepts, whole numbers, fractions, and decimals. A complete description of the skills assessed in the Survey is given in Test Content Specifications for the Survey of Basic Skills: Mathematics, Grades Six and Twelve (Sacramento: California State Department of Education, 1975).

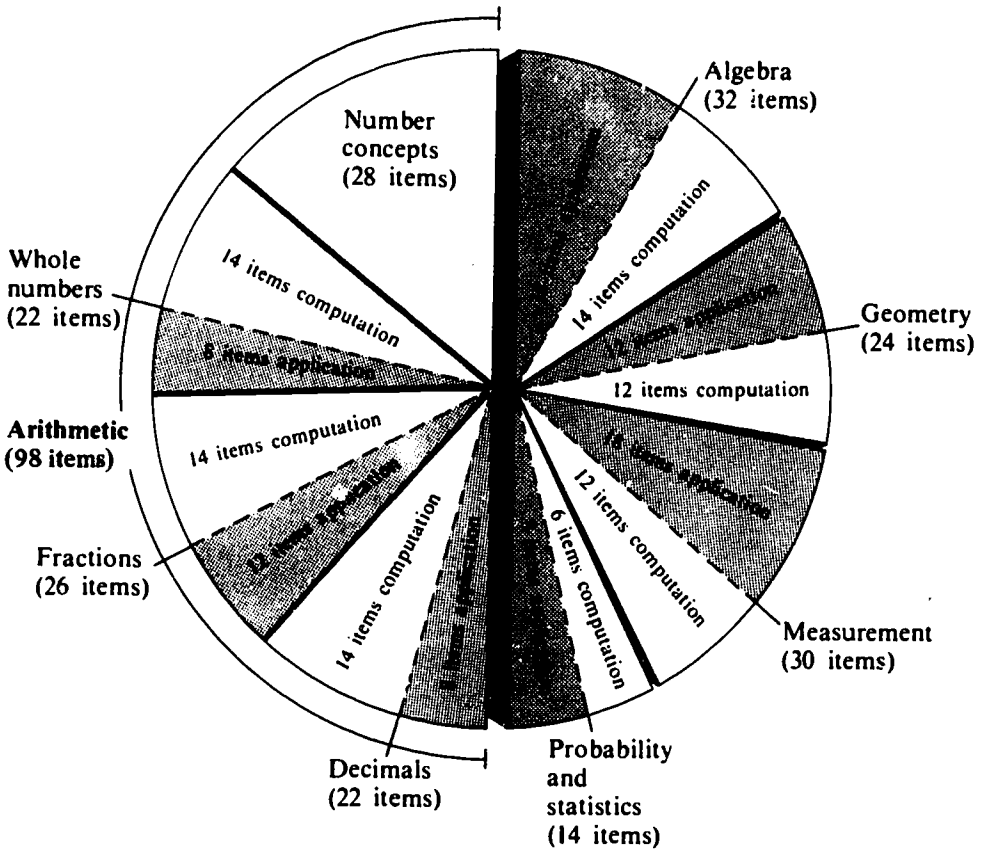


Fig. 10. Number of questions, by skill area, in the mathematics section of the *Survey of Basic Skills: Grade 12*

Mathematics Results for Grade Twelve

Table 13 contains the twelfth-grade Survey results on the total test and for the five major content categories assessed on the Survey--arithmetic, algebra, geometry, measurement, and probability and statistics. The results are presented for the computation and applications portion of each category. Additionally, the results are presented for the category of problem solving which is an aggregation of application questions in arithmetic, algebra, and measurement. The table shows the scores for 1975-76 through 1979-80 and the changes in scores over the five-year period.

A graphical representation of these skill area results for the five year period appears in Figure 11. The following overall conclusions are apparent from the data in Table 13 and in Figure 11.

- The overall mathematics achievement of California twelfth grade students showed a trend from a decline to leveling off in 1977-78 and since then the scores have shown increasing trends in the two years following it.

- From 1978-79 to 1979-80, the scores increased in all skill areas except the skill areas of number theory, number properties, algebra applications, and computations in measurement, in which the scores remained the same or declined very slightly.

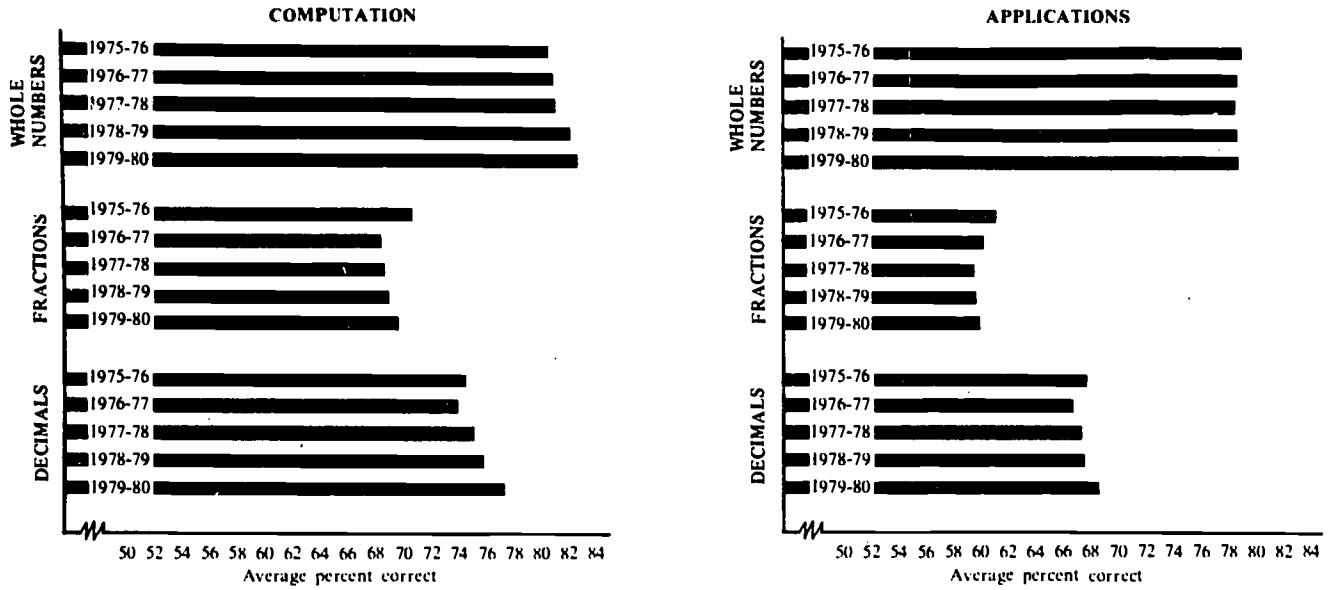
- Computation scores have steadily increased over the four year period with the greatest gain occurring in decimal computation.

Table 13

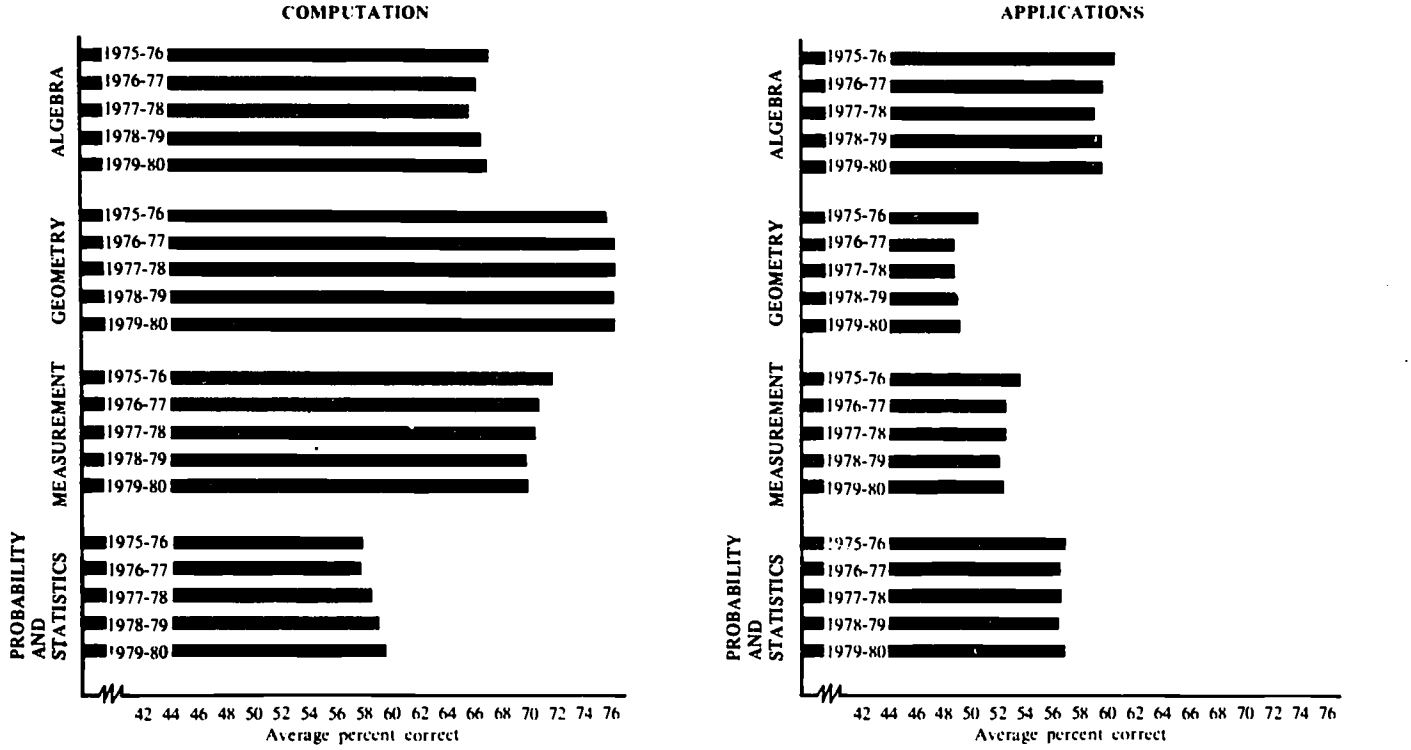
Mathematics Scores of California Twelfth Grade Students
on the Survey of Basic Skills: Grade 12

Skill area	Number of questions	Average percent correct					Change			
		1975-76	1976-77	1977-78	1978-79	1979-80	1975-76 to 1976-77	1976-77 to 1977-78	1977-78 to 1978-79	1978-79 to 1979-80
MATHEMATICS, TOTAL	198	67.0	66.3	66.3	66.5	66.8	-0.7	-0-	+0.2	+0.3
Arithmetic	98	72.9	72.1	72.2	72.7	73.1	-0.8	+0.1	+0.5	+0.4
Number concepts	28	74.3	73.5	73.6	73.9	74.1	-0.8	+0.1	+0.3	+0.2
Number and numeration	14	71.0	70.1	69.9	70.1	70.6	-0.9	-0.2	+0.2	+0.5
Number theory	8	76.2	75.9	76.4	76.9	76.7	-0.3	+0.5	+0.5	-0.2
Number properties	6	79.6	78.5	78.6	78.8	78.7	-1.1	+0.1	+0.2	-0.1
Whole numbers	22	80.1	80.1	80.1	80.6	81.0	-0-	-0-	+0.5	+0.4
Computation	14	80.9	81.0	81.2	81.9	82.4	+0.1	+0.2	+0.7	+0.5
Application	8	78.7	78.5	78.2	78.3	78.4	-0.2	-0.3	+0.1	+0.1
Fractions	26	66.0	64.5	64.3	64.7	65.0	-1.5	-0.2	+0.4	+0.3
Computation	14	70.4	68.3	68.4	69.0	69.6	-2.1	+0.1	+0.6	+0.6
Application	12	60.9	60.0	59.5	59.6	59.7	-0.9	-0.5	+0.1	+0.1
Decimals	22	71.8	71.2	72.0	72.9	73.7	-0.6	+0.8	+0.9	+0.8
Computation	14	74.1	73.8	74.0	75.6	76.7	-0.3	+1.0	+1.0	+0.9
Application	8	67.8	66.6	67.2	67.7	68.3	-1.2	+0.6	+0.5	+0.6
Algebra	32	62.9	62.1	61.8	62.1	62.3	-0.8	-0.3	+0.3	+0.2
Computation	14	66.4	65.9	65.5	66.0	66.4	-0.5	-0.4	+0.5	+0.4
Application	18	60.1	59.2	58.8	59.1	59.1	-0.9	-0.4	+0.3	-0-
Geometry	24	62.7	62.1	61.8	61.8	62.0	-0.6	-0.3	-0-	+0.2
Knowledge of facts	12	75.2	75.5	75.5	75.4	75.5	+0.3	-0-	-0.1	+0.1
Application	12	50.1	48.7	48.1	48.3	48.4	-1.4	-0.6	+0.2	+0.1
Measurement	30	60.5	59.5	59.4	59.0	59.2	-1.0	-0.1	-0.4	+0.2
Knowledge of facts	12	71.6	70.5	70.1	69.7	69.6	-1.1	-0.4	-0.4	-0.1
Application	18	53.1	52.2	52.2	51.9	52.2	-0.9	-0-	-0.3	+0.3
Probability and statistics	14	57.2	56.9	57.3	57.4	57.8	-0.3	+0.4	+0.1	+0.4
Computation	6	57.9	57.6	58.3	59.0	59.6	-0.3	+0.7	+0.7	+0.6
Application	8	56.6	56.3	56.5	56.2	56.5	-0.3	+0.2	-0.3	+0.3
Problem Solving	62	61.8	60.7	60.6	60.7	60.9	-1.1	-0.1	+0.1	+0.2
Arithmetic	28	68.5	67.2	67.1	67.2	67.5	-1.3	-0.1	+0.1	+0.3
Graphs	34	56.2	55.4	55.2	55.3	55.4	-0.8	-0.2	+0.1	+0.1

(a) Student Performance on Computation and Application Questions on Whole Numbers, Fractions, and Decimals



(b) Student Performance on Computation and Application Questions in Geometry, Measurement and Graphs, and Probability and Statistics



(c) Student Performance on Numeration, Number Theory, and Number Properties Questions

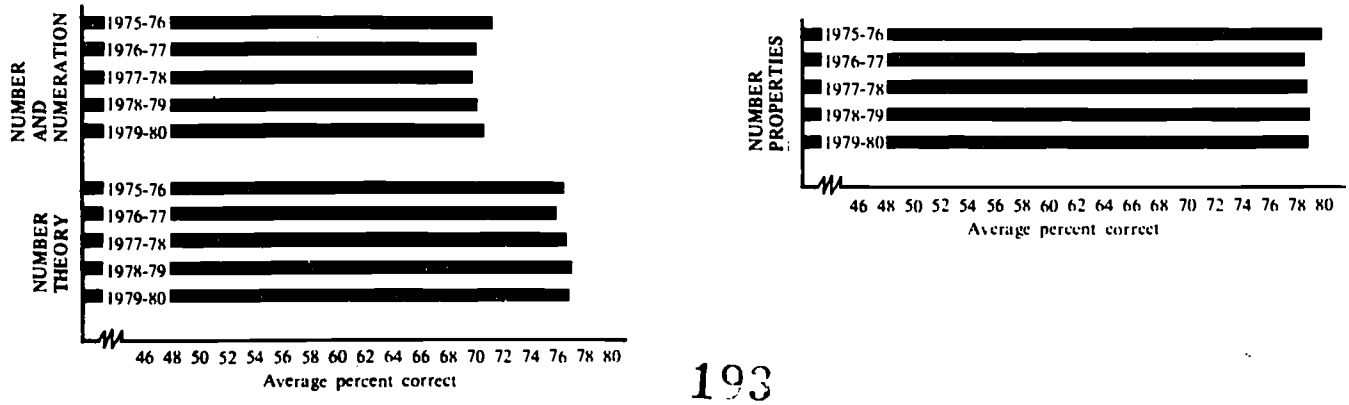


Fig.11 Graphic representations of percent correct scores in skill areas of mathematics on the *Survey of Basic Skills: Grade 12*

Analysis and Interpretation of Skill Area Results

The California Mathematics Assessment Advisory Committee conducted an in-depth review of the mathematics results, by skill area. The committee members judged the adequacy of student performance in light of the difficulty of the questions, the relative emphasis placed on each skill in a typical classroom, and the changes in student performance over several years. Particular attention was given to the performance of students in the applications sections of the Survey in this review.

The committee reviews that were conducted on a skill-by-skill area basis are summarized in the following table. The left-hand column provides descriptions of the skills assessed within a skill area and illustrative test questions. The committee's analysis of the twelfth grade results is presented in the right-hand column.

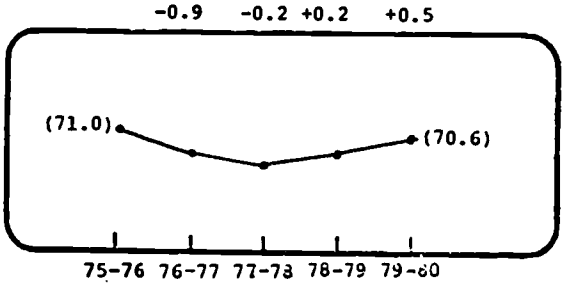
Skill area descriptions and illustrative questions	Committee's observations and judgments
I. ARITHMETIC The arithemtic portion of the Survey consists of questions in four main skill areas: number concepts, whole numbers, fractions, and decimals.	The overall percent correct on the 98 questions in arithmetic in 1979-80 was 73.1. This was an improvement of 0.4 percent correct over the score in 1978-79.
A. Number concepts The number concepts portion of the Survey is subdivided into number and numeration, number theory, and number properties.	Of the 28 questions in number concepts, the percent correct in 1979-80 was 74.1, an increase of 0.2 from the score in the previous year.
1. Number and numeration The student must be able to identify whole numbers, fractions, and decimals; identify place value; and recognize points on a number line.	In 1979-80, the percent correct score on the 14 questions in number and numeration was 70.6, an increase of 0.5 percent correct from the score in 1978-79. The changes in scores over a five-year period are shown in the chart below.

Example 63

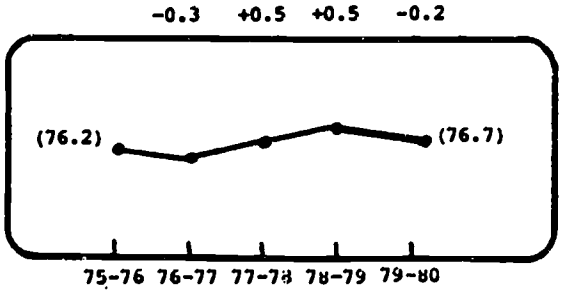
In which numeral is the digit 7 in the tenths' place?

25 976.3 13 97.63 52 9.763 10 0.9763

Year	76-77	77-78	78-79	79-80
Percent correct	52.2	49.7	49.9	51.9



Skill area descriptions and illustrative questions	Committee's observations and judgments
	From 1978-79 to 1979-80 the scores increased on 10 questions and decreased on four. Example 63 is typical of the questions on which the scores showed an increase. The committee members noted that students have difficulty in distinguishing between "tens" and "tenths." The twelfth grade students also seem to have difficulty in rounding numbers and comparing fractions.
2. Number theory The student must recognize odd, even, prime, and composite numbers and choose the lowest common multiple or greatest common factor of several numbers.	In 1979-80 the percent correct score on the eight questions in this category was 76.7, a decrease of 0.2 percent correct from the score in 1978-79. The changes in scores over a five-year period are shown in the chart below.



Example 64

Which is a prime number?

8 ○ 6 73 ● 7 7 ○ 8 12 ○ 9

Year	76-77	77-78	78-79	79-80
Percent correct	71.0	71.8	73.1	72.9

From 1978-79 to 1979-80 the scores increased on three and decreased on five questions in number theory. Example 64 illustrates the performance of twelfth grade students on a typical question in this skill area. The committee noted that twelfth grade students continue to have difficulty with prime numbers and prime factorization.

Skill area descriptions and illustrative questions	Committee's observations and judgments

3. Number properties

The student must recognize commutative, associative, and distributive properties of operations on numbers.

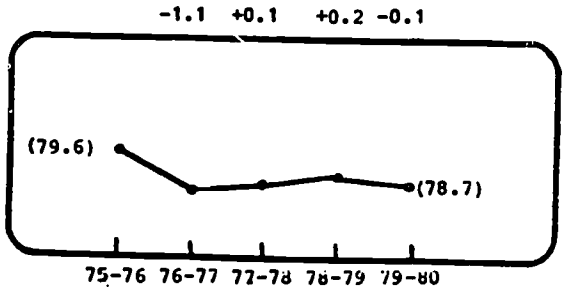
Example 65

Another way to write 36 + 42 is:

82 ● (30 + 40) + (6 + 2)
9 ○ (30 x 6) + (40 x 2)
3 ○ (30 + 40) x (6 + 2)
6 ○ (30 + 2) x (40 + 6)

Year	76-77	77-78	78-79	79-80
Percent correct	81.2	81.9	81.9	82.4

In 1979-80 the percent correct score on the six questions in number properties was 78.7, a decrease of 0.1 percent correct from the score in 1978-79. The changes in scores over a five-year period are shown in the chart below.



The five-year trend of scores in number properties shows the the scores decreased from 1975-76 to 1976-77 and after that the scores have remained essentially unchanged. Example 65 illustrates the performance of students on a typical question from this skill area.

B. Whole numbers

The questions in whole numbers are subdivided into computation and applications.

The overall percent correct on 22 questions in whole numbers in 1979-80 was 81.0, an increase of 0.4 percent correct from the score in 1978-79.

1. Computation in whole numbers

The student must perform addition, subtraction, multiplication, and division involving whole numbers.

In 1979-80 the percent correct score on the 14 questions in this category was 82.4, an increase of 0.5 percent correct from the score in the previous year. The changes in scores over a five-year period are shown on the following chart.

Skill area descriptions and illustrative questions

Example 66

3,876
x 904

5 ○ 364,344 6 ○ 3,494,904
8 ○ 3,493,904 81 ● 3,503,904

Year	76-77	77-78	78-79	79-80
Percent correct	78.7	79.4	79.8	80.8

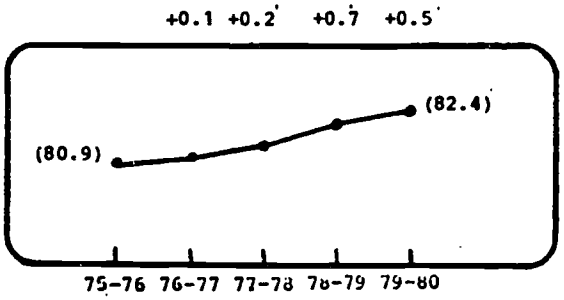
Example 67

(+4) + (-3) - (-7) =

38 ○ -6 5 ○ +6 52 ● +8 5 ○ +14

Year	76-77	77-78	78-79	79-80
Percent correct	48.0	49.1	50.5	51.7

Committee's observations and judgments



The committee members were pleased with the second year of improvement in test scores in whole numbers. In the opinion of the committee, this improvement reflects the emphasis placed on remediation in most schools because of the high school proficiency tests.

A closer look at the individual computation questions showed that the average percent correct score for every question in whole numbers increased except for one subtraction question. The average percent correct for this question decreased from 96.3 in 1978-79 to 96.0 in 1979-80. Example 66 is illustrative of student performance in this skill.

On the items involving computation with integers a part of the whole number computation subskill, student performance was considerably lower. In the opinion of the committee this lower performance simply reflects the different course enrollment patterns in mathematics at the high school level. Example 67 is illustrative of student performance in this skill.

Skill area descriptions and illustrative questions	Committee's observations and judgments

2. Applications in whole numbers

The student must apply the four arithmetic operations on whole numbers in solving problems presented in a daily life context.

Example 68

Mr. Martinez had a fire in his home. Repairing the damage will cost about $900. His home is valued at $14,000 and is insured for $12,000. Mr. Martinez had paid $32 a year for ten years for his insurance. The insurance company has agreed to pay the full amount of the claim ($900). Which of the following statements are true?

A. The amount of the claim is more than what has been paid to the company.

B. The insurance company should pay $14,000 for this claim.

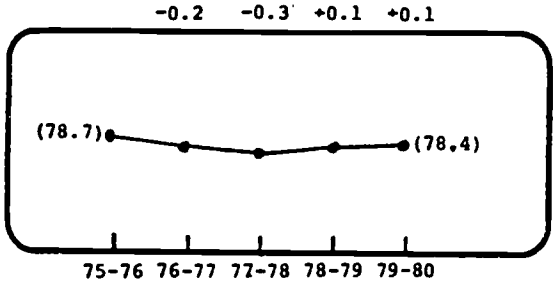
C. If the house had been completely burned, the insurance company would pay $14,000.

D. The maximum claim Mr. Martinez could collect is $12,000.

3 ○ A, B 10 ○ A, C 10 ○ B, C 77 ● A, D

Year	76-77	77-78	78-79	79-80
Percent correct	76.8	76.3	77.2	76.7

In 1979-80 the percent correct score on eight questions in this category was 78.4, an increase of 0.1 percent correct from the score in 1978-79. The changes in scores over a five-year period are shown in the chart below.



The trend of scores in applications of whole numbers shows a two-year decline from 1975-76 to 1977-78 and a slight increase in the two following years. A closer look at the individual application questions shows that from 1978-79 to 1979-80 the percent correct increased on four out of the eight questions, and decreased on four. Example 68 is illustrative of student performance in this skill area.

In the opinion of the committee, since application scores have not, in general, kept up with computation scores some redirection of time and effort to be spent on application problems would be beneficial. As in the results of the third and sixth grade Survey,

Skill area descriptions and illustrative questions	Committee's observations and judgments

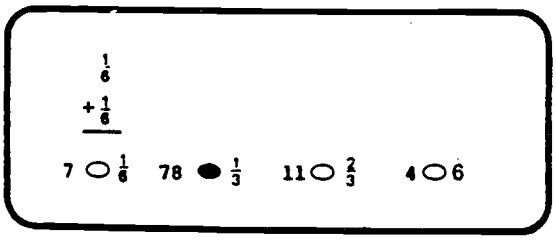
C. Fractions

The questions in fractions are classified as computation or application.

1. Computations in fractions

The student must perform addition, subtraction, multiplication and division involving fractional numbers.

Example 69

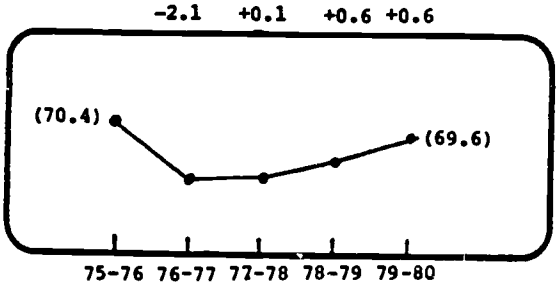


Year	76-77	77-78	78-79	79-80
Percent correct	76.6	75.4	76.6	77.7

students in the twelfth grade also seemed to have difficulty in choosing the correct operation or operations necessary to solve a given problem. In the opinion of the committee, problem analysis and modeling techniques need to become a consistent and organized part of the mathematics curriculum from kindergarten through twelfth grade.

The overall percent correct in fractions in 1979-80 was 65.0, an increase of 0.3 percent correct from the score in 1978-79.

In 1979-80 the percent correct score on the 14 questions in fraction computation was 69.6, an increase of 0.6 percent correct. The changes in scores over a five-year period are shown in the chart below.



The trend in scores on fraction computation reveals that after a decline of scores from 1975-76 to 1976-77, the scores have increased steadily in the next three years. From 1978-79 to 1979-80 the percent correct score increased on nine of the 14 questions, decreased on three,

Skill area descriptions and illustrative questions

Committee's observations and judgments

Example 70

$3\frac{2}{3} \times 5\frac{1}{2} =$

41 ○ $15\frac{1}{3}$ 17 ○ $16\frac{1}{3}$ 37 ● $20\frac{1}{6}$ 5 ○ $21\frac{1}{6}$

Year	76-77	77-78	78-79	79-80
Percent correct	34.2	35.5	35.5	36.6

and remained the same on two. Example 69 shows the typical performance of students on a question in fraction computation, which is slightly easier than an average question. Example 70 is a question that was most difficult for students; the question involves multiplication of a number represented in mixed numeral form. The committee members felt that the average percent correct in computation with fractions should be improved.

2. Applications in fractions

The student must use the four arithmetic operations on fractions, mixed fractions, or whole numbers and fractions to demonstrate comprehension or ability to solve problems in daily life context.

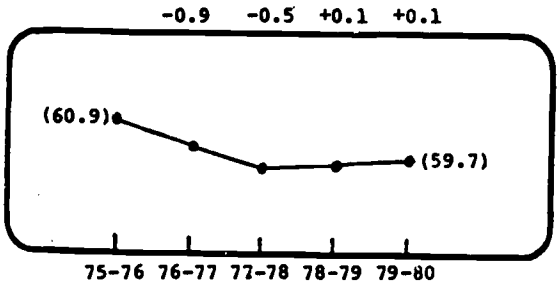
In 1979-80 the percent correct score on the 12 questions in this category was 59.7, an improvement of 0.1 percent correct over the score in 1978-79. The changes in scores over a five-year period are shown in the chart below.

Example 71

The ratio of men to women at a meeting was 4:5. If there were 20 women at the meeting, how many men were there?

13 ○ 15 47 ● 16 27 ○ 25 4 ○ 30
9 ○ None of these

Year	76-77	77-78	78-79	79-80
Percent correct	45.7	46.0	45.0	47.0



From 1978-79 to 1979-80 the percent correct scores increased on seven questions and decreased on five. The members of the advisory committee judged the performance on fraction application questions as inadequate. They observed that

Skill area descriptions and illustrative questions	Committee's observations and judgments

twelfth-grade students have the most difficulty with problems involving ratio and percents. Example 71 is illustrative of student performance in this skill area.

D. Decimals

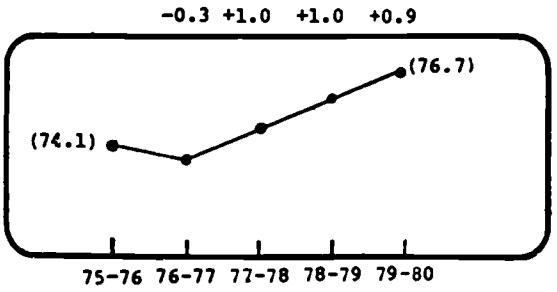
The questions in decimals are classified as computation or applications.

The overall percent correct on the 22 questions in decimals in 1979-80 was 73.7, an improvement of 0.8 percent correct from the score in 1978-79.

1. Computations in decimals

The student must perform addition, subtraction, multiplication, and division involving decimal numbers.

In 1979-80 the percent correct score on the 14 questions in this category was 76.7, an improvement of 0.9 percent correct over the score in 1978-79. The changes in the scores over a five-year period are shown in the chart below.



Example 72

.44
x 2

2 ○ .088 96 ● .88 1 ○ 8.8 1 ○ 88

Year	76-77	77-78	78-79	79-80
Percent correct	95.0	95.3	95.2	95.8

Example 73

$\frac{7.08}{10}$ =

62 ● 0.708 13 ○ 7.08 16 ○ 70.8 9 ○ 708.0

Year	76-77	77-78	78-79	79-80
Percent correct	59.5	59.5	60.4	61.7

Over the five-year period, 1975-76 through 1979-80, the decimal computation questions showed the greatest gains (2.6 percent correct) of all other skill areas. From 1978-79 to 1979-80 the percent correct scores increased on 11, decreased on two, and remained the same on one question.

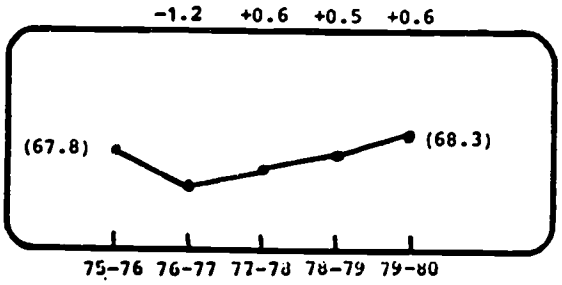
Skill area descriptions and illustrative questions	Committee's observations and judgments

The members of the committee were very pleased with the student performance in decimal computation. The committee members observed that twelfth grade students do very well in addition, subtraction, or multiplication. Example 72 is illustrative of student performance on the questions they do well. The committee members also observed that twelfth grade students had difficulty in converting fractions to decimals, dividing a decimal by 10, and converting decimal to percents. Example 73 is illustrative of the skill in which students do not perform very well.

2. Applications in decimals

The student must use the four arithmetic operations on numbers in decimal form to demonstrate understanding of principles and ability to solve problems in daily life context.

In 1979-80 the percent correct score on the eight questions in decimal applications was 68.3, an improvement of 0.6 percent correct over the score in 1978-79. The changes in the scores over a five-year period are shown in the chart below.



Example 74

An astronaut requires 2.2 pounds of oxygen per day while in space. How many pounds of oxygen are needed for a team of 3 astronauts for 5 days in space?

4 ○ 13.2 7 ○ 15.2 68 ● 33 21 ○ 330

Year	76-77	77-78	78-79	79-80
Percent correct	65.2	65.4	67.4	67.6

The decimal application scores have shown a steady trend of improvement in the three years from 1976-77 to 1979-80. From 1978-79 to 1979-80 the percent correct sccre increased

Skill area descriptions and illustrative questions	Committee's observations and judgments

on seven and decreased on one question in this skill area.

The advisory committee members were gratified with the improvement in student scores in decimal applications. However, they judged student performance to be inadequate and in need of improvement. As with applications of whole numbers and fractions, the committee felt that an emphasis on problem analysis and modeling will also help students to improve their scores in decimal applications. Example 74 is illustrative of the performance of students in this skill area.

II. ALGEBRA

The questions in algebra are classified as computations or applications.

The overall percent correct on the 32 questions in algebra in 1979-80 was 62.3, an improvement of 0.2 percent correct over the score in 1978-79.

A. Computations in algebra

The student must be able to perform addition, subtration, multiplication, and division of algebraic variables and identify a point shown on a rectangular coordinate.

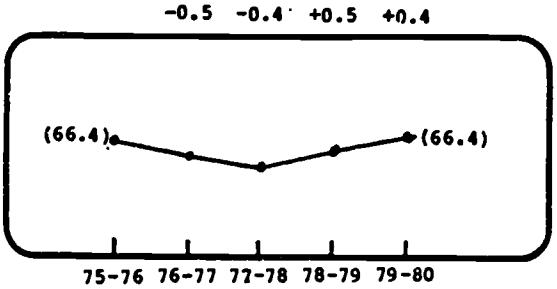
In 1979-80 the percent correct score on the 14 questions in algebraic computation was 66.4, an increase of 0.4 percent correct from the score in 1978-79. The changes in scores over a five-year period are shown in the chart below.

Example 75

If $9x - 63 = 18$, then $x =$

○ -9 (8) ○ -5 (9) ○ 0 (4) ○ 5 (12) ● 9 (67)

Year	76-77	77-78	78-79	79-80
Percent correct	65.1	66.0	66.0	67.2



Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 76

If John hiked x miles and Paul hiked 3 miles less than John, then Paul hiked:

80 ● $(x - 3)$ miles 7 ○ $(x + 3)$ miles
10 ○ $(3 - x)$ miles 3 ○ $3x$ miles

Year	76-77	77-78	78-79	79-80
Percent correct	80.4	79.8	80.9	80.4

Example 77

If a boy who is x years old now is twice the age of his sister, how old will his sister be 5 years from now?

8 ○ $(2x + 10)$ years 48 ○ $(2x + 5)$ years
31 ● $\left(\frac{x}{2} + 5\right)$ years 13 ○ $\left(\frac{x + 5}{2}\right)$ years

Year	76-77	77-78	78-79	79-80
Percent correct	31.3	30.7	30.7	30.7

Over the five-year period, 1975-76 through 1979-80, the percent correct in algebraic computation first decreased, then showed an upward trend. From 1978-79 to 1979-80 the percent correct increased on 11 questions and decreased on three. Example 75 illustrates the typical performance of students on questions in this skill area. The committee members pointed out that twelfth grade students were able to set up easier algebraic sentences (Example 76) but they were unable to perform as well on questions involving difficult algebraic sentences (Example 77).

The committee members felt that since algebra is not one of the required courses in many high schools, these patterns are not unexpected. The committee, however, felt that such elementary algebraic notions are important in formulating and finding answers to many practical problems; therefore, such algebraic skills should be required of all students before they graduate from high school.

B. Applications in algebra

The student must be able to construct an algebraic equation to solve a given problem and be able to interpret tables, charts, and graphs.

In 1979-80 the percent correct score on the 18 questions in applications in algebra was 59.1, which was the same as the score in 1978-79. The changes in scores over a five-year period are shown on the following page.

Skill area descriptions and illustrative questions	Committee's observations and judgments

Example 78

TEMPERATURE	
Fahrenheit	Celsius
32°	0°
41°	5°
50°	10°
59°	15°
77°	25°
212°	100°

A change of how many degrees occurs on the Fahrenheit scale when a 10-degree change occurs on the Celsius scale?

11 ○ 9 59 ● 18 10 ○ 32 20 ○ 50

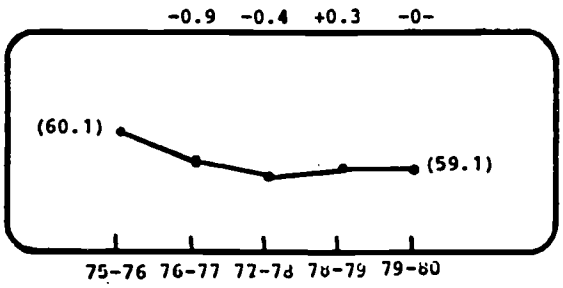
Year	76-77	77-78	78-79	79-80
Percent correct	57.3	56.9	57.4	58.6

Example 79

The number of feet that an object will fall in t seconds (neglecting air resistance) is given by the formula, $s = \frac{1}{2}gt^2$, where s = the number of feet, and $g = 32$ (the acceleration due to gravity). Assuming there is no air resistance, how far will a parachutist drop in a free fall of 10 seconds?

44 ● 1,600 feet
11 ○ 2,440 feet
18 ○ 3,200 feet
3 ○ 3,400 feet
24 ○ None of these

Year	76-77	77-78	78-79	79-80
Percent correct	42.2	41.8	44.1	44.4



The twelfth grade students showed an increase in percent correct score on 10 of the 18 application questions from 1978-79 to 1979-80. Example 78 illustrates the student performance on a typical question in this skill area. The members of the committee felt a need for improvement of the skills in graphing and solving word problems. They observed that twelfth grade students do well on questions involving symbolic graphs, simple line graphs, and coordinate graphs. The students do poorly on questions involving word problems (Example 79) and graphs requiring two-step analysis.

Skill area descriptions and illustrative questions	Committee's observations and judgments

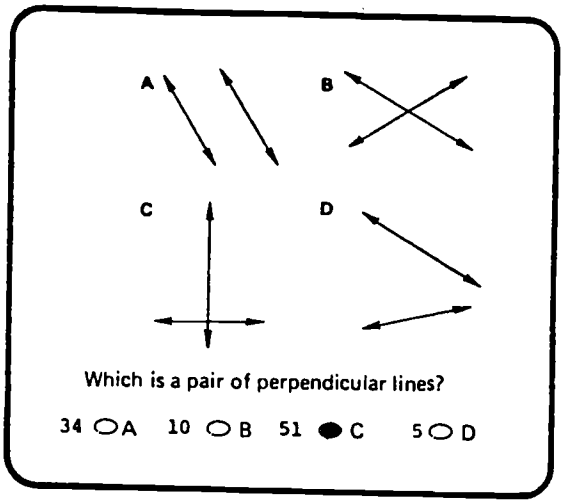
III. GEOMETRY

The questions in geometry are categorized as knowledge of facts and concepts or applications.

A. Knowledge of facts in geometry

The student must be able to identify basic geometric sets and figures.

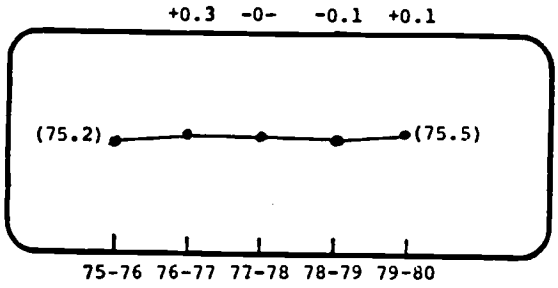
Example 80



Year	76-77	77-78	78-79	79-80
Percent correct	50.8	50.7	51.7	51.4

The overall percent correct on the 24 questions in geometry in 1979-80 was 62.0, an improvement of 0.2 percent correct over the score in 1978-79.

In 1979-80 the percent correct score on the 12 questions in knowledge of facts in geometry was 75.5, an increase of 0.1 percent correct from the score in 1978-79. The changes in scores over a five-year period are shown in the chart below.



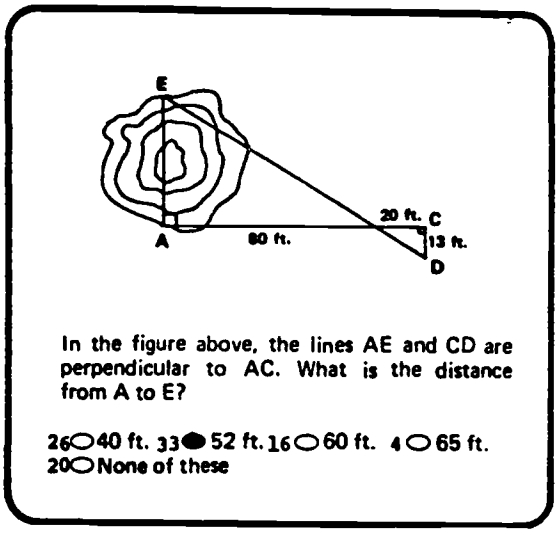
From 1978-79 to 1979-80 the percent correct score increased on eight questions and decreased on four. Example 80 illustrates the performance of twelfth grade students on a question related to perpendicular lines. The committee observed that 32 percent of the students selected the answer for parallel lines instead of perpendicular lines. The committee felt that basic knowledge and concepts in geometry must be part of high school math proficiency programs and expressed a need for improving the skills as illustrated in Example 80.

Skill area descriptions and illustrative questions	Committee's observations and judgments

B. Applications in geometry

The student must be able to comprehend and apply basic geometric knowledge and concepts.

Example 81

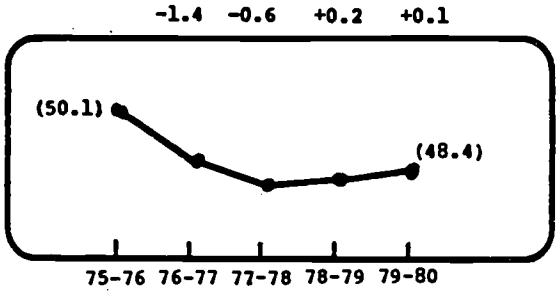


In the figure above, the lines AE and CD are perpendicular to AC. What is the distance from A to E?

26○ 40 ft. 33● 52 ft. 16○ 60 ft. 4○ 65 ft. 20○ None of these

Year	76-77	77-78	78-79	79-80
Percent correct	33.8	32.5	32.8	32.7

In 1979-80 the percent correct score on the 12 questions in geometric concepts and applications was 48.4, an increase of 0.1 percent correct from the score in 1978-79. The changes in scores over a five-year period are shown in the chart below.



From 1978-79 to 1979-80 the percent correct scores in geometric applications increased on six questions, decreased on five, and remained unchanged on one. Example 81 shows the performance of students on a question from this skill area.

The advisory committee observed that the scores in geometry are no longer declining. However, the committee recommended that increased curricular emphasis be placed on applications in geometric relationships in secondary classrooms.

IV. MEASUREMENT

The questions in measurement are categorized as computations and applications.

The overall percent correct on the 30 questions in measurement in 1979-80 was 59.2, an increase of 0.2 percent correct.

A. Computations in measurement

The student must be able to estimate length and volume; convert length, mass, volume, and time from one unit to another unit; and perform arithmetic operations on quantities of length, mass, volume, and time.

In 1979-80 the percent correct score on the 12 questions in measurement computations was 69.6, a decrease of 0.1 percent correct from the score in 1978-79. The changes in scores over a five-year period are shown on the following chart.

Skill area descriptions and illustrative questions

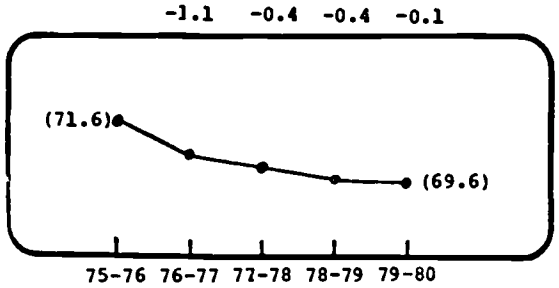
Committee's observations and judgments

Example 82

4 feet 2 inches
-2 feet 10 inches

72● 1 foot 4 inches
6○ 2 feet 4 inches
19○ 2 feet 8 inches
13○ 7 feet

Year	76-77	77-78	78-79	79-80
Percent correct	74.1	71.9	71.9	72.2



From 1978-79 to 1979-80 the percent correct score on measurement computations questions increased on six questions and decreased on six, resulting in a slight decrease of 0.1 percent correct.

The advisory committee members observed that four of the six decreasing test questions in this skill area involved the U.S. customary units of measure (yards, feet, inches). Instruction in California has moved towards an emphasis on metric measure. The decreasing scores on the U.S. customary system items may reflect this change. Example 82 is illustrative of student performance in this skill. However, the committee members noted a growth on U.S. customary questions from the sixth grade to twelfth grade. The question in Example 82 was part of the sixth grade Survey as well as the twelfth grade Survey. Sixth graders had an average percent correct score of 44.1 and twelfth graders had an average percent correct score of 72.2. Forty percent of the sixth grade students

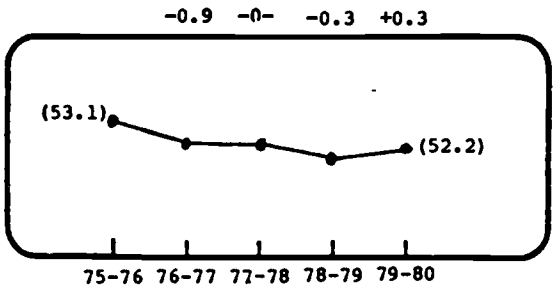
Skill area descriptions and illustrative questions	Committee's observations and judgments

reverse the digits in the subtraction item, while only 15 percent of the twelfth grade students still make this error.

B. Applications in measurement

The student must be able to solve problems related to measurement of length, area, mass, and volume.

In 1979-80 the percent correct score on the 18 questions in measurement applications was 52.2, an increase of 0.3 percent correct from the score in 1978-79. The changes in scores over a five-year period are shown in the chart below.



Example 83

The length of a fence surrounding a monument is 144 feet. If the posts are spaced 12 feet apart how many posts will be needed?

1 ○ 10 3 ○ 11 91 ● 12 5 ○ 13

Year	76-77	77-78	78-79	79-80
Percent correct	89.7	90.5	90.4	90.7

Example 84

A housewife will pay the lowest price per ounce for rice if she buys:

11 ○ 12 ounces for 40 cents
8 ○ 14 ounces for 45 cents
35 ● 1 pound, 12 ounces for 85 cents
46 ○ 2 pounds for 99 cents

Year	76-77	77-78	78-79	79-80
Percent correct	36.8	36.2	35.8	35.1

From 1978-79 to 1979-80 twelfth grade students increased their percent correct scores on 11 questions, decreased on five, and did not change on one question. The committee members noted that twelfth grade students showed adequate performance on word problems related to area and perimeter (Example 83); however, students had low scores on consumer related questions (Example 84). Since the development of intelligent consumers is one desirable goal of a good mathematics program, the advisory committee recommended that greater emphasis be placed on consumer mathematics involving such things as unit pricing.

Skill area descriptions and illustrative questions	Committee's observations and judgments

V. PROBABILITY AND STATISTICS

The questions in probability and statistics are classified as computation and applications.

A. Computation in probability and statistics

The student must be able to compute the probability of simple events and compute the mean, mode, and median of a set of given numbers.

Example 85

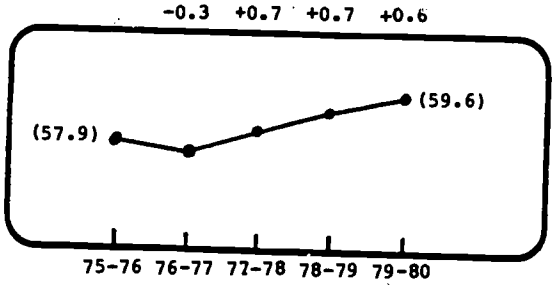
Find the median of the following set of numbers: 68, 92, 84, 72, 84, 75, 78

○ 84 (21) ○ 80 (17) ○ 79 (31) ● 78 (18) ○ 75 (13)

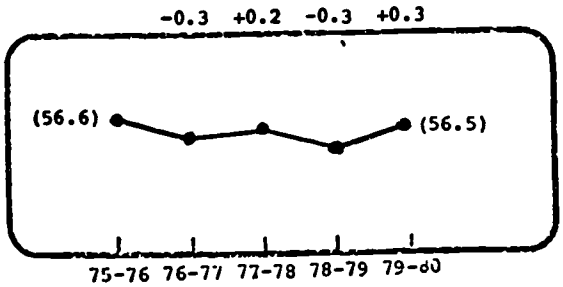
Year	76-77	77-78	78-79	79-80
Percent correct	16.4	17.0	17.4	17.5

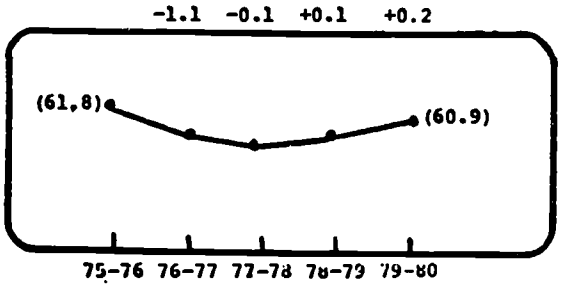
The overall percent correct on the 14 questions in probability and statistics in 1979-80 was 58.1 percent correct, an improvement of 0.4 percent correct over the score in 1978-79.

In 1979-80 the percent correct score on the six questions in this category was 59.6, an increase of 0.6 percent correct from the score in 1978-79. The changes in scores over a five-year period are shown in the chart below.



Over the five-year period, 1975-76 through 1979-80, the scores in this skill area first dropped slightly and then showed a continuous increase from 1976-77. The percent correct scores increased from 1978-79 to 1979-80 on all of the six questions in this skill area. The growth in probability and statistics computation score (2.0 percent correct) over the five-year period was the second greatest increase on the Survey and was exceeded only by 2.9 percent correct increase in decimal computation.

Skill area descriptions and illustrative questions	Committee's observations and judgments
	The advisory committee judged that most twelfth grade students have learned the computation of averages (means) but are not familiar with the important concept of median. Example 85 is a typical question involving the computation of median.
B. Applications in probability and statistics The student must be able to solve problems related to elementary concepts in probability and statistics.	In 1979-80 the percent correct score on the eight questions in probability and statistics application was 56.5, an increase of 0.3 percent correct from the score in 1978-79. The changes in scores over a five-year period are shown in the chart below.
Example 86 Three of four students each weighs 60 pounds. What is the weight of the fourth student if the average of the weights of all four students is 70 pounds? 56 ● 100 pounds 8 ○ 70 pounds 18 ○ 80 pounds 18 ○ 65 pounds	
Year 76-77 77-78 78-79 79-80 Percent correct 57.5 56.9 55.4 55.7	From 1978-79 to 1979-80 the percent correct scores increased on five questions and decreased on three questions. Example 86 illustrates the performance of students on a typical question in statistics. The advisory committee members judged that the scores in probability and statistics are quite low and in need of improvement. The committee felt that since the basic probability and statistical concepts and terminology are common in day-to-day life, classroom instruction should be designed to emphasize the application of these concepts.

Skill area descriptions and illustrative questions	Committee's observations and judgments
VI. PROBLEM SOLVING The questions in this category are an aggregation of arithmetic, algebra, and measurement problem-solving questions. The student must be able to solve word problems involving operations of addition, subtraction, multiplication, and division of whole numbers, decimals, and fractions and those involving algebraic and measurement concepts.	The overall percent correct on the 62 questions in problem solving was 60.9 in 1979-80, an improvement of 0.2 percent correct from the score in 1978-79. The trend in scores over a five-year period is shown in the chart below.  The committee members observed that the improvement of scores in problem solving was slightly lower than the improvement of scores on computation questions. They judged that scores in problem solving need attention. The committee felt that an emphasis on problem analysis and modeling would help students to improve their problem solving skills.

Summary of the Committee's Conclusions and Recommendations

The members of the Mathematics Assessment Advisory Committee were very pleased to note the slight upward trend in mathematics scores for the second consecutive year. The scores of twelfth-grade students had a history of declining scores since 1969, the year in which the Iowa Tests of Educational Development was first introduced for statewide assessment. The scores leveled off in 1977-78 and since then have registered a slight improvement. The scores have shown an increase in all major skill areas; the area of decimals registering the greatest gains from 1978-79 to 1979-80.

The patterns of strengths and weaknesses discerned by the committee members in their analysis of the twelfth grade mathematics results is summarized below.

Areas of Strength	Areas in need of improvement
Computing whole numbers	Computing with mixed fractions, decimals, ratio, and percents
Performing applications with whole numbers	Performing applications involving fractions and decimals
Solving equations in one unknown	Solving equations in two unknowns
Reading line and bar graphs	Interpreting data from tables and graphs requiring two-step analysis
Recognizing common geometric terms and shapes	Comprehending geometric relationships
Computing with denominate numbers	Understanding median and range and computing probability of events
	Skill development in problem analysis and modeling

The members of the mathematics assessment advisory committee made the following recommendations after analyzing the results of the twelfth-grade students and discerning strengths and weaknesses in their performance.

- The advisory committee recommended that time and effort be redirected from drill and practice on computation skills to the development of problem solving strategies. The committee suggested that problem analysis and modeling should be used as an umbrella in the general math curriculum, as recommended by the Addendum to California Mathematics Framework (1980).

- The advisory committee recommended that greater emphasis should be placed on encouraging females to constructively pursue mathematics in secondary schools. In fact, concurrently, both teachers and counselors should be supportive of all students taking mathematics in high school.

- The advisory committee recommended that high school math proficiency programs must go beyond arithmetic operations. The programs must be enriched by including skills that make students good problem solvers in life. The following skills should be part of a good math proficiency program: computing with decimals, ratios, percents; setting up and solving algebraic equations, interpreting data from tables and graphs requiring two steps; comprehending geometric relationships; understanding basic statistical concepts; and skill development in problem analysis and modeling.

Student Performance in Mathematics by Subgroups

As part of the administration of the Survey of Basic Skills tests in grades three, six, and twelve, information is provided by students or teachers on each student's sex and the socioeconomic group to which a student's parents belong. In the 1977-78 and 1978-79 Annual Reports of the California Assessment Program (CAP), student achievement at grades six and twelve was examined by sex and by socioeconomic group (SES). Since this is the first year of the assessment of mathematics at the third grade, student performance, by sex, at the third grade level does not appear in any previous CAP reports.

The following paragraphs describe special analyses conducted for the data at the third, sixth, and twelfth grade levels. At the third grade level, student achievement has been analyzed for girls and for boys, and the pattern in their achievement has been examined for the major skill categories in the Survey of Basic Skills: Grade 3. At the sixth- and twelfth-grade levels, student achievement patterns have been examined by SES and by achievement gain (or loss) from 1978-79 to 1979-80.

Student achievement, by sex, at grade three. Figure 12 shows the performance at grade three for boys and girls by skill areas. Student performance is shown for skill questions (computation of knowledge) as well as for application questions. The figure shows that girls outperform boys in 13 of the 20 subskills. The girls' performance is lower than that of boys for four subskills and is equal for three. The performance of boys and girls is equal for multiplication, patterns and graphs skills (comprised mostly of questions on number patterns), and measurement applications. The girls' performance is lower than that of boys for applications involving number facts, applications in multiplication, linear measures, and other measures. Overall, the percent correct score for girls was 74.6 and for boys 73.3.

Several pairs of items on the test used the same numbers, however, one item tested computation skills directly, the other required the student to determine the essential operation and then perform it. As presented earlier,

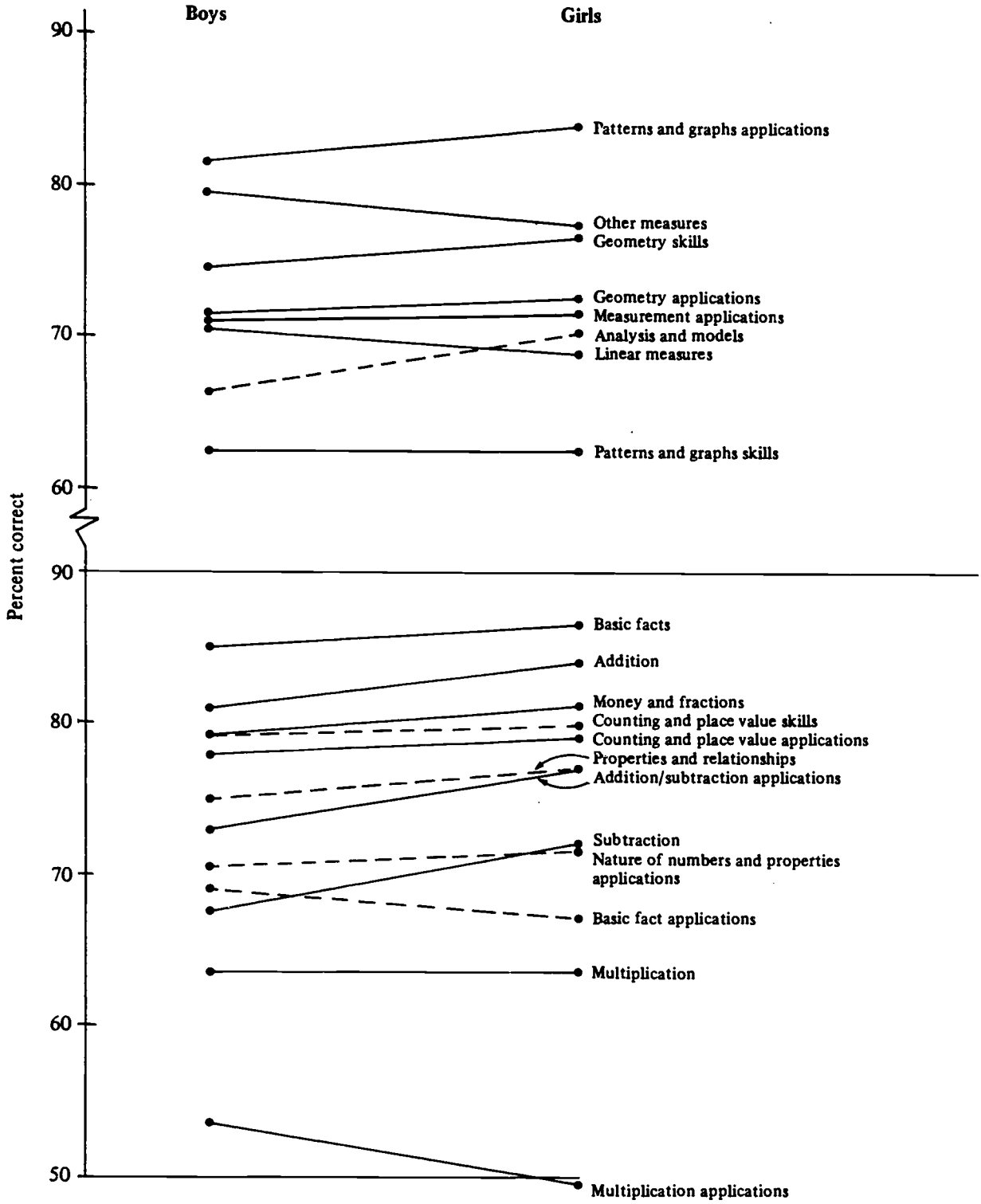
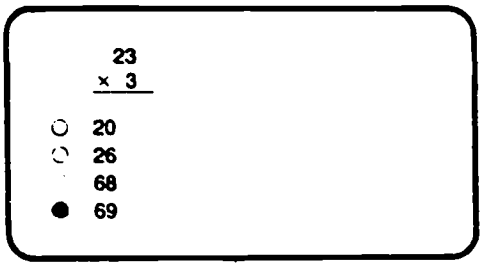


Fig. 12. Mathematics performance of third grade boys and girls, by skill area, 1979-80

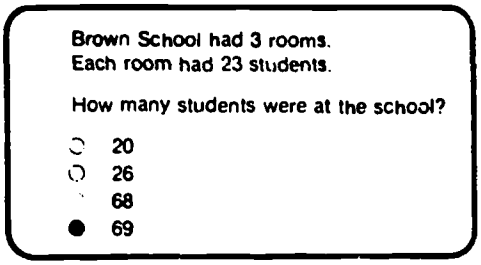
the computation questions were somewhat easier than the application questions. There is a general difficulty level, however, that is, easy computation items are easy application items and hard computation questions are hard application questions. When the test data are examined by sex, however, the pattern is broken; girls outperform boys on basic facts and computation in multiplication, but boys outperform girls in applications of basic facts and of multiplication. Examples A and B are illustrative of student performance, by sex, on the paired questions involving multiplication. In contrast, examples C and D are the matched-pair questions involving addition with renaming, on which girls outperform boys on both the computation and application questions.

Example A



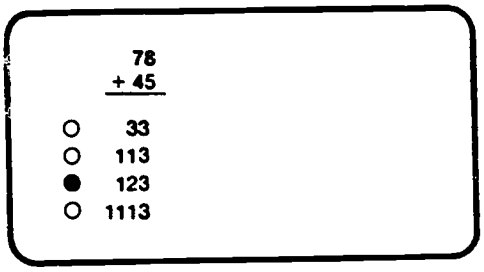
	Percentage	
	Boys	Girls
	3.5	3.9
	10.4	9.9
	6.3	3.9
	78.8	81.4

Example B



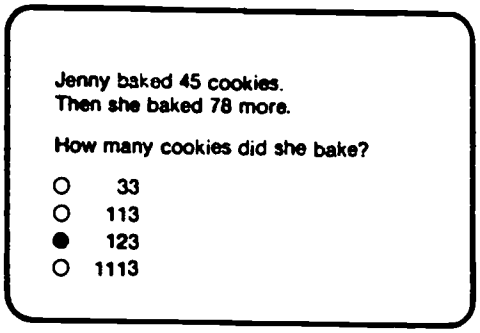
	Percentage	
	Boys	Girls
	4.4	5.2
	33.9	41.5
	6.0	3.6
	54.9	48.9

Example C



	Percentage	
	Boys	Girls
	8.5	7.9
	9.5	6.6
	74.5	79.4
	7.1	5.8

Example D



	Percentage	
	Boys	Girls
	6.0	5.1
	12.4	7.5
	74.0	81.0
	6.7	5.8

The committee members felt these observations to be interesting and expressed a desire for a more detailed examination of these initial results.

Student achievement, by socioeconomic categories, for grades six and twelve. Table 14 shows the percent correct scores on the Survey of Basic Skills: Grade 6 for students grouped according to socioeconomic classifications. Similarly, Table 15 shows the percent correct scores of twelfth grade students obtained from the Survey of Basic Skills: Grade 12. In tables 14 and 15 the results are presented for the major skill area categories on the two Surveys.

The tables show the gain scores from 1978-79 to 1979-80 for the entire state population in the sixth and twelfth grades. At the sixth grade level, the overall scores improved 0.8 percent correct, and at the twelfth grade overall scores improved 0.3 percent correct. An examination of tables 14 and 15 shows that the gains are not uniform across the various socioeconomic categories.

Table 14

Student Performance in Mathematics on the Survey of Basic Skills: Grade 6 by Skill Area and Socioeconomic Classification of Students' Parents, 1978-79 and 1979-80

Skill area	Number of questions	Average Percent Correct								Change			
		Professional		Semi-Professional		Skilled		Unskilled		Professional	Semi-Professional	Skilled	Unskilled
		78-79	79-80	78-79	79-80	78-79	79-80	78-79	79-80				
Mathematics, Total	160	70.1	70.5	63.7	64.5	57.1	58.1	49.5	50.8	.4	.8	1.0	1.3
Arithmetic	96	73.6	74.1	67.2	67.9	60.4	61.4	52.4	53.6	.5	.7	1.0	1.2
Number concepts	28	77.6	77.5	71.2	71.7	63.9	65.0	55.0	56.0	-.1	.5	1.1	1.0
Whole numbers	28	78.0	78.2	72.8	73.4	67.0	67.6	59.3	60.6	.2	.6	.6	1.3
Fractions	20	65.3	66.2	56.8	58.1	48.5	50.0	40.1	42.0	.8	1.3	1.5	1.9
Decimals	20	70.9	71.3	64.3	64.9	58.0	59.0	51.4	52.3	.4	.6	1.0	.9
Geometry	20	68.3	68.9	63.5	64.0	58.6	59.1	52.3	53.5	.6	.5	.5	1.2
Measurement and Graphs	32	65.7	65.9	59.6	60.3	53.1	54.0	46.1	47.4	.2	.7	.9	1.3
Probability and statistics	12	55.4	57.1	46.7	48.3	39.2	40.3	31.2	33.6	1.7	1.6	1.1	2.4

Table 15

Student Performance in Mathematics on the Survey of Basic Skills: Grade 12, by Skill Area and Socioeconomic Classification of Students' Parents, 1978-79 and 1979-80

Skill area	Number of questions	Average percent correct								Change			
		Advanced degree		4-year College		Some College		High school graduate		Advanced degree	4-year college	Some college	High school graduate
		78-79	79-80	78-79	79-80	78-79	79-80	78-79	79-80				
Mathematics, Total	198	74.8	74.9	71.6	71.6	67.6	67.8	61.8	61.9	+.1	-0-	+.2	+.1
Arithmetic	98	79.7	80.0	77.1	77.3	73.8	74.2	68.5	68.8	+.3	+.2	+.4	+.3
Whole numbers	22	85.7	85.4	83.7	84.1	81.6	82.0	77.4	77.9	-.3	+.4	+.4	+.5
Fractions	26	73.6	73.9	69.9	69.9	66.0	66.2	59.3	59.6	+.3	-0-	+.2	+.3
Decimals	22	78.5	79.1	76.4	77.0	73.6	74.3	69.6	70.0	+.6	+.6	+.7	+.4
Algebra	32	72.1	72.2	68.3	68.2	63.2	63.2	56.3	56.5	+.1	-.1	-0-	+.2
Geometry	24	71.0	70.8	67.4	67.1	62.6	62.5	56.6	56.5	-.2	-.3	-.1	-.1
Measurement	30	67.6	67.5	64.2	63.6	60.0	60.1	54.1	54.2	-.1	-.6	+.1	+.1
Probability and Statistics	14	67.8	68.0	64.3	64.0	58.5	59.1	52.1	51.8	+.2	-.3	+.6	-.3

At the sixth grade level, students from the unskilled SES categories made the highest gains in most skill areas, whereas students from the professional SES categories made the smallest gains. When data were examined on an item-by-item basis, the number of items showing a decline from 1978-79 to 1979-80 was 42 out of 160 for students in the professional and semiprofessional categories and 26 out of the 160 for the students in the skilled and semi-skilled categories. For the remaining items, the score was either the same or showed improvement from 1978-79 to 1979-80. The tendency of declining scores for students in professional and semiprofessional categories was greater for boys than for girls. Furthermore, declines were greater for application questions than for computation questions. The data for grade twelve presented in Table 15 shows similar patterns. However, the differences are not as large as for grade six students.

Committee members were pleased with the improvement of results at grades six and twelve for students from all socioeconomic categories. However, they expressed concern over the relatively smaller improvement in scores for students who are probably more able. They urged that while it is important to bring the low-achieving student up to the desired level of compentency, the process should not neglect the more able student.

VI. Television and Student Achievement

This year for the first time all sixth and twelfth graders were asked to indicate on California Assessment Program (CAP) answer sheets how much time they spend watching television, doing homework or assigned reading, and reading other materials for their own enjoyment. More than 230,000 twelfth grade students (99 percent) and more than 280,000 sixth grade students (99 percent) responded to the questions. The actual questions are shown below:

Grade Six

HOMEWORK

Time spent on homework yesterday.

- ◯ No homework was assigned
- ◯ I had homework but I didn't do it.
- ◯ Less than 1 hour
- ◯ Between 1 and 2 hours
- ◯ More than 2 hours

TV and READING

Yesterday, how much time did you spend:

	0-1 hrs	1-2 hrs	2-3 hrs	3-4 hrs	4 or more hrs
1. Watching TV?	◯	◯	◯	◯	◯
2. Reading just for your own enjoyment?	◯	◯	◯	◯	◯

Grade Twelve

On a typical weekday, approximately how many hours do you spend reading?

For Class Assignments		Other Reading	
◯ 0 - ½	◯ 3 - 4	◯ 0 - ½	◯ 3 - 4
◯ ½ - 1	◯ 4 - 5	◯ ½ - 1	◯ 4 - 5
◯ 1 - 2	◯ 5 - 6	◯ 1 - 2	◯ 5 - 6
◯ 2 - 3	◯ 6 or more	◯ 2 - 3	◯ 6 or more

On a typical weekday, approximately how many hours do you watch TV?

◯ 0 - ½	◯ 3 - 4
◯ ½ - 1	◯ 4 - 5
◯ 1 - 2	◯ 5 - 6
◯ 2 - 3	◯ 6 or more

The responses to the questions were reviewed and are reported here in comparison to test scores and such other factors as the socioeconomic status (SES) of the students' families and the students' levels of English language fluency. Initially the results were also examined to see if there were any differences between the test results for boys and for girls. All differences which occurred were found to be insignificant. Although the results have not yet been analyzed in detail, there is one particularly noteworthy preliminary indication: Students who watch a lot of television generally score lower on the CAP tests than those students who watch little or no television. The preliminary results by no means prove that television watching causes lower test scores; they do, however, suggest an important area for further research.

Overall Relationship Between Test Scores and Amount of Television Watched

As Figures 13 and 14 show, the inverse relationship between amount of television watched and the scores attained holds true for all portions of the CAP tests (reading, written expression and mathematics) and for both sixth graders and twelfth graders. The rate of decline in test performance of sixth graders remained constant with each increment of television watching through three hours per day, then became noticeably worse for those -- nearly 60,000 pupils or 20 percent of the sixth graders surveyed -- who indicated they watch four or more hours per day. Twelfth graders' scores are similar except there is no correspondingly sharp drop in test scores at the three-hour point. More important, the reader will note that the association between amount of television watched and test scores attained for all subject matter areas appears to be more pronounced among twelfth graders. Their overall drop in test scores is correspondingly greater for each subject area than is that of sixth graders.

Achievement and Television Viewing According to Family Socioeconomic Level

When student achievement and television viewing was examined in terms of the socioeconomic status (SES) of the students' families the same pattern of results was found. Figures 15 through 20 show again that, in general, the students who watched the most television attained the lowest test scores.

One clear finding, especially for sixth graders, is that as the amount of television viewing increases, the corresponding decrease in test scores is more pronounced for pupils from higher SES homes than for pupils from lower SES homes. In fact, the more television the lowest SES sixth graders indicated they watched the higher their scores were - - at least up to the 3-4 hour point.

The amount of time students indicated they spend watching television is strongly related to socioeconomic level; lower SES children watch more. In grade six, about the same number of children from families headed by unskilled workers watch more than four hours (11,451) as watch less than one hour (10,408), whereas less than one-third as many children from professional families watch more than four hours (4,918) as watch less than one hour (15,713). The contrast is even more striking among twelfth graders.

Relationship Between Reading Test Scores and Television Viewing, According to Amount of Reading Done at Home

Figures 21 through 24 show that students who read the most (both for homework and for enjoyment purposes) and who watch the least televison are generally the students who attain the highest test scores.

The reader may have noted that the questions about television viewing on the sixth grade answer sheet were somewhat different from those on the twelfth

grade answer sheet. Sixth graders were asked to indicate the amounts of time spent on homework and on reading for enjoyment. Twelfth graders were asked to indicate the amounts of time they spend on "reading for class assignments" and on "other reading." Although the responses are therefore not exactly parallel between the grades, the sixth graders' responses to the question about homework have been analyzed in tandem with the twelfth graders' responses to the question about reading for class assignments. Figures 21 and 22 show the findings of analyses made using these pairings.

Reading for Homework

Although there are some small differences among the various categories of students, sixth graders' test scores generally increase as a function of the amount of time they indicated they spend doing homework, and students in all categories who do not complete their homework attained scores substantially lower than those who do. These relationships did not alter, however, the overall relationship between increasing television watching and decreasing scores - except that this overall decrease was somewhat lower in rate for students who do not complete their homework.

For twelfth graders, whose overall test score decline associated with television watching was at least as strong as that of sixth graders, the positive relationship between time spent on assigned reading and test scores attained was less pronounced than that of sixth graders. It should perhaps be noted in regard to this latter finding that 615 twelfth graders claimed both to do more than six hours of assigned reading each night and to watch television for more than six hours each night. It is perhaps also remarkable that 74,842 (27 percent) sixth graders indicated they were assigned no homework and another 109,856 sixth graders (39 percent) are assigned less than one hour of homework daily, for a combined fraction of virtually two-thirds of the sixth graders.

Reading for Enjoyment

When test scores were studied in terms of television viewing and reading for enjoyment, the results were quite similar to those just discussed (see Figures 23 and 24). Several trends can be observed. First, the scores are higher for those students who read more, regardless of time spent watching television. Second, the declines associated with increased amounts of television watching among sixth graders are about the same for all increments of time spent reading up to about three hours of television watching per day. Beyond that point the decline increases in rate for those who read more. For twelfth graders, the pattern does not hold in this one foregoing important respect; in fact, for students who read the most (more than six hours per day), the decline associated with television watching is notably less pronounced.

The actual amount of time spent on each activity is noteworthy. While more than half (61 percent) of the sixth graders read for enjoyment less than one

hour per day, only 27 percent watch television less than one hour. The contrast is even sharper for the "over four hours" categories--two percent for reading versus 20 percent for television viewing. Not unexpectedly, those students who read more tend to watch television less. For example, of those students who read more than four hours daily, only 898 (0.3 percent) watch more than four hours of television.

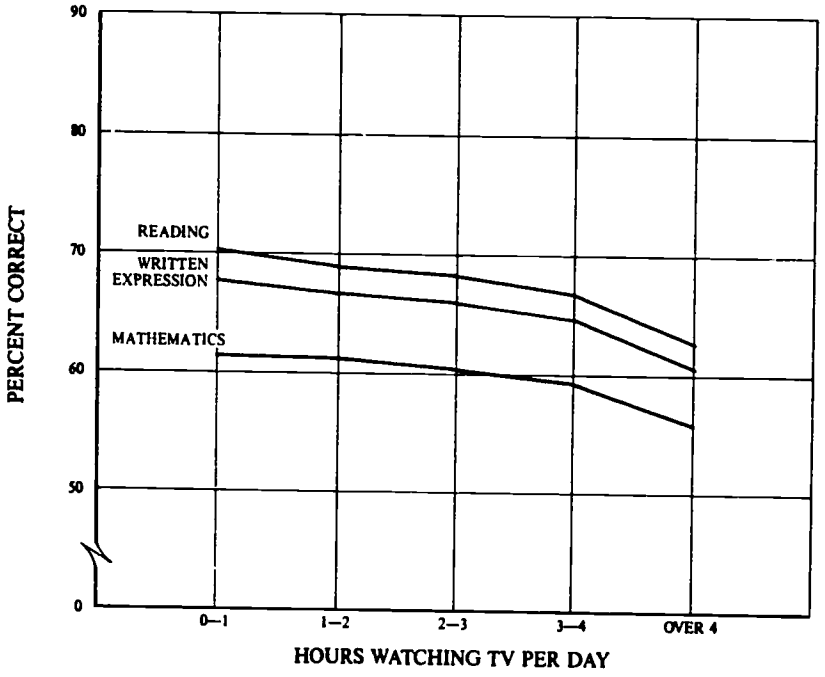
Regarding twelfth graders, the reader can observe nearly identical patterns, although twelfth graders tend to read more (30.1 percent read more than four hours in comparison to two percent for sixth graders). Conversely, as mentioned earlier, they also watch television less than sixth graders.

Reading Test Scores by Amount of Television Watched and English Language Fluency

Figure 25 shows the relationship between sixth graders' test scores and the amount of television they watch, when the results are analyzed according to the students' levels of English fluency. The scores attained by "limited-English" speaking students are quite low; it is not surprising that students who are not fluent in English would score low on a test given in English. Figure 25 shows the only other positive relationship found (the first being for low socioeconomic sixth graders) between achievement and television viewing: The more television limited-English students watch, the higher they tend to score on the reading portion of the Survey of Basic Skills: Grade 6. The otherwise prevalent declining trend reappears for the other fluency groups.

Figure 13

STUDENT ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO SUBJECT MATTER AREA — *GRADE 6*

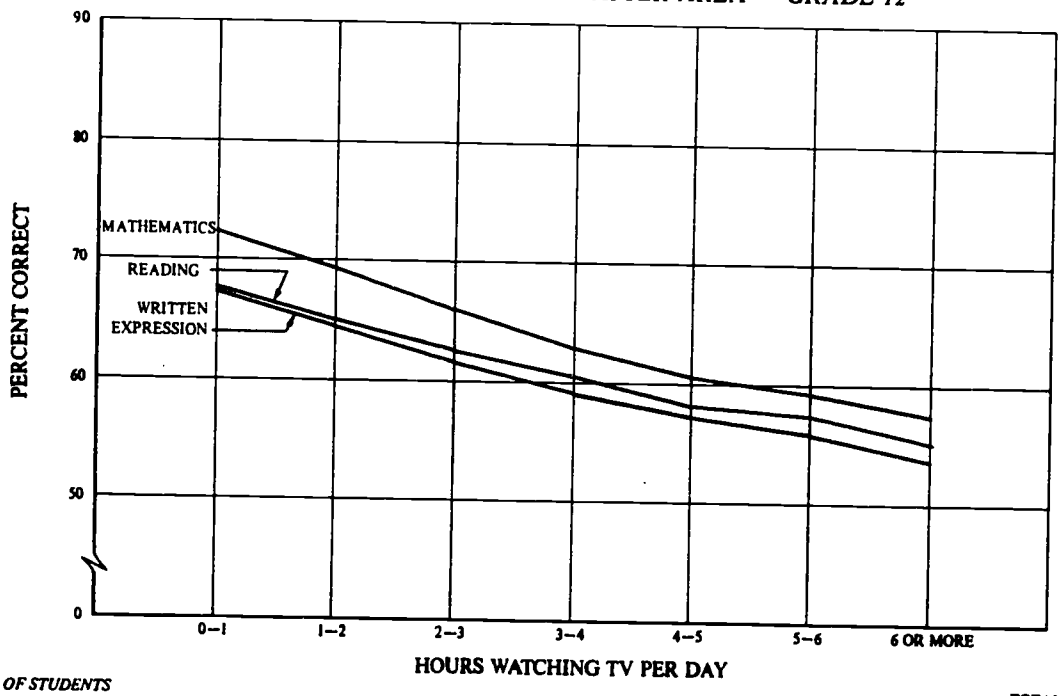


NUMBER OF STUDENTS

						N/R	TOTAL
TOTAL	76,973	64,643	48,314	30,738	57,276	3,963	281,907
PERCENT	27%	23%	17%	11%	20%	2%	100%

Figure 14

STUDENT ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO SUBJECT MATTER AREA — *GRADE 12*

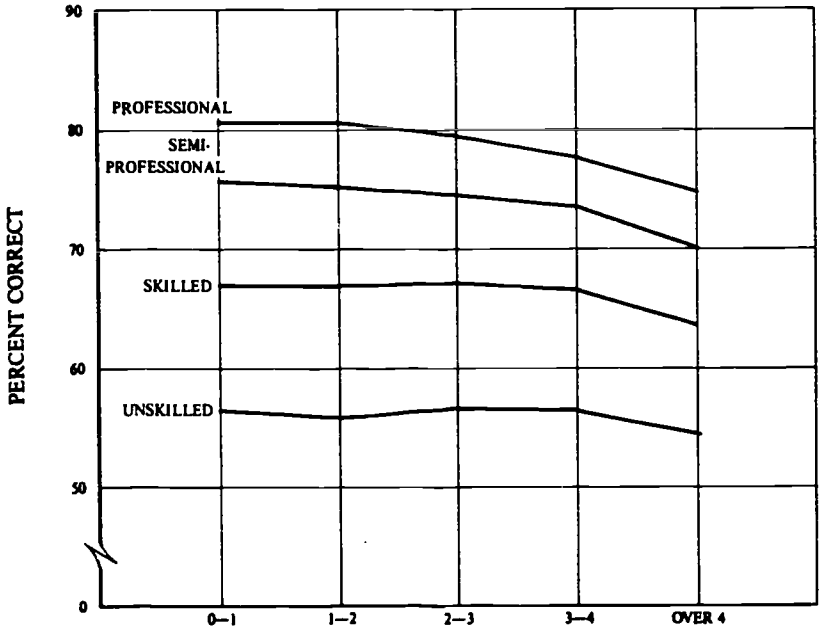


NUMBER OF STUDENTS

								TOTAL
TOTAL	67,717	50,211	43,082	29,135	16,402	8,295	12,707	227,549
PERCENT	29.8%	22.1%	18.9%	12.8%	7.2%	3.7%	5.5%	100.0%

Figure 15

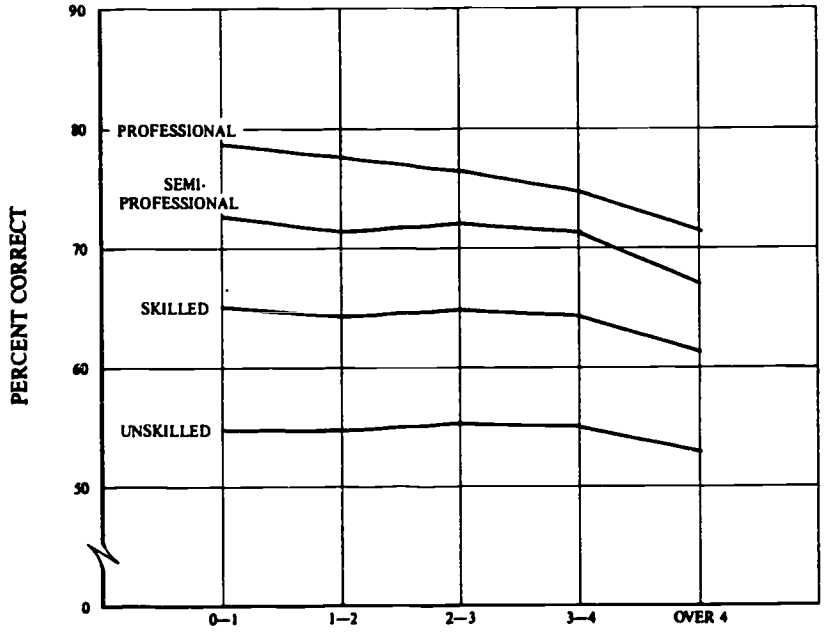
STUDENT READING ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO SOCIO-ECONOMIC STATUS OF PARENTS — *GRADE 6*



NUMBER OF STUDENTS BY SOCIO-ECONOMIC STATUS						N/R	TOTAL	
PROFESSIONAL	15,713	11,176	7,022	3,787	4,918	337	42,953	15%
SEMI-PROFESSION	15,634	12,927	9,449	5,812	9,631	495	53,948	19%
SKILLED	23,713	21,283	16,966	11,301	21,795	1,189	96,247	34%
UNSKILLED	10,408	9,391	7,591	5,211	11,451	769	44,821	16%
NON-RESPONDENTS	11,505	9,866	7,286	4,627	9,481	1,173	43,938	16%
TOTAL	76,973	64,643	48,314	30,738	57,276	3,963	281,907	
PERCENT	27%	23%	17%	11%	20%	2%		100%

Figure 16

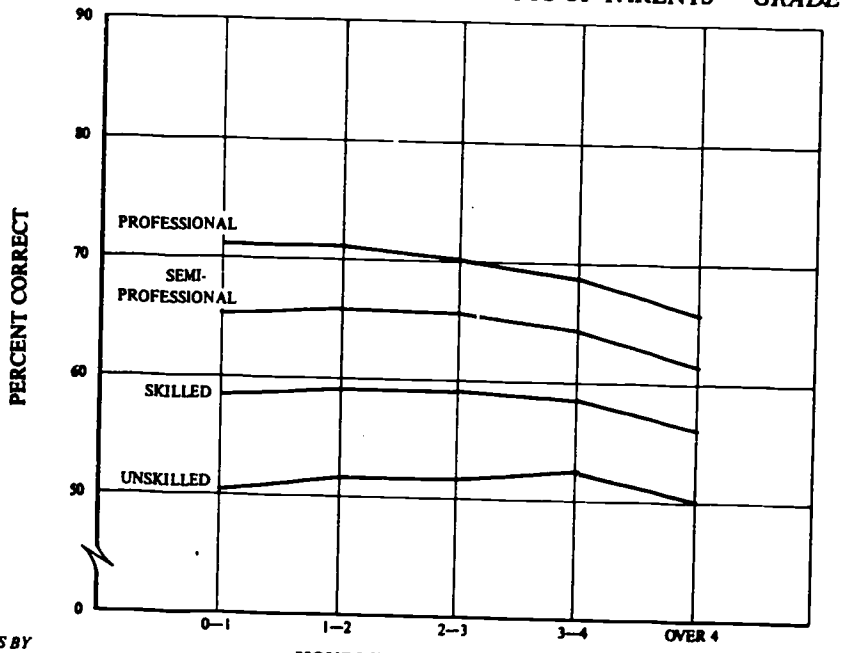
STUDENT WRITTEN EXPRESSION ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO SOCIO-ECONOMIC STATUS OF PARENTS — *GRADE 6*



NUMBER OF STUDENTS BY SOCIO-ECONOMIC STATUS						N/R	TOTAL	
PROFESSIONAL	15,713	11,176	7,022	3,787	4,918	337	42,953	15%
SEMI-PROFESSION	15,634	12,927	9,449	5,812	9,631	495	53,948	19%
SKILLED	23,713	21,283	16,966	11,301	21,795	1,189	96,247	34%
UNSKILLED	10,408	9,391	7,591	5,211	11,451	769	44,821	16%
NON-RESPONDENTS	11,505	9,866	7,286	4,627	9,481	1,173	43,938	16%
TOTAL	76,973	64,643	48,314	30,738	57,276	3,963	281,907	
PERCENT	27%	23%	17%	11%	20%	2%		100%

Figure 17

STUDENT MATHEMATICS ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO SOCIO-ECONOMIC STATUS OF PARENTS — *GRADE 6*

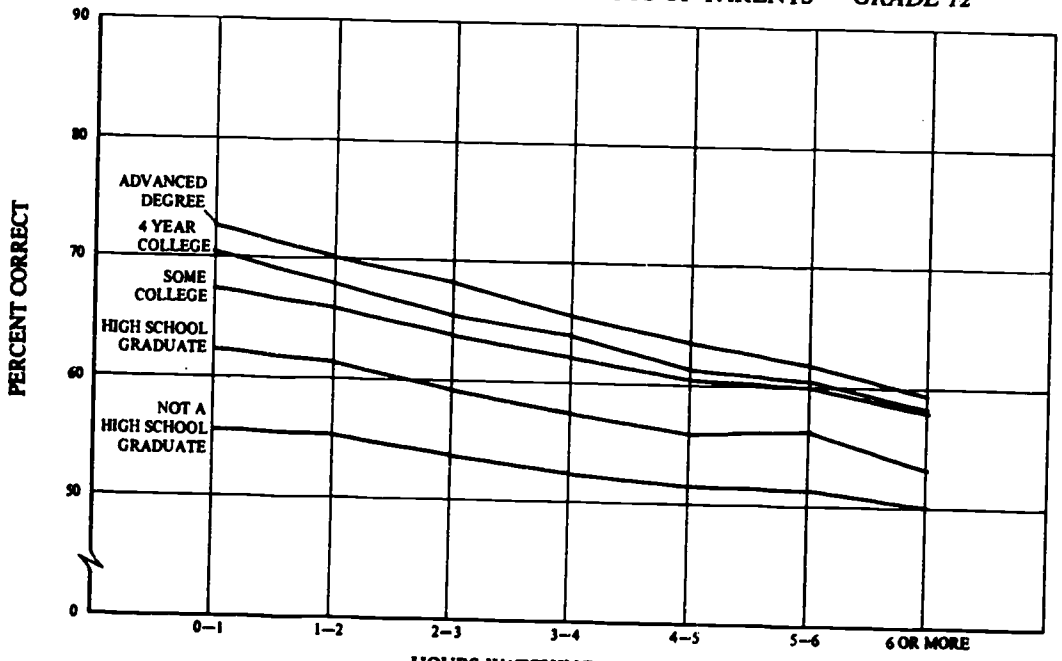


NUMBER OF STUDENTS BY SOCIO-ECONOMIC STATUS

						N/R	TOTAL	
PROFESSIONAL	15,713	11,176	7,022	3,787	4,918	337	42,953	15%
SEMI-PROFESSION	15,634	12,927	9,449	5,812	9,631	495	53,948	19%
SKILLED	23,713	21,283	16,966	11,301	21,795	1,189	96,247	34%
UNSKILLED	10,408	9,391	7,591	5,211	11,451	769	44,821	16%
NON-RESPONDENTS	11,505	9,866	7,286	4,627	9,481	1,173	43,938	16%
TOTAL	76,973	64,643	48,314	30,738	57,276	3,963	281,907	
PERCENT	27%	23%	17%	11%	20%	2%		100%

Figure 18

STUDENT READING ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO SOCIO-ECONOMIC STATUS OF PARENTS — *GRADE 12*

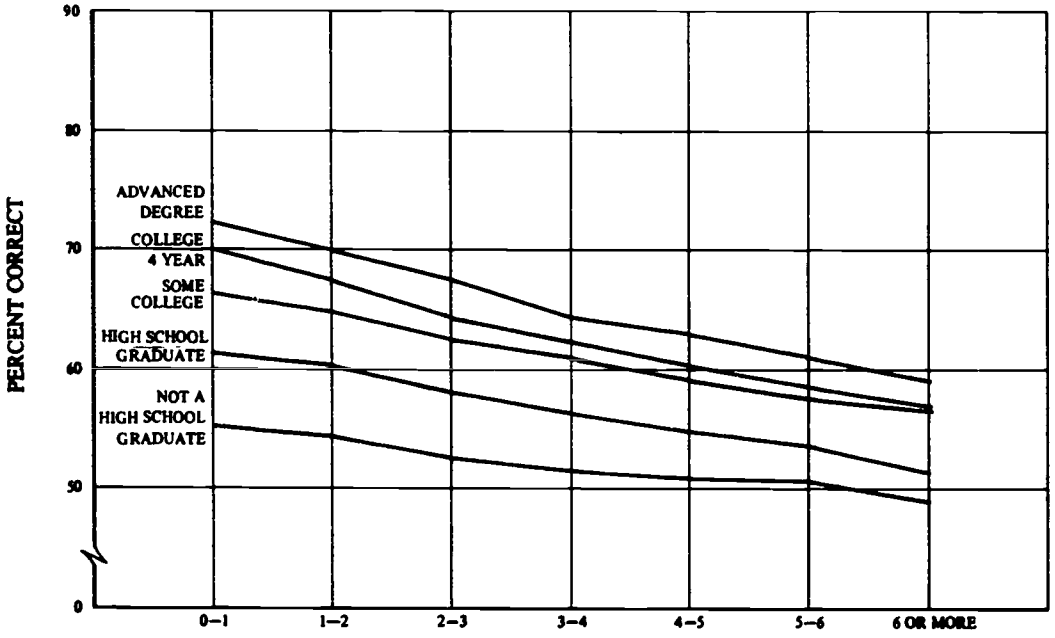


NUMBER OF STUDENTS

								TOTAL	
ADVANCED DEGREE	16,923	9,244	6,128	3,424	1,730	818	1,323	39,590	17.4%
4 YEAR COLLEGE	14,928	10,097	7,725	4,613	2,425	1,127	1,656	42,571	18.7%
SOME COLLEGE	17,679	14,017	12,305	8,149	4,491	2,233	3,366	62,240	27.3%
HIGH SCHOOL GRADUATE	13,090	11,885	11,850	8,822	5,294	2,714	4,101	57,756	25.4%
NOT A HIGH SCHOOL GRADUATE	5,097	4,968	5,074	4,127	2,462	1,403	2,261	25,392	11.2%
TOTAL	67,717	50,211	43,082	29,135	16,402	8,295	12,707	227,549	
PERCENT	29.8%	22.1%	18.9%	12.8%	7.2%	3.7%	5.5%		100.0%

Figure 19

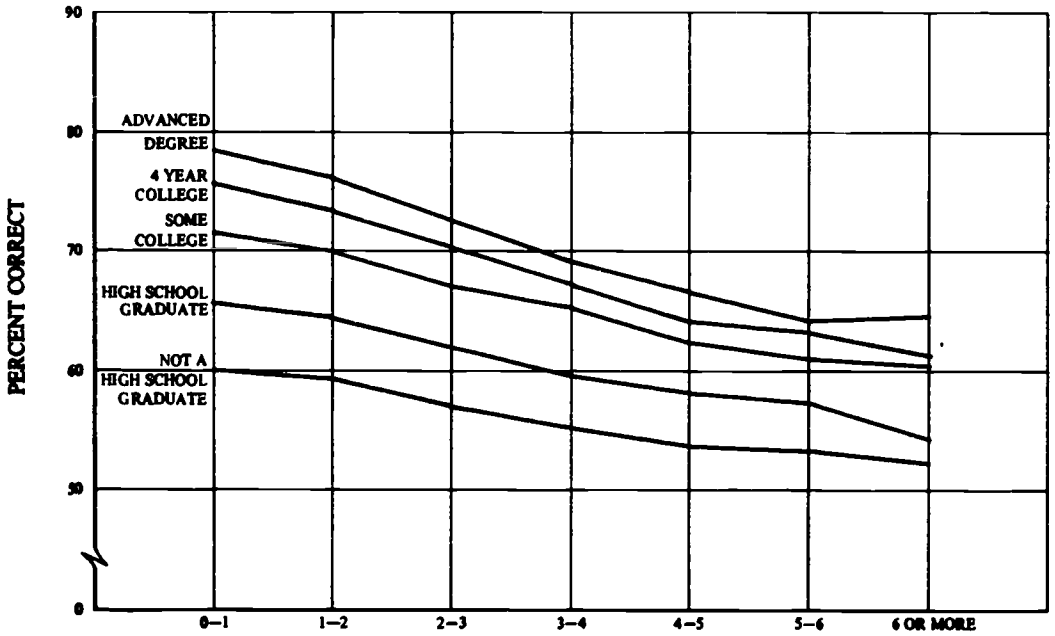
STUDENT WRITTEN EXPRESSION ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO SOCIO-ECONOMIC STATUS OF PARENTS — *GRADE 12*



NUMBER OF STUDENTS	0–1	1–2	2–3	3–4	4–5	5–6	6 OR MORE	TOTAL	
ADVANCED DEGREE	16,923	9,244	6,128	3,424	1,730	818	1,323	39,590	17.4%
4 YEAR COLLEGE	14,928	10,097	7,725	4,613	2,425	1,127	1,656	42,571	18.7%
SOME COLLEGE	17,679	14,017	12,305	8,149	4,491	2,233	3,366	62,240	27.3%
HIGH SCHOOL GRADUATE	13,090	11,885	11,850	8,822	5,294	2,714	4,101	57,756	25.4%
NOT A HIGH SCHOOL GRADUATE	5,097	4,968	5,074	4,127	2,462	1,403	2,261	25,392	11.2%
TOTAL	67,717	50,211	43,082	29,135	16,402	8,295	12,707	227,549	
PERCENT	29.8%	22.1%	18.9%	12.8%	7.2%	3.7%	5.5%		100.0%

Figure 20

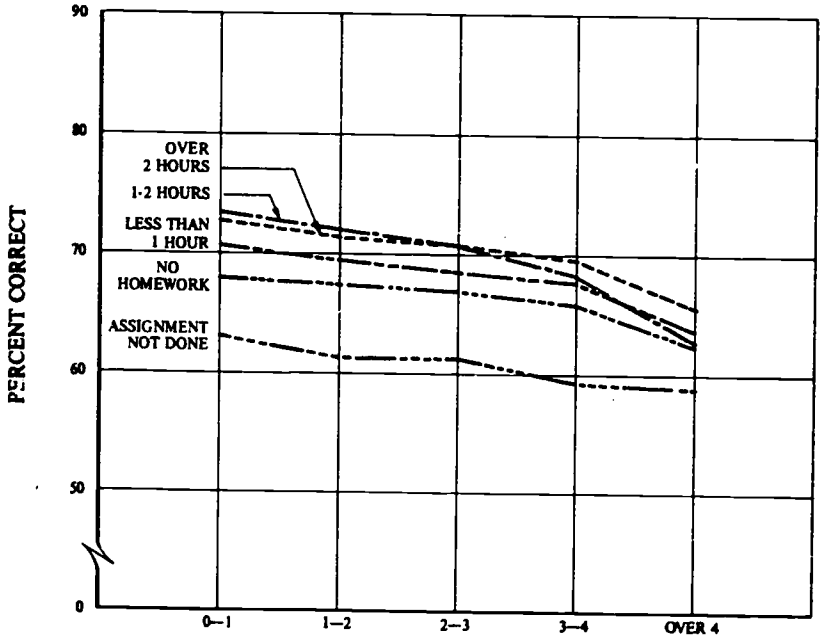
STUDENT MATHEMATICS ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO SOCIO-ECONOMIC STATUS OF PARENTS — *GRADE 12*



NUMBER OF STUDENTS	0–1	1–2	2–3	3–4	4–5	5–6	6 OR MORE	TOTAL	
ADVANCED DEGREE	16,923	9,244	6,128	3,424	1,730	818	1,323	39,590	17.4%
4 YEAR COLLEGE	14,928	10,097	7,725	4,613	2,425	1,127	1,656	42,571	18.7%
SOME COLLEGE	17,679	14,017	12,305	8,149	4,491	2,233	3,366	62,240	27.3%
HIGH SCHOOL GRADUATE	13,090	11,885	11,850	8,822	5,294	2,714	4,101	57,756	25.4%
NOT A HIGH SCHOOL GRADUATE	5,097	4,968	5,074	4,127	2,462	1,403	2,261	25,392	11.2%
TOTAL	67,717	50,211	43,082	29,135	16,402	8,295	12,707	227,549	
PERCENT	29.8%	22.1%	18.9%	12.8%	7.2%	3.7%	5.5%		100.0%

Figure 21

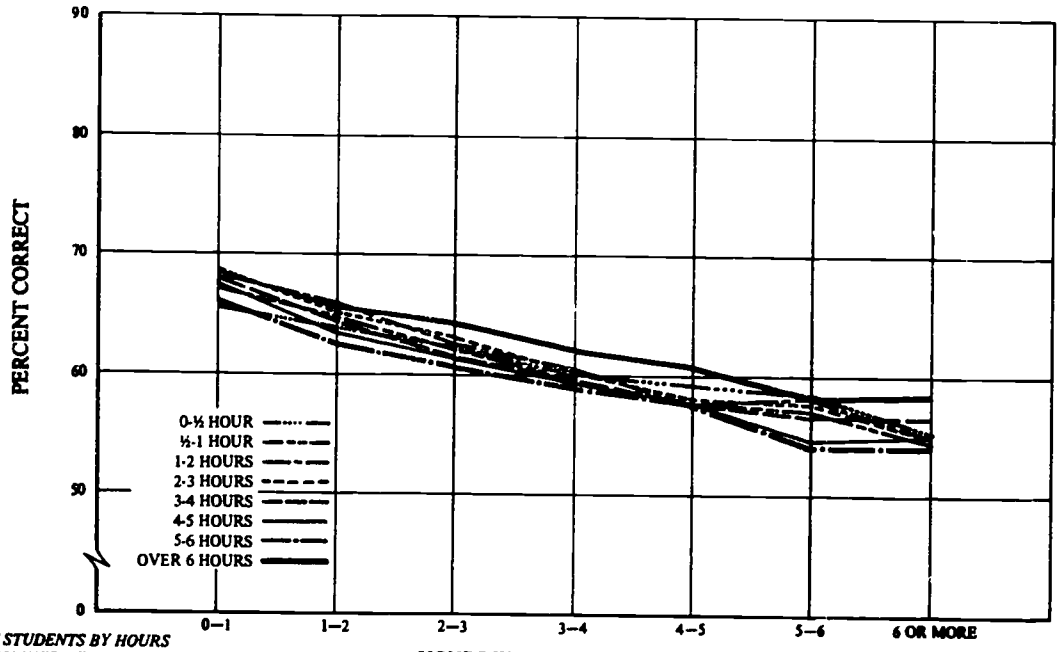
STUDENT READING ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO TIME SPENT ON HOMEWORK — *GRADE 6*



NUMBER OF STUDENTS BY HOURS SPENT-HOMEWORK						N/R	TOTAL	
NO HOMEWORK	19,634	16,366	12,489	8,103	17,417	833	74,842	27%
ASSIGNMENT NOT DONE	5,546	4,092	3,337	2,377	6,294	316	21,962	8%
LESS THAN 1 HOUR	28,676	26,391	19,856	12,483	21,487	963	109,856	39%
1-2 HOURS	17,501	14,821	10,696	6,547	9,577	541	59,683	21%
OVER 2 HOURS	5,244	2,664	1,698	1,071	2,123	162	12,962	4%
NON-RESPONDENTS	372	309	238	157	378	1,148	2,602	1%
TOTAL	76,973	64,643	48,314	30,738	57,276	3,963	281,907	
PERCENT	27%	23%	17%	11%	20%	2%		100%

Figure 22

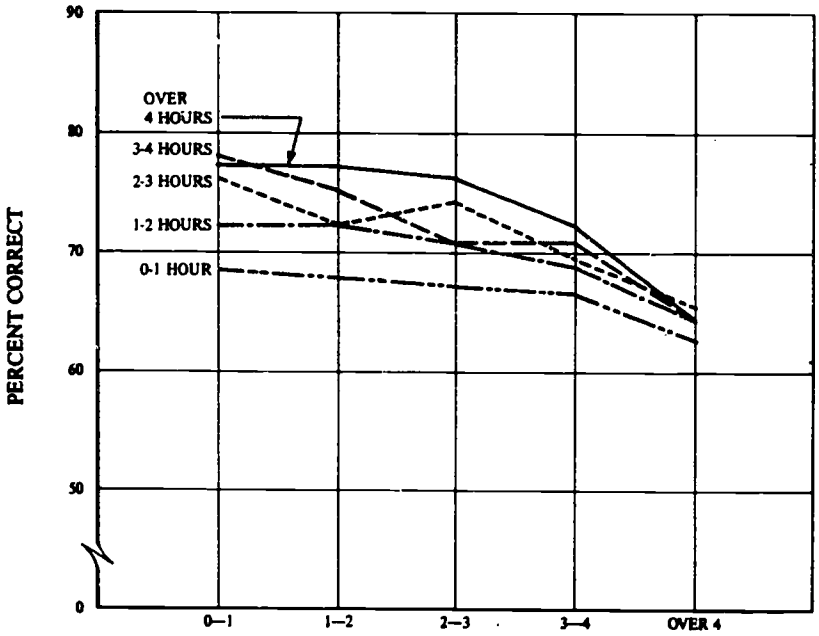
STUDENT READING ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO TIME SPENT READING FOR CLASS ASSIGNMENTS — *GRADE 12*



NUMBER OF STUDENTS BY HOURS SPENT IN ASSIGNED READING								TOTAL	
0-½ HOUR	13,373	8,787	6,942	4,659	2,611	1,393	2,608	40,373	17.6%
½-1 HOUR	20,576	16,017	13,068	8,556	4,640	2,369	3,091	68,317	29.8%
1-2 HOURS	17,469	13,362	11,990	7,777	4,309	1,981	2,704	59,592	26.0%
2-3 HOURS	8,616	6,848	6,103	4,531	2,403	1,231	1,732	31,464	13.7%
3-4 HOURS	4,188	3,054	2,927	2,115	1,399	652	1,116	15,451	6.8%
4-5 HOURS	1,949	1,266	1,231	939	611	377	637	7,010	3.1%
5-6 HOURS	836	585	541	381	291	195	342	3,171	1.4%
OVER 6 HOURS	1,219	589	515	338	226	173	615	3,675	1.6%
TOTAL	68,226	50,508	43,317	29,296	16,490	8,371	12,845	229,053	
PERCENT	29.8%	22.0%	18.9%	12.8%	7.2%	3.7%	5.6%		100.0%

Figure 23

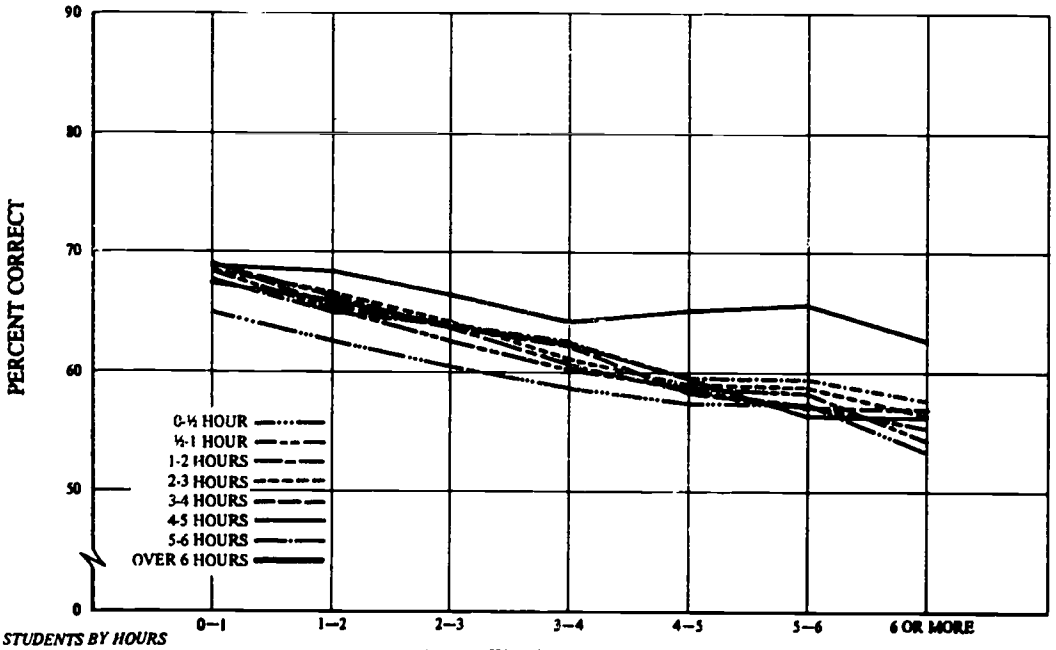
STUDENT READING ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO TIME SPENT READING FOR ENJOYMENT — *GRADE 6*



NUMBER OF STUDENTS BY HOURS SPENT READING FOR ENJOYMENT						N/R	TOTAL	
0-1 HOUR	44,314	41,290	29,129	19,059	38,183	871	172,846	61%
1-2 HOURS	19,414	12,988	13,140	7,327	11,351	517	64,737	23%
2-3 HOURS	5,942	5,199	2,027	2,029	3,084	223	18,504	7%
3-4 HOURS	1,999	1,544	1,314	370	1,232	90	6,549	2%
OVER 4 HOURS	2,364	1,031	762	625	898	140	5,820	2%
NON-RESPONDENTS	2,940	2,591	1,942	1,328	2,528	2,122	13,451	5%
TOTAL	76,973	64,643	48,314	30,738	57,276	3,963	281,907	
PERCENT	27%	23%	17%	11%	20%	2%		100%

Figure 24

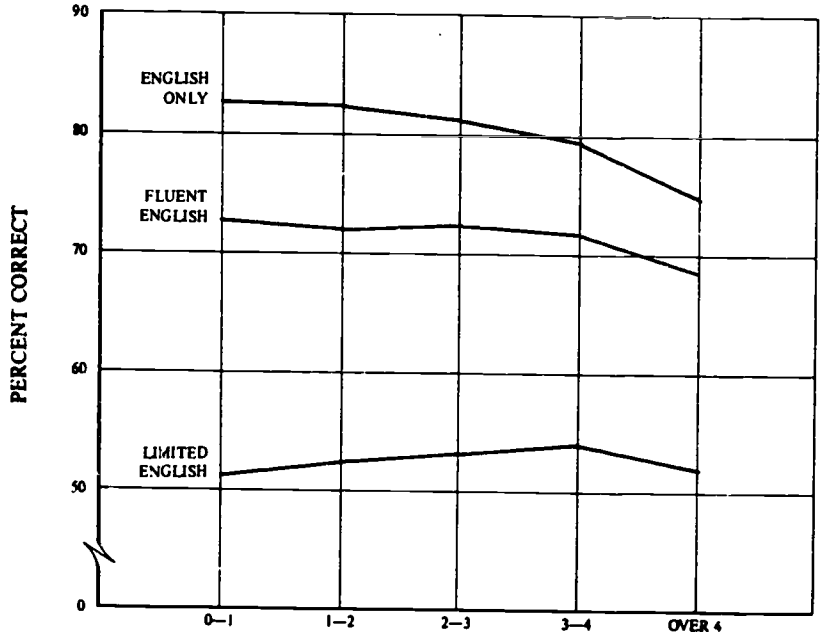
STUDENT READING ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO TIME SPENT READING FOR OTHER THAN CLASS ASSIGNMENTS —*GRADE 12*



NUMBER OF STUDENTS BY HOURS SPENT IN UNASSIGNED READING								TOTAL	
0-½ HOUR	17,698	11,897	9,421	6,435	3,635	1,907	3,314	54,307	24.4%
½-1 HOUR	20,736	15,784	12,609	7,943	4,402	2,045	2,674	66,193	29.7%
1-2 HOURS	14,768	11,330	10,242	6,638	3,529	1,706	2,278	50,491	22.7%
2-3 HOURS	6,752	5,449	5,071	3,855	2,049	1,088	1,473	25,737	11.5%
3-4 HOURS	3,196	2,470	2,532	1,804	1,157	604	937	12,700	5.7%
4-5 HOURS	1,426	1,074	1,036	908	592	375	570	5,981	2.7%
5-6 HOURS	691	459	483	338	256	168	344	2,739	1.2%
OVER 6 HOURS	1,394	759	700	520	334	216	794	4,717	2.1%
TOTAL	66,661	49,222	42,094	28,441	15,954	8,106	12,384	222,862	
PERCENT	29.9%	22.1%	18.9%	12.8%	7.2%	3.6%	5.5%		100.0%

Figure 25

STUDENT READING ACHIEVEMENT AND TELEVISION VIEWING ACCORDING TO ENGLISH LANGUAGE FLUENCY — *GRADE 6*



NUMBER OF STUDENTS BY ENGLISH FLUENCY LEVEL						N/R	TOTAL	
ENGLISH ONLY	59,285	47,665	35,538	22,343	42,655	2,570	210,056	75%
FLUENT ENGLISH	11,109	11,015	8,562	5,705	10,117	657	47,165	17%
LIMITED ENGLISH	2,713	2,995	2,095	1,403	2,233	350	11,789	4%
NON-RESPONDENTS	3,866	2,968	2,119	1,287	2,271	386	12,897	4%
TOTAL	76,973	64,643	48,314	30,738	57,276	3,963	281,907	
PERCENT	27%	23%	17%	11%	20%	2%		100%

VII. Analyses of Achievement for Subgroups

In this section of the report, the statewide achievement of third, sixth, and twelfth grade students are analyzed by different background characteristics reported for the students. For all three grades, achievement scores are analyzed by sex, socioeconomic level and mobility. For grades three and six data is also available by English language fluency plus other language spoken.

This chapter contains the relative achievement levels and amount of change for a period of years for students grouped by certain background characteristics. The findings in this chapter must be read with extreme care to avoid conclusions that appear sound on the surface but can be shown to be misleading when additional information is added to the analysis.

First of all, the reader should not attempt to view student characteristics out of context. Certain patterns in achievement level will be observed when scores are grouped by selected student characteristics, but one should not conclude that the factor being reviewed is the cause, since there is much interrelationship among the factors. The reader should be cautious about making comparisons of scores across grades or levels of a given student characteristic. These types of comparisons assume consistent background factors, comparable students, and equivalent group variances. For example, when reviewing mobility, it appears that students who have been in the school of testing the greater number of years have higher achievement levels. However, a socioeconomic factor may also be involved in the achievement differences between mobility levels.

Student Level Analysis of Achievement and Background Factors

Grade Three

As part of the administration of the Survey of Basic Skills: Grade 3, teachers provided information about the following student characteristics: sex, English language fluency, socioeconomic level, and mobility. This section contains three years of reading test scores, and gives the 1979-80 scores for language and mathematics for this first year of testing with the new Survey of Basic Skills for each of the subgroups of pupils defined by these factors.

Sex. The reading scores of both boys and girls continued to improve in 1979-80 (see Table 16). Girls have been scoring higher than boys in reading and continue to do so, and also score higher in the additional content areas of written language and mathematics. The difference is least in mathematics, where the gap is only two-thirds as great as in the other subjects.

English language fluency. Table 17 gives achievement test scores of students grouped by levels of English fluency and by the other language spoken. Also shown are the percentages of students in each group. The percent of pupils who were identified as speaking only English has decreased during this period covered in this report and now represents only seventy-five percent of third graders. The percent of students classified as fluent in English but speaking another language increased between 1978-79 and 1979-80 by almost two percent. Most of this increase was among Spanish speaking students. The number and percent of third graders who were not tested because they were classified as non-English speaking has increased and now accounts for 3.3 percent of the third grade test population. In 1977-78, they represented 1.3 percent, only slightly higher than the 1.1 percent recorded in 1975-76 and 1976-77.

The reading test scores among the groups of students show a decrease for those speaking English only. In both the fluent English and limited-English speaking students, the students whose other language was Spanish had the lowest test scores.

The reading achievement of the limited-English speaking group has been showing improvement and had the highest increase (from a score of 145 to 170) of all groups between 1978-79 and 1979-80. It might be noted that the percent of students classified as non-English speaking nearly doubled, from 1.7 to 3.3 percent, while the percent of limited-English speaking decreased more than one percent. The achievement test scores across the three language groups are quite similar for reading and written language. However, English-only pupils had lower scores, while the fluent and limited groups who spoke another language had higher scores in math than they did in reading and in language. This was true regardless of language spoken.

Socioeconomic level. Third grade teachers were asked to indicate the occupational level of the principal breadwinner in the students' family. The occupational information permitted a comparison of scores by socioeconomic level. In Table 18 the achievement test scores and percent of pupils are given for the four occupational groups as well as for those students' parents occupation was indicated as "unknown". There are considerable differences between the scores for students from different socioeconomic backgrounds. On the average, students from families at the highest socioeconomic levels achieved the highest scores in reading, language and mathematics. The written language and mathematics scores are somewhat lower than the mathematics scores for this group of students. The second highest socioeconomic group had the next highest achievement scores. The pattern of decreasing scores with lower levels of socioeconomic level appears across all content areas. The levels of achievement across the three content areas varies somewhat with lower socioeconomic levels achieving slightly better in mathematics than they do in the language arts.

Mobility. Teachers were asked to designate the grade in which each child first enrolled in the school. This information permits a comparison of student scores by the length of time a student has attended his or her

current school and is shown in Table 19. The trend noted in previous reports toward an increase in mobility has continued. While forty-five percent of the third graders, had been in the school of testing since kindergarten, almost one-fourth had entered the school in the year of testing.

The score trend noted in earlier years is also present; the longer the students have been in the school the higher they score, although the more recent arrivals are making greater progress.

Table 16

Survey of Basic Skills: Grade 3 Scores by Sex
1977-78 through 1979-80

Sex	Percent of students			Average test scores				
				Reading			Written language	Mathematics
	1977-78	1978-79	1979-80	1977-78	1978-79	1979-80	1979-80	1979-80
State Total	100.0	100.0	100.0	245	248	250	250	250
Boys	50.0	49.9	49.9	238	241	243	243	248
Girls	49.6	49.7	48.5	257	259	260	260	254
No response	.4	.4	1.6					

Table 17

Survey of Basic Skills: Grade 3 Scores for Reading, Language and Mathematics
1977-78 through 1979-80

English language fluency and other language spoken	Percent of students			Average Test Scores				
				Reading			Written Language	Mathematics
	1977-78	1978-79	1979-80	1977-78	1978-79	1979-80	1979-80	1979-80
State Total	100.0	100.0	100.0	245	248	250	250	250
English only	78.5	77.0	74.5	260	264	262	262	259
Fluent English, Total	14.3	14.2	15.9	226	232	232	233	238
Chinese	.7	.6	.6	301	308	316	304	333
Japanese	.4	.3	.3	316	317	312	304	320
Philippine Dialects	.7	.8	.8	278	283	289	288	290
Spanish	10.3	10.2	11.4	211	218	222	224	228
Vietnamese	--	--	.3	--	--	278	269	288
Korean	--	--	.4	--	--	305	296	319
Other	2.0	2.0	1.5	271	276	269	270	275
No response	.2	.2	.6	--	--	--	--	--
Limited English, Total	6.1	7.1	6.0	142	145	170	175	194
Chinese	.2	.2	.2	206	208	225	224	274
Japanese	.1	.1	a	223	228	2[illegible]	244	302
Philippine Dialects	.2	.2	.2	206	209	221	229	244
Spanish	4.9	5.8	4.7	134	138	168	174	190
Vietnamese	--	--	.2	--	--	196	196	238
Korean	--	--	.1	--	--	225	223	266
Other	.6	.7	.4	172	177	189	196	214
No response	.1	.1	.2	--	--	--	--	--
Non-English Speaking [b]	1.3	1.7	3.3	--	--	--	--	--
No response	a	a	.3	--	--	--	--	--

a Value less than .05 percent

b Students classified as non-English speaking at the time of testing were not administered the Survey test. No scores are included for such students.

Table 18

Survey of Basic Skills: Grade 3 Scores by Occupation of Principal Breadwinner in Student's Family
1977-78 through 1979-80

of principal dwinner	Percent of students			Average test scores				
				Reading			Written language	Mathematics
	1977-78	1978-79	1979-80	1977-78	1978-79	1979-80	1979-80	1979-80
tal	100.0	100.0	100.0	245	248	250	250	250
ive Professional anager	16.5	16.2	15.4	316	319	315	306	306
ofessional ical, Salesworker, echnician	22.3	22.0	21.0	281	283	278	277	274
d or Semiskilled ee	36.4	37.1	38.2	241	243	244	246	245
led Employee	17.2	16.7	17.8	191	194	205	208	211
n	6.1	6.2	5.5	203	206	213	216	217
onse	1.5	1.8	2.0	--	--	--	--	--

Table 19

Survey of Basic Skills: Grade 3 Scores by Student Mobility

1977-78 through 1979-80

e in which student rst enrolled in hool of testing	Percent of Students			Average test scores				
				Reading			Written language	Mathematics
	1977-78	1978-79	1979-80	1977-78	1978-79	1979-80	1979-80	1979-80
tate Total	100.0	100.1	100.0	245	248	250	250	250
Kindergarten	46.8	45.4	44.9	255	257	256	256	255
Grade 1	13.1	13.3	13.3	250	255	255	254	254
Grade 2	15.7	15.6	16.5	246	250	251	251	251
Grade 3	23.6	24.7	24.0	238	242	245	245	245
o response	.8	1.0	1.3					

Student-Level Analysis of Achievement and Background Factors Grade Six

As part of the administration of the Survey of Basic Skills, sixth grade teachers and students provided information on student characteristics. This section contains the reading and math scores for the sixth grade students grouped on the basis of sex, English language fluency, socioeconomic index, and student mobility.

Analysis of Findings

The following sections represent a summary of the findings for selected background factors. Statewide scores in reading and mathematics increased between 1978-79 and 1979-80 and scores for most subgroups of students also show gains.

Sex. Reading and math scores increased between 1978-79 and 1979-80 for both boys and girls. (See Table 20). In reading, the progress made by boys and girls was about the same, but with a slight edge for girls, resulting in a modest increase in the gap between the boys and the higher scoring girls. The gains for boys and girls were equal in math, allowing the boys to maintain their small advantage.

English language fluency. Table 21 shows reading and math scores by language fluency categories, and for student's who speak English and another language, the scores by the language they speak.

Two additional languages were added in 1979-80, Vietnamese and Korean. Between 1978-79 and 1979-80 scores for all language fluency categories increased, and this also held true for each of the languages spoken except for the undefined category called "other language". Children whose other language was Chinese or Japanese continued to have higher scores than students who speak English only, and students who were classified as limited-English speaking and speak Chinese or Japanese had higher scores than all limited speaking students. Students who speak fluent English and Spanish have lower scores than the statewide average and have the lowest scores among limited-English speaking students. Spanish speaking students constitute the largest percentage of the fluent English and limited-English speaking students.

Socioeconomic index. Occupation of the breadwinner in the pupil's family. Sixth grade teachers were asked to indicate the occupational level of the chief breadwinner in the family. The occupational information permits comparison of pupils' scores by the socioeconomic level of their parents. Table 22 shows the percent of pupils in each occupational level. It also gives the reading and math scores for each occupational group. Differences in achievement are evident among students of different socioeconomic backgrounds. Students from families in which the principal breadwinner was classified as a professional scored highest and those from families whose

principal breadwinner was a less trained worker scored lowest. Two years of socioeconomic data are now available, but comparisons of 1979-80 scores with 1978-79 should be tempered with caution since only two years of data are available. Occupational groups show gains in 1979-80 except those in the unknown and no response classification. The greatest increases in reading, as well as in math, were in two occupational groups - skilled and semiskilled and unskilled.

Mobility. Students were asked to indicate the grade they were in when they first enrolled in their present school. Table 23 gives the percent of pupils in each category. The largest categories of pupils are those who enrolled at the school sometime during the sixth grade and those who had not moved since kindergarten. The groups did not differ substantially in average scores, although there was a trend for the less mobile pupils to score higher than the more recent arrivals at a school. The percentage of students in each category did not change much between 1978-79 and 1978-80. Reading and math scores increased for all groups of students. There were slightly higher scores for both reading and math between 1978-79 and 1979-80 for students in the middle elementary grades, but conclusions about these differences should await another year of data.

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Table 20

Survey of Basic Skills: Grade 6 Scores for Reading and Mathematics by Sex
1975-76 through 1979-80

Sex	Average reading scores									Average mathematics scores								
	Years					Changes				Years					Changes			
	1975-76	1976-77	1977-78	1978-79	1979-80	1975-76 to 1976-77	1976-77 to 1977-78	1977-78 to 1978-79	1978-79 to 1979-80	1975-76	1976-77	1977-78	1978-79	1979-80	1975-76 to 1976-77	1976-77 to 1977-78	1977-78 to 1978-79	1978-79 to 1979-80
State Total	66.1	65.9	66.3	66.8	67.5	-0.2	+0.4	+0.5	+0.7	57.4	57.7	58.5	59.0	59.8	+0.3	+0.8	+0.5	+0.8
Boys[a]	64.7	64.5	65.0	65.7	66.4	-0.2	+0.5	+0.7	+0.7	57.5	57.9	58.7	59.2	60.0	+0.4	+0.8	+0.5	+0.8
Girls[a]	67.7	67.2	67.6	67.9	68.7	-0.5	+0.4	+0.3	+0.8	57.2	57.5	58.1	58.8	59.6	+0.3	+0.8	+0.5	+0.8

[a]Boys represent 50.4 percent and girls 49.6 percent of the students.

Table 21

Survey of Basic Skills: Grade 6 Scores for Reading, Language and Mathematics
1977-78 through 1979-80

English language fluency and other language spoken	Percent of Students			Reading					Mathematics				
				Average scores			Changes		Average scores			Changes	
	1977-78	1978-79	1979-80	1977-78	1978-79	1979-80	1977-78 to 1978-79	1978-79 to 1979-80	1977-78	1978-79	1979-80	1977-78 to 1978-79	1978-79 to 1979-80
State Total	100.0	100.0	100.0	66.3	66.8	67.5	+0.5	+0.7	58.5	59.0	59.8	+0.5	+0.8
English only	74.5	73.3	73.1	68.6	69.4	70.2	+0.8	+0.8	59.7	60.5	61.3	+0.8	+0.8
Fluent English, Total	14.6	15.8	16.4	59.6	60.9	61.3	+1.3	+0.4	54.5	55.2	56.1	+0.7	+0.9
Chinese	.6	.7	.6	75.5	76.3	77.1	+0.8	+0.8	72.9	72.6	73.8	+0.3	+1.2
Japanese	.3	.3	.3	78.0	78.7	78.8	+0.7	+0.1	70.3	72.7	72.7	+2.4	-0-
Philippine Dialects	.7	.7	.8	67.8	68.6	68.7	+0.8	+0.1	61.6	62.5	63.0	+0.9	+0.5
Spanish	10.7	11.3	11.8	56.3	57.3	57.8	+1.0	+0.5	51.2	51.7	52.4	+0.5	+0.7
Vietnamese	--	--	.3	--	--	69.4	--	--	--	--	68.6	--	--
Korean	--	--	.3	--	--	75.9	--	--	--	--	72.1	--	--
Other	2.0	2.4	2.0	66.7	68.4	66.8	+1.7	-2.0	61.4	62.4	62.1	+1.0	-0.4
No response	.3	.3	.3	--	--	--	--	--	--	--	--	--	--
Limited English, Total	3.7	4.4	4.1	39.2	40.1	42.0	+0.9	+1.9	44.3	44.6	46.2	+0.3	+1.6
Chinese	.1	.2	.2	44.4	48.2	50.8	+3.8	+2.6	61.4	63.2	63.9	+1.8	+0.7
Japanese	a	a	a	54.8	59.2	52.2	+4.1	-0.7	72.7	71.7	71.7	-1.0	-0-
Philippine Dialects	.1	.1	.1	49.5	47.6	49.9	+1.9	+2.3	50.2	49.2	50.0	-1.0	+0.8
Spanish	2.9	3.3	3.1	37.9	38.8	40.5	+0.9	+1.7	41.6	41.6	43.1	-0-	+1.5
Vietnamese	--	--	.2	--	--	43.7	--	--	--	--	57.8	--	--
Korean	--	--	.1	--	--	49.8	--	--	--	--	65.6	--	--
Other	.4	.6	.3	43.5	42.8	43.8	-0.7	+1.5	54.5	53.7	50.5	-0.8	-3.1
No Response	.1	.1	.1	--	--	--	--	--	--	--	--	--	--
Non-English Speaking [b]	.9	1.2	1.9	--	--	--	--	--	--	--	--	--	--
No response	6.3	5.4	4.5	--	--	--	--	--	--	--	--	--	--

[a] Value less than .05 percent.

[b] Students classified as non-English speaking at the time of testing were not administered the Survey test. No scores are included for such students.

Table 22

Survey of Basic Skills: Grade 6 Scores for Reading and Mathematics by Occupation of the Principal Breadwinner in the Student's Family 1978-79 and 1979-80

Occupation of principal breadwinner	Percent of students		Average reading scores			Average mathematics scores		
	1978-79	1979-80	1978-79	1979-80	Change	1978-79	1979-80	Change
State Total	100.0*	100.0*	66.8	67.5	+0.7	59.0	59.8	+0.8
Executive, professional, or manager	14.0	15.2	79.3	79.7	+0.4	70.1	70.6	+0.5
Semiprofessional, clerical, sales worker, or technician	17.1	19.1	73.3	73.9	+0.6	63.7	64.5	+0.8
Skilled or semiskilled employee	32.5	34.1	65.2	66.1	.9	57.1	58.1	+1.0
Unskilled employee	15.0	15.9	54.0	55.6	+1.6	49.6	50.9	+1.3
Unknown	6.3	6.4	57.6	57.2	-0.4	51.7	51.8	+0.1

*Includes 15.1 percent non-response for 1978-79 and 9.2 percent for 1979-80.

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Table 23

Survey of Basic Skills: Grade 6 Scores for Reading and Mathematics by Student Mobility 1978-79 and 1979-80

Grade in which student first enrolled in school of testing	Percent of students		Average reading scores			Average mathematics scores		
	1978-79	1979-80	1978-79	1979-80	Change	1978-79	1979-80	Change
State Total	100.0*	100.0*	66.8	67.5	+0.7	59.0	59.8	+0.8
Kindergarten	25.6	24.8	68.8	69.3	+0.5	60.6	61.4	+0.8
Grade 1	6.1	5.7	67.7	68.3	+0.6	59.7	60.2	+0.5
Grade 2	5.3	5.5	67.5	68.7	+1.2	59.6	61.0	+1.4
Grade 3	7.1	7.4	66.2	67.2	+1.0	58.4	59.4	+1.0
Grade 4	11.3	11.1	66.2	67.2	+1.0	58.7	59.7	+1.0
Grade 5	13.4	14.0	65.9	66.6	+0.7	58.1	58.9	+0.8
Grade 6	30.3	30.3	66.0	66.9	+0.9	58.3	59.0	+0.7

*Includes .9 percent non-response in 1978-79 and 1.3 percent in 1979-80.

Student-Level Analysis of Achievement and Background Factors Grade Twelve

As part of the administration of the Survey of Basic Skills: Grade 12 students provided certain information about themselves. This section presents scores by sex, parent education level, and mobility.

Sex. Table 24 shows that the reading scores for both boys and girls declined by 0.1 percent correct. Boys continued to score below girls by 0.1 percent correct.

In math, the scores of both boys and girls improved, but the girls' rate of improvement was much greater than the boys'. Girls' scores improved by 0.4 percent correct compared with 0.2 percent correct for boys. Girls now score 4.3 percent correct below the boys. In 1975-76 girls scores were 5.6 percent lower than boys'. Girls now score higher than they did in 1975-76 by 0.7 percent correct, while boys, after a decline between 1975-76 and 1976-77 have not yet attained the 1975-76 level. The difference between boys and girls is now 3.3 percent correct.

Parent education. Table 25 shows the percent of pupils who indicated which of five educational levels their most educated parent had achieved. It also gives the reading and math scores for each group of students. For both content areas the trend is the same: higher scores are associated with a higher educational background. In reading, 1979-80 scores of students in almost all categories is lower than the 1978-79 scores, while the statewide increase in mathematics scores was reflected in increases in all groups. Between 1978-79 and 1979-80 the mathematics scores of students whose parents had some college showed some improvement.

Mobility. Students were asked to indicate how many times they had changed schools since the end of the sixth grade because they had moved to a different house. The results are presented in Table 26.

The percentages for the two years for which this information has been reported have remained quite similar. Close to two-thirds of the students had not changed schools and another eight percent indicated they had moved only once. The other twenty percent had moved between two and six times. The scores across the two years is mixed for the mobility groups. Greater increases in percent correct were observed in the reading scores of students who had moved several times, and these generally were the lower scoring students both this year and last. Almost all groups of students had increases in mathematics scores.

Table 24

Survey of Basic Skills: Grade 12 Scores for Reading and Mathematics by Sex
1975-76 through 1979-80

Sex	Reading									Mathematics								
	Average Scores					Change				Average Scores					Change			
	1975-76	1976-77	1977-78	1978-79	1979-80	1975-76 to 1976-77	1976-77 to 1977-78	1977-78 to 1978-79	1978-79 to 1979-80	1975-76	1976-77	1977-78	1978-79	1979-80	1975-76 to 1976-77	1976-77 to 1977-78	1977-78 to 1978-79	1978-79 to 1979-80
State Total	64.1	63.6	63.3	63.2	63.1	-0.5	-0.3	-0.1	-0.1	67.0	66.3	66.3	66.5	66.8	-0.7	-0-	+0.2	+0.3
Boys[a]	64.0	63.4	63.3	63.2	63.1	-0.6	-0.1	-0.1	-0.1	69.4	68.7	68.7	68.8	69.0	-0.7	-0-	+0.1	+0.2
Girls[a]	64.3	63.8	63.4	63.3	63.2	-0.5	-0.4	-0.1	-0.1	64.0	63.9	63.9	64.3	64.7	-0.1	-0-	+0.4	+0.4

[a]Boys represent 49.2 percent and girls 50.8 percent of the students.

Table 25

Survey of Basic Skills: Grade 12 Scores for Reading and Mathematics by Parental Education, 1978-79 and 1979-80

Highest educational level of student's parent	Percent of students		Average reading scores			Average mathematics scores		
	1978-79	1979-80	1978-79	1979-80	Changes	1978-79	1979-80	Changes
State Total	100.0*	100.0*	63.2	63.1	-0.1	66.5	66.8	+0.3
Advanced degree	16.4	17.1	70.1	69.8	-0.3	74.7	75.0	+0.3
Four-year college	18.0	18.4	67.2	66.9	-0.3	71.5	71.7	+0.2
Some college	26.6	26.8	64.6	64.5	-0.1	67.3	67.8	+0.5
High school graduate	26.0	24.9	59.4	59.3	-0.1	61.5	61.9	+0.4
Not a high school graduate	11.3	11.0	53.5	53.5	-0-	55.9	56.7	+0.8

*Includes 1.7 percent non-response in 1978-79 and 1.8 percent in 1979-80.

Table 26

Survey of Basic Skills: Grade 12 Scores for Reading and Mathematics by Mobility 1978-79 and 1979-80

Mobility (Number of times student changed schools)	Percent of students		Average reading scores			Average mathematics scores		
	1978-79	1979-80	1978-79	1979-80	Change	1978-79	1979-80	Change
State Total	100.0*	100.0*	63.2	63.1	-0.1	66.5	66.8	+0.3
None	62.3	61.9	64.3	64.2	-0.1	67.4	68.0	+0.6
Once	17.6	18.0	63.1	62.7	-0.4	66.3	66.6	+0.3
2	8.3	8.5	60.6	61.0	+0.4	64.0	64.9	+0.9
3	5.7	5.6	60.2	60.2	-0-	63.2	63.8	+0.6
4	2.9	2.8	59.4	60.2	+0.8	62.5	63.0	+0.5
5	1.3	1.3	59.1	59.4	+0.3	62.0	61.5	-0.5
6 or more	1.3	1.4	58.0	58.6	+0.6	59.9	60.7	+0.8

*Includes .6 percent non-response in 1978-79 and .6 percent in 1979-80.

VIII. Comparisons with National Norms

Some of the difficulties in using publishers' national norms to judge the adequacy of the performance of California students are discussed in Chapter II. Briefly, the two main problems are (1) lack of agreement among publishers' samples; and (2) lack of timeliness. Any comparison based on a single publisher's norm group (a national sample of students tested at a given time) can be quite misleading and is a tenuous undertaking at best. Since no test is given nationwide, one must rely on various publishers' estimates of the nationwide distribution of test scores. These estimates vary from publisher to publisher and are clearly "guesstimates." Part of the problem in establishing norms is that publishers are dependent upon the goodwill and cooperation of the districts they select to administer their tests. When the districts that have been carefully selected as part of a national sample decline to participate in the norming study, the results become that much more uncertain. In addition, because of the expense involved, publishers are not able to update their norms more than once every five to eight years.

To cope with this situation, the Department's plan is to compare the performance of California students with the norms of a variety of tests and updates the comparisons whenever the tests are renormed or when new tests become available. This is done by giving a sample of California students both the publisher's standardized test and the California test. In some cases no extra testing is required. Scores for a publisher's standardized test are simply collected from the school districts that administered the test to all of their students in certain schools for other purposes. The statistical techniques used to equate the two tests are briefly described in Appendix H of the 1978-79 report. The result of this type of "equating study" is to show how California students would have compared to a national norm group if, in fact, all California students had taken the published test.

This approach has several advantages: (1) the national comparisons are more timely since they can be updated as new norms become available; (2) the estimates are more stable since they do not depend on the representativeness of a single publisher's sample; and (3) the progress of California students can be assessed with a test that fits the objectives of the instructional program and simultaneously, with no additional testing, can be compared to national norms.

The comparisons presented in this report are based on the tests with recent national norms. This report also contains the results of earlier equating studies so that the reader can inspect the long-term (from 11 to 14 years) achievement test trends in California against the backdrop of national norms.

Grade Three

Table 27 contains the estimated national percentile ranks of the median score of California third grade students' performance on the reading tests since 1966-67. The trend over the years is clearly one of growth, with the third grade scores increasing from the 34th to the 38th percentile rank on the Stanford Reading Test, at the 52nd on the Cooperative Primary Reading Test, and now increasing from the 55th to the 58th on the Comprehensive Tests of Basic Skills (CTBS). In written language and math the estimated percentile ranks are 53 and 51. Figure 26 is a pictorial display of these trends.

The following outline should help the reader understand more fully the national comparisons.

1. The third grade results for 1966-67 through 1970-71 were based on the Stanford Reading Test, which was administered to all third grade students in California. The norms for the Stanford Reading Test were established in 1963. Thus, the gains that occurred each year are relative to those norms.

2. The third grade results for 1971-72 through 1972-73 were based on the Cooperative Primary Reading Test (CPRT), which was administered to all third grade pupils in California. The norms for the CPRT were established in 1966. The dramatic increase of scores in the changeover years was due largely to the great differences between the norms of the Stanford Reading Test and those of the CPRT.

3. In 1973-74 the California Assessment Program developed the Reading Test. A systematic sample of one-ninth of all students tested in grade three was used in an equating study to estimate the performance of the median pupil in California relative to 1966 Cooperative Primary Reading Test norms. The results indicated little change from those of the previous years.

4. In 1974-75 the Reading Test was revised and administered to all third grade students in California. The same test was used in 1975-76, 1976-77, 1977-78, and 1978-79. The results of an equating study were used to estimate the performance of California students in comparison to the norms established in 1973 for the Comprehensive Tests of Basic Skills (CTBS), Form S. As a result of the modest increases in the third grader scores, the median score of California pupil performance in grade three in 1978-79 was at the 58th percentile of CTBS 1973 norms.

5. In 1979-80, the new Survey of Basic Skills: Grade 3 was administered to all third grade students in California public schools. The new test was equated to the Comprehensive Tests of Basic Skills (CTBS), Form S, 1973 norms. The median California student is estimated to be at the 58th percentile in reading, the 53rd percentile in written language, and the 51st in mathematics.

Grade Six

The performance of sixth graders in California declined in the early 1970s and leveled off by 1974. It has climbed steadily since then. Table 28 shows that the median California sixth grade student's performance in 1979-80 was slightly above the national sample tested in 1973 by the makers of the Comprehensive Tests of Basic Skills. Figure 27 is a graphic representation of these trends. Reading performance, with a percentile rank of 56, continued to be slightly higher than that of language (53) and mathematics (55).

A more complete description of these findings is given below:

1. From 1969-70 to 1973-74 the Comprehensive Tests of Basic Skills (Form Q, 1968 norms) was administered to all California sixth grade students. During this period the performance of California students declined from four to nine percentile ranks on the basis of the 1968 norms.

2. In 1974-75 the first version of the California Assessment Program test, the Survey of Basic Skills, was administered statewide. An equating study that was conducted that year showed that scores had improved and that if the Comprehensive Tests of Basic Skills had been administered statewide, the percentile ranks would have gone up to 48, 43, and 44 for reading, language, and mathematics, respectively.

3. A revision of the Survey was administered in 1975-76, 1976-77, 1977-78, 1978-79, and 1979-80. An equating study showed that on the basis of the 1973 version of the CTBS, California students improved enough in 1975-76 to equal or exceed the national average in reading and mathematics. Following the upward trend of earlier years, the 1979-80 improvement in language and mathematics achievement boosted the percentile ranks to 53 and 55, respectively. The percentile rank for reading moved up to the 56th percentile.

Grade Twelve

The performance of twelfth grade students in California has been declining consistently since testing began in 1969-70. By 1976-77 the median high school senior was at the 42nd, 33rd, and 43rd percentile ranks in reading, written expression, and mathematics, respectively, on the basis of the Iowa Tests of Educational Development with its 1962 norms. On the basis of tests with more recent norms the ranks were even lower (see Table 29 and Figure 28).

Progress noted in 1978-79 has continued in 1979-80. Reading continued to decline in percent correct units but the percentile ranks stayed the same as last year: 41, 32, and 34 for the three tests used to establish national comparisons. Written expression scores did not change, leaving the percentile ranks at 34, 27 and 28. The improvement in mathematics increased the national percentile ranks to 44, 42 and 44.

Table 27

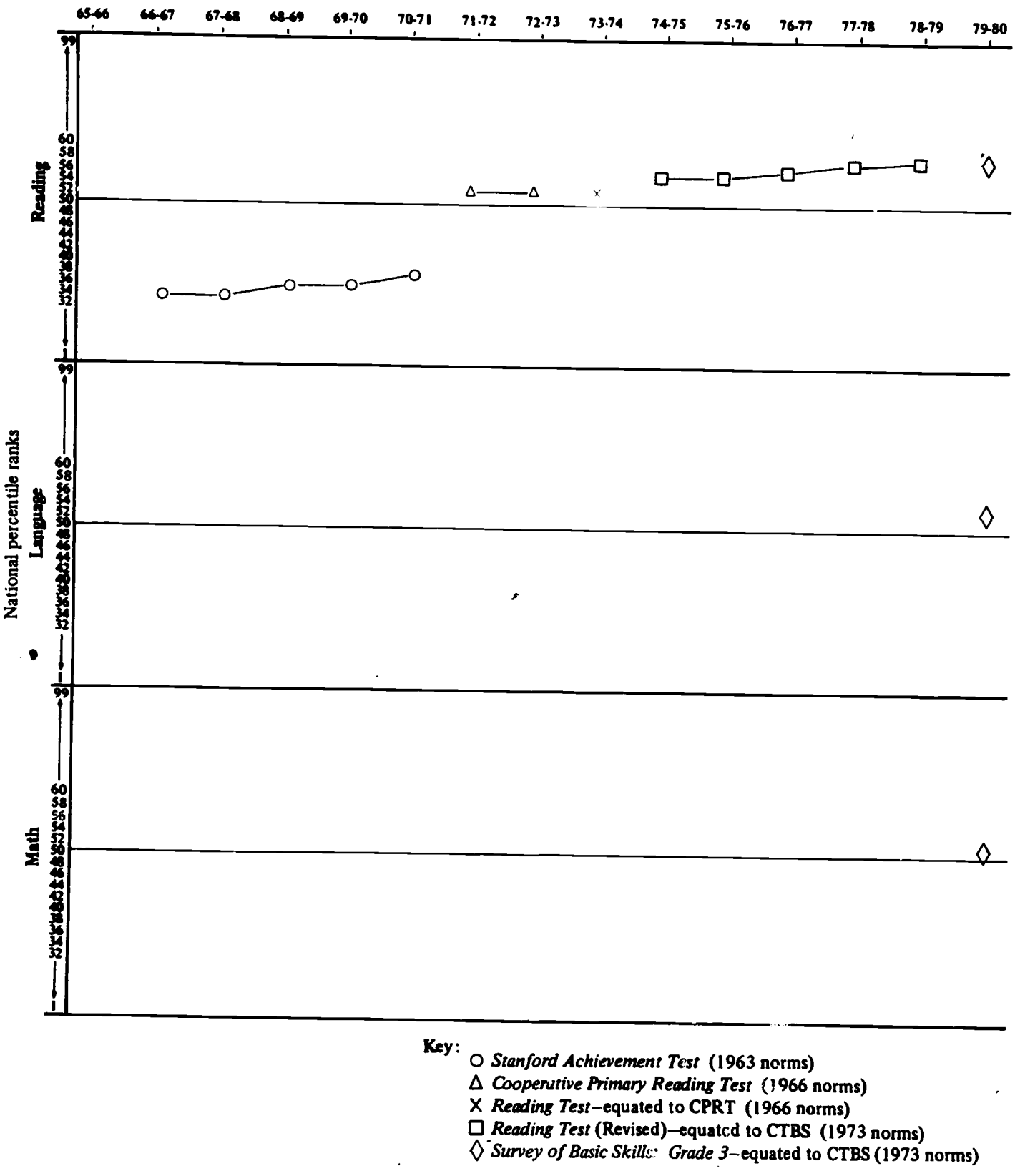
Estimated National Percentile Ranks of Median California Pupil Performance
1966-67 through 1979-80
Grade Three

Content area	Test administered												
	Stanford Reading Test					Cooperative Primary Reading Test		Reading Test[a]	Reading Test[b] (Revised)				Survey of Basic Skills[c]
	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Reading	34	34	36	36	38	52	52	52	55	55	56	57	58	58
Language	--	--	--	--	--	--	--	--	--	--	--	--	--	53
Mathematics	--	--	--	--	--	--	--	--	--	--	--	--	--	51
Norms:	Stanford, 1963 norms					CPRT, 1966 norms			CTBS, 1973 norms					

a The Reading Test, was first administered in 1973-74. The percentile ranks are based on an equating of the Reading Test and the Cooperative Primary Reading Test, forms 23A and 23B, normed in 1966

b The revised Reading Test was administered to all California students in 1974-75, 1975-76, 1976-77, and 1978-79. The percentile ranks are based on equating studies of the revised Reading Test and the Comprehensive Tests of Basic Skills, Form S, normed in 1973.

c The new Survey of Basic Skills: Grade 3 was administered to all California students in 1979-80. The estimated national percentile ranks are based on an equating study of the new test and the Comprehensive Tests of Basic Skills, Form S, normed in 1973.



Key:

- ○ *Stanford Achievement Test* (1963 norms)
- △ *Cooperative Primary Reading Test* (1966 norms)
- X *Reading Test*–equated to CPRT (1966 norms)
- □ *Reading Test* (Revised)–equated to CTBS (1973 norms)
- ◇ *Survey of Basic Skills: Grade 3*–equated to CTBS (1973 norms)

Fig. 26. National percentile ranks of median third grade California student performance, 1965-66 through 1979-80 for reading and 1979-80 for written language and math

Table 28

Estimated National Percentile Ranks of Median California Student Performance
1969-70 through 1979-80
Grade Six

Content area	Test administered									
	Comprehensive Tests of Basic Skills					Survey of Basic Skills[a]	Survey of Basic Skills[b]			
	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Reading	48	46	44	44	44	48	53	53	55	55	56
Language	43	43	39	39	37	43	49	51	51	52	53
Mathematics	47	43	38	38	38	44	50	51	53	54	55
Norms:	CTBS, 1968 norms						CTBS, 1973 norms				

a The new California test, the Survey of Basic Skills: Grade 6, was first administered to all California pupils in 1974-75. The percentile ranks are based on an equating of the Survey of Basic Skills and the Comprehensive Tests of Basic Skills (CTBS), Form Q, which was normed in 1968.

b The revised version of the Survey of Basic Skills: Grade 6, was administered from 1975-76 through 1979-80. the percentile ranks are based on an equating of the revised Survey of Basic Skills and the Comprehensive Test of Basic Skills (CTBS), Form S, 1973 edition.

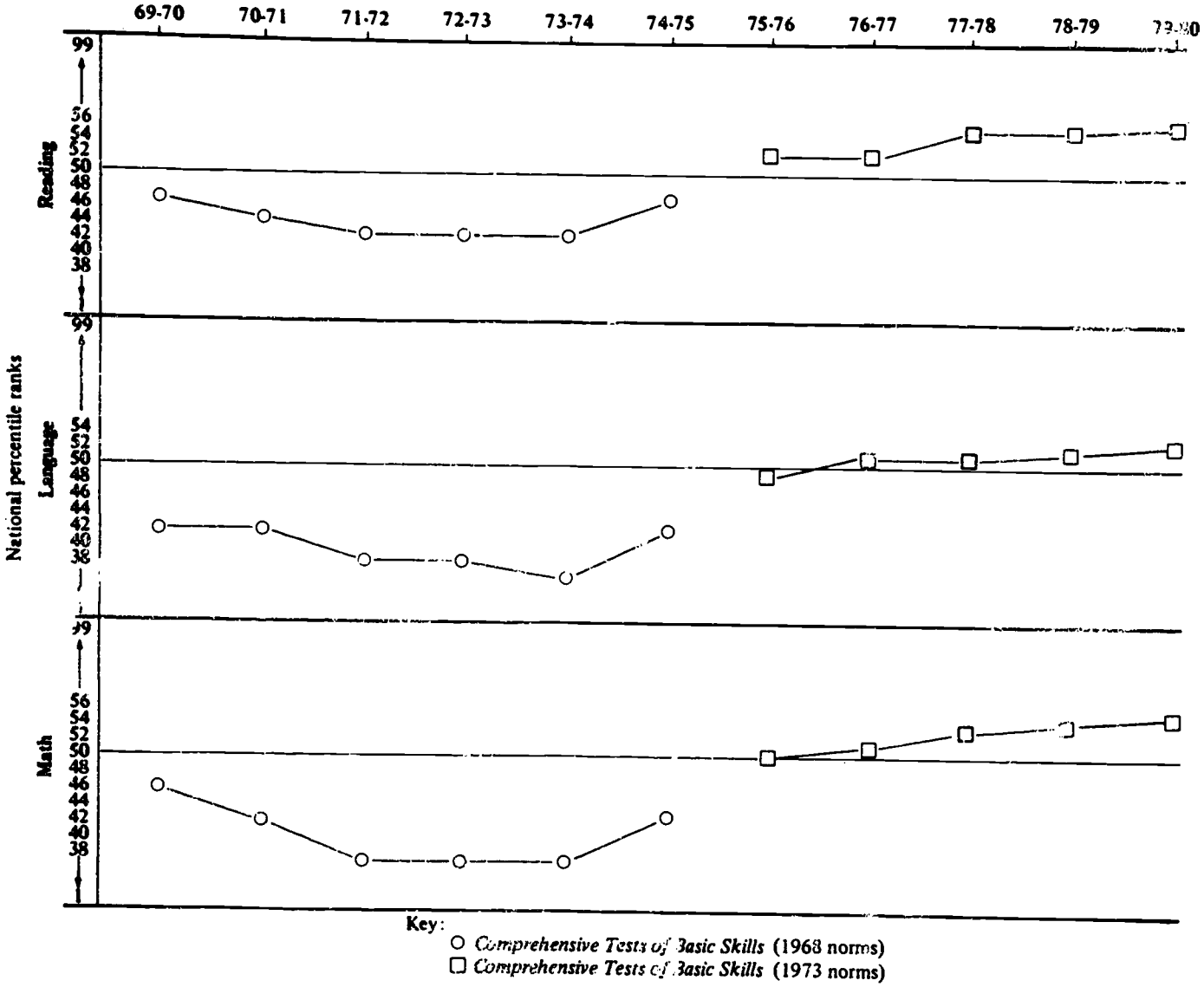


Fig. 27. National percentile ranks of median sixth grade California student performance, 1969-70 through 1979-80

Table 29

Estimated National Percentile Ranks of Median California Student Performance
1969-70 through 1979-80
Grade Twelve

Content area	Test administered										
	Iowa Tests of Educational Development, Form X, normed in 1962					Survey of Basic Skills[a]	Survey of Basic Skills[a] (Revised)				
	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Reading											
ITED, 1962 norms	52	49	49	47	47	41	43	42	42	41	41
TAP, 1970 norms						33	35	33	32	32	32
STEP, 1970 norms						34	38	36	35	34	34
Language											
ITED, 1972 norms	42	40	38	36	34	32	34	33	34	34	34
TAP, 1970 norms						25	27	26	26	27	27
STEP, 1970 norms						27	29	28	28	28	28
Mathematics											
ITED, 1962 norms	48	48	48	48	48	41	44	43	43	43	44
TAP, 1970 norms						38	43	41	41	41	42
STEP, 1970 norms						41	44	43	43	43	44

[a] The new California test, the Survey of Basic Skills: Grade 12, was administered to all California students from 1974-75 through 1979-80. The percentile ranks are based on equating studies of the Survey of Basic Skills and three other tests with national norms: (1) Iowa Test of Educational Development, Form X-4, normed in 1962; (2) Tests of Academic Progress, normed in 1970; and (3) Sequential Tests of Educational Progress, Series II, normed in 1970.

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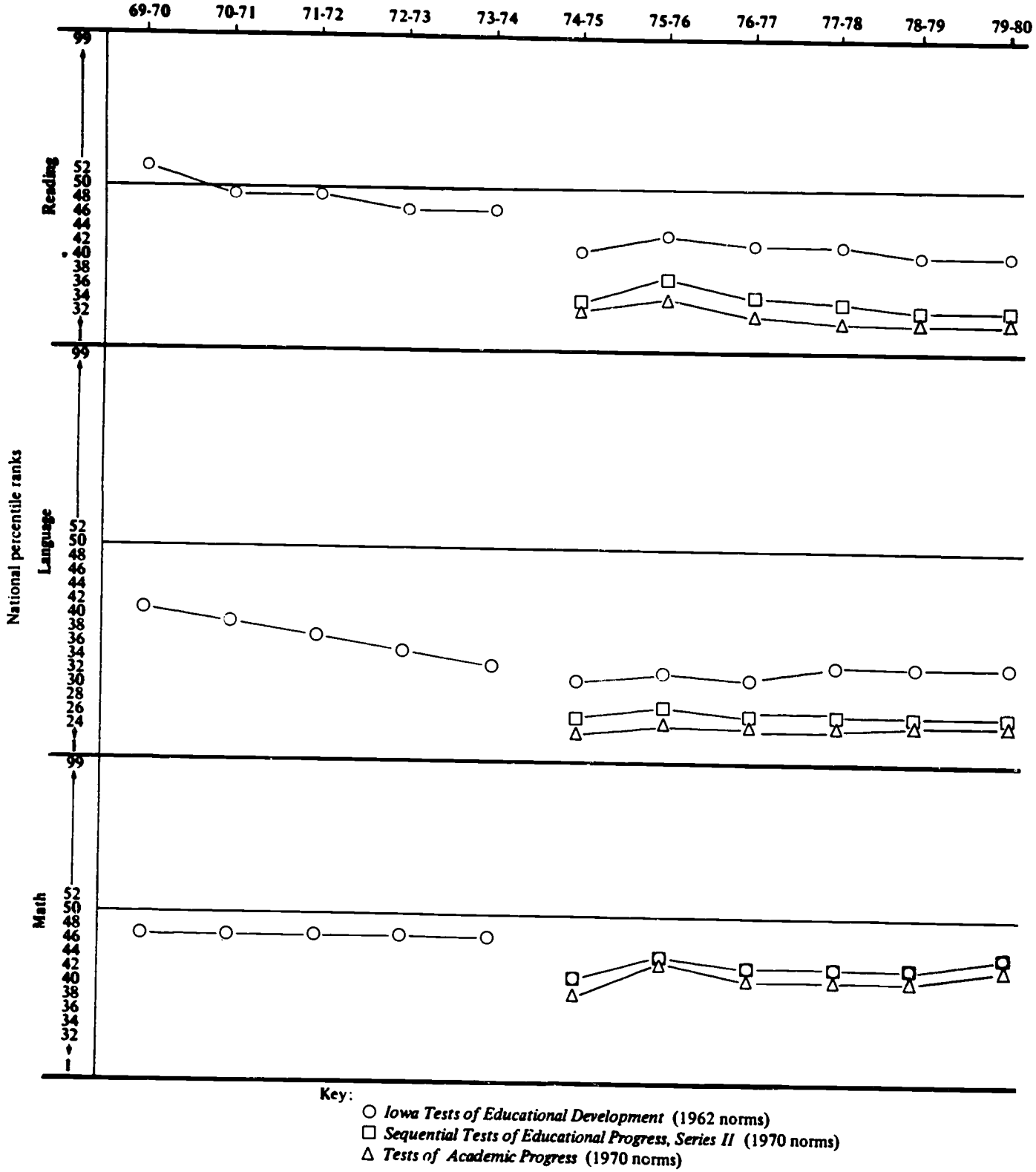

Fig. 28. National percentile ranks of median twelfth grade California student performance, 1969-70 through 1979-80

Appendix A

ASSESSMENT ADVISORY COMMITTEES

Listed below are the members of the Reading Assessment Advisory Committee, English Language Assessment Advisory Committee, and the Mathematics Assessment Advisory Committee, who were instrumental in the review and analysis of the 1979-80 findings.

Reading Assessment Advisory Committee

Vincent Abata, Office of the Sonoma County Superintendent of Schools

Espy Acuna, Central Union High School District

Robert Bennett, San Diego City Unified School District

Sandy Biren, San Juan Unified School District

Jacqueline Chaparro, Office of the San Diego County Superintendent of Schools

Pat Endsley, Berkeley Unified School District

Jack Green, Oceanside City Unified School District

Ruth Hartley, California State University, Sacramento

Cecelia Hill, Los Angeles Unified School District

Jacqueline Hodge, West Fresno Elementary School District

Joyce Krutop, National Elementary School District

Herlinda Leong, Los Nietos Elementary School District

Heath Lowry, University of the Pacific

Margaret Lynch, California State University, San Francisco

Marguerite May, Los Angeles Unified School District

Phyllis McKinney, Playmate Day School

Donovan Merck, State Department of Education

Janice Meyer, Office of the Santa Barbara County Superintendent of Schools

H. Carol Perry, Ceres Unified School District

Alpha Quincy, Mt. Diablo Unified School District

Grayce Ransom, University of Southern California

Marie Santos, Denair Unified School District

Marian Schilling, Office of the Los Angeles County Superintendent of Schools

Alice Scofield, San Jose State University

Vivian Silver, State Department of Education

Rudy Skoczlas, Gilroy Unified School District

Fred Sorkin, Los Angeles Unified School District

Joellyn Taylor, Far West Regional Educational Laboratory

Myrna Tsukamoto, San Francisco Unified School District

Barbara Valdez, North Sacramento Elementary School District

Mareta Varner, Monterey Peninsula Unified School District

John Walters, Office of the San Diego County Superintendent of Schools

Mel Wiseman, Los Angeles Unified School District

Beth Breneman, State Department of Education Consultant to the Committee

English Language Assessment Advisory Committee

Sheila Anchondo, San Bernardino City Unified School District

Robert Bennett, San Diego City Unified School District

Gwen Brewer, California State University, Northridge

Stephen Black, Oakland Unified School District

Muriel Dillard, Office of the Kern County Superintendent of Schools

Shirley Drake, Office of the San Bernardino County Superintendent of Schools

Kent Gill, Davis Joint Unified School District

Richard Giovannoli, Biggs Unified School District

Bernard Goodmanson, Los Angeles Unified School District

Julia Gottesman, Office of the Los Angeles County Superintendent of Schools

Jim Gray, University of California, Berkeley

Louise Grindstaff, California State University, Northridge

Al Grommon, Stanford University (retired)

Wayne Harsh, University of California, Davis

Roger Hyndman, Los Angeles Unified School District

Everett I. Jones, University of California, Los Angeles

Helen Lodge, California State University, Northridge

Joanna McKenzie, California State University, Northridge

Barbara Mahoney, Modesto City Elementary School District

Marguerite May, Los Angeles Unified School District

Fred Myers, Anaheim Union High School District

George Nemetz, State Department of Education

Warren Newman, Office of the Los Angeles County Superintendent of Schools

Dale Oscarson, Palo Alto City Unified School District

Darlene Rice, Montebello Unified School District

Elizabeth Scarpa, Tamalpais Unified School District

Alice Scofield, San Jose State University

William Stryker, California State University, Northridge

Violet Tallmon Office of the Stanislaus County Superintendent of Schools (retired)

Ross Winterowd, University of Southern California

Jane Wise, San Juan Unified School District

William Wise, San Juan Unified School District

Thelma Worthen, San Ramon Valley Unified School District

John Yockey, Los Angeles Unified School District

Joanne Yee, Gold Oak Union Elementary School District

Beth Breneman, State Department of Education Consultant to the Committee

Mathematics Assessment Advisory Committee

Charles Allen, Los Angeles Unified School District

Marguerite Brydegaard, San Diego State University

Clyde Corcoran, Whittier Union High School District

Richard Dean, California Institute of Technology

Sister Rose Eleanor Ehret, Holy Names College

Lyle Fisher, San Rafael City High School District

Ruth Hadley, Lompoc Unified School District

Joseph Hoffmann, State Department of Education

Gail Lowe, Los Angeles Unified School District

Sandy Marshall, University of California, Santa Barbara

Vance Mills, San Diego City Unified School District

Robert Obrey, Office of the San Mateo County Superintendent of Schools

Susan A. Ostergard, University of California, Davis

Holland Payne, Sacramento City Unified School District

Henry Palmer, Office of the Los Angeles County Superintendent of Schools

Ruth Riley, Fresno Unified School District

Linda Silvey, Los Angeles Unified School District

Jean Stenmark, Oakland Unified School District

Shirley Trembley, Bakersfield College

Tej Pandey, State Department of Education Consultant to the Committee

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