REL Technical Brief

REL 2008—No. 007

Aligning mathematics assessment standards: Texas and the 2009 National Assessment of Educational Progress (NAEP)

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October 2008

ies NATIONAL CENTER FOR EDUCATION EVALUATION AND REGIONAL ASSISTANCE
Institute of Education Sciences
U.S. Department of Education

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October 2008

After receiving the 2007 REL Southwest alignment study of the Texas Assessment of Knowledge and Skills (TAKS) and the National Assessment of Educational Progress (NAEP) assessment standards in science (http://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=76&productID=36), the Texas Education Agency and the REL Southwest Governing Board requested that REL Southwest conduct a similar alignment study to learn how the TAKS assessment standards align with the 2009 NAEP assessment standards in mathematics.

This REL Technical Brief was prepared for IES under Contract ED-06-CO-0017 by Regional Educational Laboratory Southwest administered by Edvance Research. The content of the publication does not necessarily reflect the views or policies of IES or the U.S. Department of Education, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

Shapely, K., and Brite, J. (2008). *Aligning mathematics assessment standards: Texas and the 2009 National Assessment of Educational Progress (NAEP)* (REL Technical Brief, REL 2008–No. 007). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest. Retrieved from http://ies.ed.gov/ncee/edlabs.

This REL Technical Brief is available on the regional educational laboratory web site at http://ies.ed.gov/ncee/edlabs.

Summary

This Technical Brief examines the alignment between the Texas Assessment of Knowledge and Skills (TAKS) mathematics assessment standards and the 2009 National Assessment of Educational Progress (NAEP) mathematics framework. It looks at the extent to which current state assessment standards cover the content on which 2009 NAEP assessments will be based. Applying the methodology used by Regional Educational Laboratory Southwest in 2007 in a similar study that examined the alignment of TAKS science assessment standards with the 2009 NAEP (http://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=76&productID=36), this study presents results for areas of full alignment, partial alignment, nonalignment, and areas where the TAKS assessment standards go beyond the NAEP standards. The study finds that 74 percent of the NAEP grade 4, 81 percent of the NAEP grade 8, and 71 percent of the NAEP grade 12 assessment standards are either fully or partially addressed by the TAKS assessment standards.

The study analyzes the alignment of the TAKS and the 2009 NAEP mathematics assessment standards. It does not analyze individual items or the alignment of state standards with the TAKS assessment items. The study does not make specific recommendations about whether a state should close gaps in alignment to the NAEP—a decision for state policymakers. Revising assessments requires substantial time and resources, so policymakers considering such revisions need to weigh the costs of such changes and the benefits they believe such changes will bring to students.

Technical brief

Why this brief?

In 2007 Regional Educational Laboratory Southwest conducted an alignment study of National Assessment of Educational Progress (NAEP) and Texas Assessment of Knowledge and Skills (TAKS) assessment standards in science to see how well the TAKS aligned with the NAEP (Timms et al. 2007). After receiving the science alignment report, the Texas Education Agency and the Regional Educational Laboratory Southwest Governing Board requested a similar alignment study to see how the TAKS mathematics assessment standards[1] align with the 2009 NAEP mathematics assessment standards.[2]

One reason for this interest is the No Child Left Behind (NCLB) Act of 2001, which requires states to develop challenging academic content and achievement standards in mathematics and to test public school students in grades 3–8 and 10–12 annually to determine how well they are mastering the subject matter defined in the state standards. States must also participate in the NAEP mathematics assessments in grades 4 and 8 every two years. Because states set their own standards, NAEP is increasingly being used as a benchmark for assessing and comparing student achievement countrywide (see, for example, Linn 2005; Linn, Baker, and Herman 2005).

NAEP data are being used increasingly in education research to investigate how the NCLB provisions have played out in different states. For example, the National Center for Education Statistics (NCES) mapped state test scores using the NAEP scale (NAEP equivalent score) and found differences in what is considered proficient. Proficient in some states mapped to NAEP Basic, while in others it mapped to NAEP Proficient, and in still others it mapped to NAEP Advanced. Much of the discrepancy between the percentages of students scoring proficient on state assessments and on NAEP was accounted for by how stringently states defined proficient (U.S. Department of Education, National Center for Education Statistics 2007). But it is unclear how much such discrepancies are also due to other factors, such as a lack of alignment between what is tested on NAEP and on state assessments, differences in the types of items used to test mathematics knowledge and skills (for example, multiple choice questions and short responses), and differences in cutpoints for determining proficiency levels.

The findings from this research will better inform Texas policymakers of specific areas in which TAKS and NAEP assessment standards differ so that they can, if necessary, review and revise their standards. This report describes the results of a systematic alignment study conducted for that purpose.

Traditional alignment studies and methods focus on aligning standards and tests. The objective of this study was to compare one set of assessment standards with another (see box 1 for study methodology).

Results

Results are presented for grades 4, 8, and 12 for the research question: To what extent do current state assessment standards on TAKS cover the content on which 2009 NAEP assessments will be based? Results are presented for areas of full alignment, partial alignment, nonalignment, and areas where the TAKS assessment standards go beyond the NAEP assessment standards. A NAEP assessment standard is considered to be fully addressed by a TAKS assessment standard or standards if all of the content of the NAEP assessment standard is contained in one or more TAKS assessment standards at the same or lower grade level. A NAEP assessment standard is considered to be partially addressed by the TAKS assessment standard or standards if the TAKS assessment

BOX 1

Study methodology

This study used the WestEd methodology, which was designed to incorporate eight of the most prominent alignment methodologies (for a detailed discussion of the WestEd methodology see Timms et al. 2007).

The review team consisted of one senior reviewer and six content reviewers. The senior reviewer had 19 years of experience in mathematics education and had worked in public schools, state education agencies, and a university setting. The six content reviewers were elementary, middle, and high school mathematics educators with 4–37 years of teaching experience. Reviewers attended several training sessions.

Each reviewer conducted independent alignment ratings of the NAEP assessment standards and TAKS assessment standards. First, they conducted gap analyses, identifying content in the grade-specific NAEP assessment standards that was absent in the grade-specific TAKS assessment standards and content in the grade-specific TAKS assessment standards that was absent in the grade-specific NAEP assessment standards. Then, reviewers examined order, to determine whether grade-specific NAEP assessment standards were included at the same grade level as the matching content in the TAKS assessment standards. The content reviewers then met in pairs to reach ratings consensus, a method designed to result in a single rating per NAEP assessment standard (no disagreement was permitted). The senior reviewer led each consensus meeting.

Content reviewers recorded alignment data in a crosswalk instrument that contained NAEP assessment standards at the appropriate grade level in the first column, then a column to fill in corresponding TAKS assessment standards, a column for ratings, a column for codes, and a column for reviewers' notes. A coding scheme was used to indicate alignment issues, including whether the assessment standard was covered at a higher or lower grade than the target grade and reason for lack of alignment. A matrix-like format was created to facilitate alignment.

standard or standards address only part of the NAEP assessment standard; the NAEP assessment standard contains more content or more detailed content than the TAKS assessment standard or standards, or the TAKS assessment standard or standards imply but do not explicitly state the content found in the NAEP assessment standard; there is a matching TAKS assessment standard at a higher grade level than the NAEP assessment standard; or there is a matching TAKS assessment standard at a lower grade level than the NAEP assessment standard, but it does not address all the content addressed by the NAEP assessment standard.

Content alignment at grade 4

The content reviewers compared the NAEP grade 4 assessment standards in the *Mathematics Framework for 2009 National Assessment of Educational Progress* (National Assessment Governing Board 2007) with the assessment standards in the *TAKS Information Booklet for Mathematics Grade 4* (Texas Education Agency 2007c). NAEP provides 65 assessment standards for grade 4. The number of assessment standards per content area in each alignment rating category is shown in table 1.

Seven of the NAEP assessment standards (11 percent) are fully addressed by the TAKS assessment standards, 41 (63 percent) are partially addressed, and 17 (26 percent) are not addressed (figure 1). (See appendix A for more detail about the alignment of the NAEP grade 4 assessment standards and the TAKS assessment standards and about the TAKS grade 4 assessment standards not covered by the NAEP grade 4 assessment standards, including details on assessment standards, ratings, codes, and whether a NAEP assessment standard is addressed at a higher or lower grade.)

TABLE 1

Number of National Assessment of Educational Progress (NAEP) grade 4 assessment standards and number of Texas Assessment of Knowledge and Skills assessment standards by alignment with NAEP, by NAEP content area, January 2008

NAEP content area	Number of NAEP assessment standards	Number of Texas assessment standards by alignment with NAEP[a]		
		Fully addressed	Partially addressed	Not addressed
Number properties and operations	20	2	15	3
Number sense	6	1	4	1
Estimation	3	1	2	0
Number operations	6	0	5	1
Ratios and proportional reasoning	1	0	1	0
Properties of numbers and operations	3	0	2	1
Mathematical reasoning using numbers	1	0	1	
Measurement	10	1	8	1
Measuring physical attributes	6	1	5	0
Systems of measurement	4	0	3	1
Geometry	15	1	8	6
Dimension and shape	4	1	2	1
Transformation of shapes and preservation of properties	4	0	3	1
Relationships between geometric figures	4	0	2	2
Position, direction, and coordinate geometry	2	0	1	1
Mathematical reasoning in geometry	1	0		1
Data analysis, statistics, and probability	9	2	4	3
Data representation	3	0	2	1
Characteristics of data sets	2	0	1	1
Probability	4	2	1	1
Algebra	11	1	6	4
Patterns, relations, and functions	5	1	2	2
Algebraic representations	2	0	2	0
Variables, expressions, and operations	2	0	1	1
Equations and inequalities	1	0	1	0
Mathematical reasoning in algebra	1	0	0	1
All content	65	7	41	17

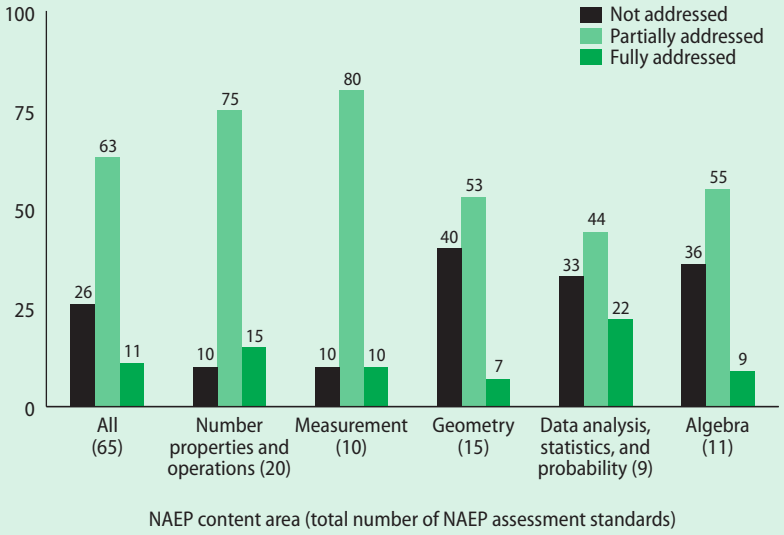
a. NAEP has 65 assessment standards at grade 4, and Texas has 35. Each Texas assessment standard may be mapped to more than one NAEP assessment standard.

Source: Expert content reviewers' summary analysis of data in appendix table A1.

Areas of full alignment. Seven (11 percent) of the NAEP grade 4 assessment standards are fully addressed by the TAKS assessment standards: 2 of 20 number properties and operations; 1 of 10 measurement; 1 of 15 geometry; 2 of 9 data analysis, statistics, and probability; and 1 of 11 algebra assessment standards. Of these 7 fully addressed NAEP grade 4 assessment standards,

FIGURE 1

Percentage of National Assessment of Educational Progress (NAEP) grade 4 assessment standards addressed by Texas Assessment of Knowledge and Skills assessment standards, by NAEP content area, January 2008



Source: Expert content reviewers' summary analysis of data in appendix table A1.

2 are addressed at a lower grade in the TAKS assessment standards.

Areas of partial alignment. Forty-one (63 percent) of the NAEP grade 4 assessment standards are partially addressed by TAKS assessment standards: 15 of 20 number properties and operations; 8 of 10 measurement; 8 of 15 geometry; 4 of 9 data analysis, statistics, and probability; and 6 of 11 algebra assessment standards. Of these 41 partially addressed NAEP grade 4 assessment standards, 3 are addressed at a lower grade and 5 at a higher grade in the TAKS assessment standards.

Areas of nonalignment. Seventeen (26 percent) NAEP assessment standards are not addressed by the TAKS assessment standards: 3 of 20 number properties and operations; 1 of 10 measurement; 6 of 15 geometry; 3 of 9 data analysis, statistics, and probability; and 4 of 11 algebra assessment standards.

Areas where Texas assessment standards go beyond the NAEP assessment standards. Texas has 35 assessment standards in the *TAKS Information Booklet for Mathematics Grade 4* (Texas Education Agency 2007c). The NAEP assessment standards do not address 7 of these TAKS assessment standards: 2 of patterns, relationships, and algebraic reasoning; 1 of geometry and spatial reasoning; 1 of measurement; 1 of probability and statistics; and 2 of mathematical processes and tools.

Content alignment at grade 8

The content reviewers compared the NAEP grade 8 assessment standards in the *Mathematics Framework for 2009 National Assessment of Educational Progress* (National Assessment Governing Board 2007) with the assessment standards in the *TAKS Information Booklet for Mathematics Grade 8* (Texas Education Agency 2007g). The NAEP provides 100 assessment standards for grade 8. The number of assessment standards per content area in each alignment rating category is shown in table 2.

Twenty-two of these assessment standards (22 percent) are fully addressed by the TAKS assessment standards, 59 (59 percent) are partially addressed, and 19 (19 percent) are not addressed (figure 2). (See appendix B for more detail on the alignment of the NAEP grade 8 assessment standards and the TAKS assessment standards and on the TAKS grade 8 assessment standards not covered by the NAEP grade 8 assessment standards, including details on assessment standards, ratings, codes, and whether a NAEP assessment standard is addressed at a higher or lower grade.)

Areas of full alignment. Twenty-two (22 percent) of the NAEP grade 8 assessment standards are fully addressed by the TAKS assessment standards: 5 of 27 number properties and operations; 7 of 12 measurement; 2 of 21 geometry; 6 of 22 data analysis, statistics, and probability;

TABLE 2

Number of National Assessment of Educational Progress (NAEP) grade 8 mathematics assessment standards and number of the Texas Assessment of Knowledge and Skills assessment standards by alignment with NAEP, by NAEP content area, January 2008

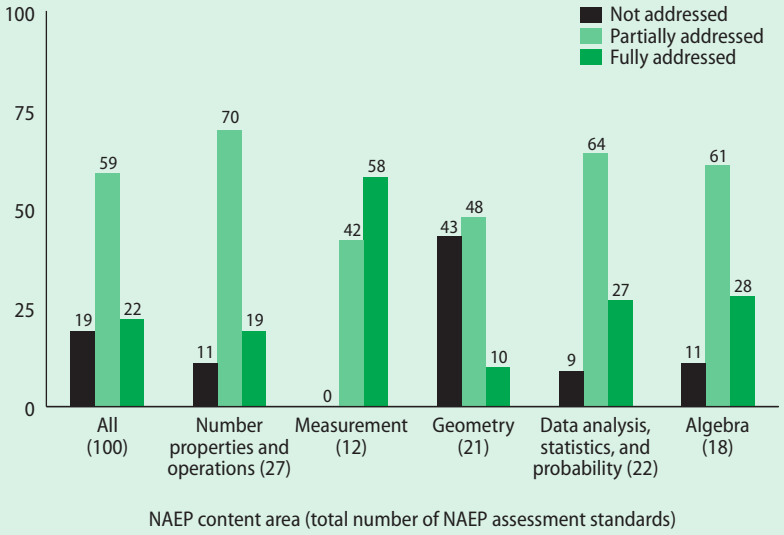
NAEP content area	Number of NAEP assessment standards	Number of Texas assessment standards by alignment with NAEP[a]		
		Fully addressed	Partially addressed	Not addressed
Number properties and operations	27	5	19	3
Number sense	8	1	6	1
Estimation	4		4	
Number operations	4	1	2	1
Ratios and proportional reasoning	4	1	3	
Properties of numbers and operations	5	2	2	1
Mathematical reasoning using numbers	2		2	
Measurement	12	7	5	0
Measuring physical attributes	6	2	4	0
Systems of measurement	5	5	0	0
Measurement in triangles	1		1	0
Geometry	21	2	10	9
Dimension and shape	6	1	4	1
Transformation of shapes and preservation of properties	5	0	2	3
Relationships between geometric figures	5	1	3	1
Position, direction, and coordinate geometry	4	0	1	3
Mathematical reasoning in geometry	1	0		1
Data analysis, statistics, and probability	22	6	14	2
Data representation	5	2	3	0
Characteristics of data sets	5	0	4	1
Experiments and samples	3	0	2	1
Probability	9	4	5	0
Algebra	18	2	11	5
Patterns, relations, and functions	5	0	3	2
Algebraic representations	5	1	3	1
Variables, expressions, and operations	2	0	2	
Equations and inequalities	5	0	3	2
Mathematical reasoning in algebra	1	1	0	0
All content	100	22	59	19

a. NAEP has 100 assessment standards at grade 8, and Texas has 38. Each Texas assessment standard may be mapped to more than one NAEP assessment standard.

Source: Expert content reviewers' summary analysis of data in appendix table B1.

FIGURE 2

Percentage of National Assessment of Educational Progress (NAEP) grade 8 assessment standards addressed by the Texas Assessment of Knowledge and Skills assessment standards by NAEP content area, January 2008



Source: Expert content reviewers' summary analysis of data in appendix table B1.

and 2 of 18 algebra assessment standards. Of these 22 fully addressed NAEP grade 8 assessment standards, 12 are addressed at a lower grade in the TAKS assessment standards.

Areas of partial alignment. Fifty-nine (59 percent) NAEP grade 8 mathematics assessment standards are partially addressed by the TAKS assessment standards: 19 of 27 number properties and operations; 5 of 12 measurement; 10 of 21 geometry; 14 of 22 data analysis, statistics, and probability; and 11 of 18 algebra assessment standards. Of these 59 partially addressed NAEP grade 8 assessment standards, 9 are addressed at a lower grade and 3 at a higher grade in the TAKS assessment standards.

Areas of nonalignment. Nineteen (19 percent) NAEP grade 8 mathematics assessment standards are not addressed in the TAKS assessment standards: 3 of 27 number properties and operations; 9 of 21 geometry; 2 of 22 data analysis, statistics, and probability; and 5 of 18 algebra assessment standards.

Areas where Texas assessment standards go beyond the NAEP assessment standards. Texas has 38 assessment standards in the *TAKS Information Booklet for Mathematics Grade 8* (Texas Education Agency 2007g). The NAEP assessment standards do not address 6 of these TAKS assessment standards: 1 of patterns, relationships, and algebraic reasoning and 5 of mathematical processes and tools.

Content alignment at grade 12

The content reviewers compared the NAEP grade 12 assessment standards in the *Mathematics Framework for 2009 National Assessment of Educational Progress* (National Assessment Governing Board 2007) with the assessment standards in the *TAKS Information Booklet for Mathematics Exit Level* (Texas Education Agency 2007a). The NAEP provides 130 assessment standards for grade 12. The number of assessment standards per content area in each alignment rating category is shown in table 3.

Thirty-six of these assessment standards (28 percent) are fully addressed by the TAKS assessment standards, 56 (43 percent) are partially addressed, and 38 (29 percent) are not addressed (figure 3). (See appendix C for more detail on the alignment of the NAEP grade 12 assessment standards and the TAKS assessment standards and on the TAKS exit level assessment standards not covered by the NAEP grade 12 assessment standards, including details on assessment standards, ratings, codes, and whether a NAEP assessment standard is addressed at a lower grade.)

Areas of full alignment. Thirty-six (28 percent) of the NAEP grade 12 assessment standards are fully addressed by TAKS assessment standards: 6 of 20 number properties and operations; 9 of 18 measurement; 11 of 30 geometry; 5 of 32 data analysis, statistics, and probability; and

TABLE 3

Number of National Assessment of Educational Progress (NAEP) grade 12 assessment standards and number of Texas Assessment of Knowledge and Skills assessment standards by alignment with NAEP, by NAEP content area, January 2008

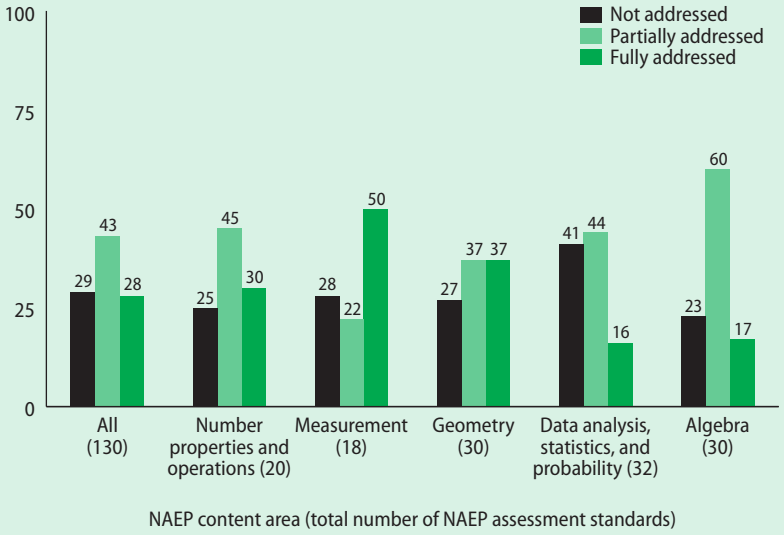
NAEP content area	Number of NAEP assessment standards	Number of Texas assessment standards by alignment with NAEP[a]		
		Fully addressed	Partially addressed	Not addressed
Number properties and operations	20	6	9	5
Number sense	4	1	2	1
Estimation	3	1	2	0
Number operations	5	0	3	2
Ratios and proportional reasoning	2	2	0	0
Properties of numbers and operations	4	1	1	2
Mathematical reasoning using numbers	2	1	1	0
Measurement	18	9	4	5
Measuring physical attributes	6	5	1	
Systems of measurement	5	1	3	1
Measurement in triangles	7	3		4
Geometry	30	11	11	8
Dimension and shape	4	3	1	0
Transformation of shapes and preservation of properties	6	1	4	1
Relationships between geometric figures	7	3	4	0
Position, direction, and coordinate geometry	8	2		6
Mathematical reasoning in geometry	5	2	2	1
Data analysis, statistics, and probability	32	5	14	13
Data representation	6	0	6	0
Characteristics of data sets	7	0	2	5
Experiments and samples	5	1	2	2
Probability	9	3	1	5
Mathematical reasoning with data	5	1	3	1
Algebra	30	5	18	7
Patterns, relations, and functions	7	1	5	1
Algebraic representations	7	1	4	2
Variables, expressions, and operations	7	1	5	1
Equations and inequalities	6	1	3	2
Mathematical reasoning in algebra	3	1	1	1
All content	130	36	56	38

a. NAEP has 130 assessment standards at grade 12, and Texas has 67. Each Texas assessment standard may be mapped to more than one NAEP assessment standard.

Source: Expert content reviewers' summary analysis of data in appendix table C1.

FIGURE 3

Percentage of National Assessment of Educational Progress (NAEP) grade 12 assessment standards addressed by Texas Assessment of Knowledge and Skills assessment standards, by NAEP content area, January 2008



Source: Expert content reviewers' summary analysis of data in appendix table C1.

5 of 30 algebra assessment standards. Of these 36 fully addressed NAEP grade 12 assessment standards, 5 are addressed at a lower grade in the TAKS assessment standards.

Areas of partial alignment. Fifty-six (43 percent) of the NAEP grade 12 mathematics assessment standards are partially addressed by the TAKS assessment standards: 9 of 20 number properties and operations; 4 of 18 measurement; 11 of 30 geometry; 14 of 32 data analysis, statistics, and probability; and 18 of 30 algebra assessment standards. Of these 56 partially addressed NAEP grade 12 assessment standards, 9 are addressed at a lower grade in the TAKS assessment standards.

Areas of nonalignment. Thirty-eight (29 percent) NAEP grade 12 mathematics assessment standards are not addressed by the Texas assessment standards: 5 of 20 number properties and operations; 5 of 18 measurement; 8 of 30 geometry; 13 of 32 data analysis, statistics, and probability; and 7 of 30 algebra assessment standards.

Areas where Texas assessment standards go beyond the NAEP assessment standards. Texas has 67 assessment standards in the *TAKS Information Booklet for Mathematics Exit Level* (Texas Education Agency 2007a). The NAEP assessment standards do not address 15 of these TAKS assessment standards: 1 of functional relationships, 1 of properties and attributes of functions, 5 of linear functions, 2 of linear equations and inequalities, 3 of geometric relationships and spatial reasoning, 1 of measurement, and 2 of mathematical processes and tools.

Limitations

The study analyzed the alignment of the TAKS mathematics assessment standards and the 2009 NAEP mathematics assessment standards. It did not analyze individual items or the alignment of state standards with the TAKS assessment items. This study was not designed to make specific recommendations about whether a state should close gaps in alignment to the NAEP—a decision for state policymakers. Revising assessments requires substantial time and resources, so policymakers considering such revisions must weigh the costs of such changes and the benefits they believe the changes will bring to students.

Notes

1. In discussing TAKS, the term *assessment standard* refers to the TAKS objectives and student expectations outlined in the series, *Texas Assessment of Knowledge and Skills Information Booklet Mathematics* (Texas Education Agency 2007a-i).
2. In discussing NAEP, the term *assessment standard* refers to the content objectives outlined in the *Mathematics Framework for 2009, Pre-publication Edition* (National Assessment Governing Board 2007).

Appendix A
Details on the alignment of the National Assessment of Educational Progress grade 4 assessment standards and the Texas Assessment of Knowledge and Skills assessment standards

TABLE A1

Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 4 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Number properties and operations				
4N.1 Number sense				
4N.1(a) Identify the place value and actual value of digits in whole numbers.	4.1 (A) use place value to read, write, compare, and order whole numbers through 999,999,999	3		
4N.1(b) Represent numbers using models such as base 10 representations, number lines, and two-dimensional models.	4.10 (A) locate and name points on a number line using whole numbers, fractions such as halves and fourths, and decimals such as tenths	2	IC	Texas does not include base-10 and two-dimensional models
4N.1(c) Compose or decompose whole quantities by place value (e.g., write whole numbers in expanded notation using place value: 342 = 300 + 40 + 2).		1		
4N.1(d) Write or rename whole numbers (e.g., 10: 5 + 5, 12—2, 2 x 5).	4.4 (B) represent multiplication and division situations in picture, word, and number form	2	IC	Texas refers only to multiplication and division
4N.1(e) Connect model, number word, or number using various models and representations for whole numbers, fractions, and decimals.	4.2 (A) use [concrete objects and] pictorial models to generate equivalent fractions 4.2 (B) model fraction quantities greater than one using [concrete objects and] pictorial models	2	IC	Texas discusses only fractions
4N.1(i) Order or compare whole numbers, decimals, or fractions.	4.2 (C) compare and order fractions using [concrete objects and] pictorial models 4.1 (A) use place value to read, write, compare, and order whole numbers through 999,999,999 4.1 (B) use place value to read, write, compare, and order decimals involving tenths and hundredths, including money, using [concrete objects and] pictorial models	2	IC	
4N.2 Estimation				
4N.2(a) Use benchmarks (well-known numbers used as meaningful points for comparison) for whole numbers, decimals, or fractions in contexts (e.g., ½ and .5 may be used as benchmarks for fractions and decimals between 0 and 1.00).	4.2 (D) relate decimals to fractions that name tenths and hundredths using [concrete objects and] pictorial models	2	IC	

(CONTINUED)

TABLE A1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 4 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Number properties and operations				
4N.2 Estimation				
4N.2(b) Make estimates appropriate to a given situation with whole numbers, fractions, or decimals by: • knowing when to estimate, • selecting the appropriate type of estimate, including overestimate, underestimate, and range of estimate, or • selecting the appropriate method of estimation (e.g., rounding).	4.5 (A) round whole numbers to the nearest ten, hundred, or thousand to approximate reasonable results in problem situations 4.5 (B) use strategies including rounding and compatible numbers to estimate solutions to multiplication and division problems	2	IC	
4N.2(c) Verify solutions or determine the reasonableness of results in meaningful contexts.	4.14 (B) solve problems that incorporate understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness	3		
4N.3 Number operations				
4N.3(a) Add and subtract: • whole numbers, or • fractions with like denominators, or • decimals through hundredths.	4.3 (A) use addition and subtraction to solve problems involving whole numbers 4.3 (B) add and subtract decimals to the hundredths place using [concrete objects and] pictorial models	2	IC	Texas does not address fractions
4N.3(b) Multiply whole numbers: • no larger than two-digit by two-digit with paper and pencil computation, or • larger numbers with use of calculator.	4.4 (C) recall and apply multiplication facts through 12 x 12 4.4 (A) model factors and products using arrays and area models 4.4 (D) use multiplication to solve problems (no more than two digits times two digits without technology	2	IC	Texas does not include using a calculator
4N.3(c) Divide whole numbers: • up to three-digits by one-digit with paper and pencil computation, or • up to five-digits by two-digits with use of calculator.	4.4 (E) use division to solve problems (no more than one-digit divisors and three-digit dividends without technology)	2	IC	Texas does not include using a calculator
4N.3(d) Describe the effect of operations on size (whole numbers).		1		
4N.3(e) Interpret whole number operations and the relationships between them.	4.1 (A) use place value to read, write, compare, and order whole numbers through 999,999,999 4.3 (A) use addition and subtraction to solve problems involving whole numbers	2	IC	
4N.3(f) Solve application problems involving numbers and operations.	4.14 (B) solve problems that incorporate understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness	2	IC	

(CONTINUED)

TABLE A1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 4 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Number properties and operations				
4N.4 Ratios and proportional reasoning				
4N.4(a) Use simple ratios to describe problem situations.	6.3 (A) use ratios to describe proportional situations	2	HG IC	It is assumed that "problem situations" in NAEP is the same as "proportional problems" in Texas
4N.5 Properties of numbers and operations				
4N.5(a) Identify odd and even numbers.		1		
4N.5(b) Identify factors of whole numbers.	4.4 (A) model factors and products using arrays and area models	2	IC	
4N.5(e) Apply basic properties of operations.	4.14 (C) select or develop an appropriate problem-solving plan or strategy, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem	2	IC	
4N.6 Mathematical reasoning using numbers				
4N.6(a) Explain or justify a mathematical concept or relationship (e.g., explain why 15 is an odd number or why 7—3 is not the same as 3—7).	4.14 (B) solve problems that incorporate understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness	2	IC	
Measurement				
4M.1 Measuring physical attributes				
4M.1(a) Identify the attribute that is appropriate to measure in a given situation.	4.11 (A) estimate and use measurement tools to determine length (including perimeter), area, capacity and weight/mass using standard units SI (metric) and customary	2	IC	
4M.1(b) Compare objects with respect to a given attribute, such as length, area, volume, time, or temperature.	4.12 (A) use a thermometer to measure temperature and changes in temperature	2	IC	NAEP "compares" and Texas "uses"; Texas refers only to temperature
4M.1(c) Estimate the size of an object with respect to a given measurement attribute (e.g., length, perimeter, or area using a grid).	4.11 (A) estimate and use measurement tools to determine length (including perimeter), area, capacity and weight/mass using standard units SI (metric) and customary	3		
4M.1(e) Select or use appropriate measurement instruments such as ruler, meter stick, clock, thermometer, or other scaled instruments.	4.11 (A) estimate and use measurement tools to determine length (including perimeter), area, capacity and weight/mass using standard units SI (metric) and customary	2	MC	

(CONTINUED)

TABLE A1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 4 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Measurement				
4M.1 Measuring physical attributes				
4M.1(f) Solve problems involving perimeter of plane figures.	3.11 (B) use standard units to find the perimeter of a shape	2	LG IC	
4M.1(g) Solve problems involving area of squares and rectangles.	3.11 (C) use [concrete and] pictorial models of square units to determine the area of two-dimensional surfaces	2	LG IC	
4M.2 Systems of measurement				
4M.2(a) Select or use appropriate type of unit for the attribute being measured such as length, time, or temperature.	4.12 (A) use a thermometer to measure temperature and changes in temperature 4.11 (A) estimate and use measurement tools to determine length (including perimeter), area, capacity and weight/mass using standard units SI (metric) and customary	2	IC	Texas does not address time
4M.2(b) Solve problems involving conversions within the same measurement system such as conversions involving inches and feet or hours and minutes.	4.11 (B) perform simple conversions between different units of length, between different units of capacity, and between different units of weight within the customary measurement system	2	IC	Texas does not address time
4M.2(d) Determine appropriate size of unit of measurement in problem situation involving such attributes as length, time, capacity, or weight.	4.11 (A) estimate and use measurement tools to determine length (including perimeter), area, capacity and weight/mass using standard units SI (metric) and customary	2	IC	Texas does not address time
4M.2(e) Determine situations in which a highly accurate measurement is important.		1		
Geometry				
4G.1 Dimension and shape				
4G.1(a) Explore properties of paths between points.	4.10 (A) locate and name points on a number line using whole numbers, fractions such as halves and fourths, and decimals such as tenths	2	IC	
4G.1(b) Identify or describe (informally) real-world objects using simple plane figures (e.g., triangles, rectangles, squares, and circles) and simple solid figures (e.g., cubes, spheres, and cylinders).		1		
4G.1(c) Identify or draw angles and other geometric figures in the plane.	4.8 (A) identify and describe right, acute, and obtuse angles	2	IC	Texas refers only to angles
4G.1(f) Describe attributes of two- and three-dimensional shapes.	4.8 (C) use essential attributes to define two- and three-dimensional geometric figures	3		

(CONTINUED)

TABLE A1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 4 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Geometry				
4G.2 Transformation of shapes and preservation of properties				
4G.2(a) Identify whether a figure is symmetrical, or draw lines of symmetry.	4.9 (C) use reflections to verify that a shape has symmetry	2	IC	
4G.2(c) Identify the images resulting from flips (reflections), slides (translations), or turns (rotations).	4.9 (B) use translations, reflections, and rotations to verify that two shapes are congruent	2	IC	
4G.2(d) Recognize which attributes (such as shape and area) change or don't change when plane figures are cut up or rearranged.		1		
4G.2(e) Match or draw congruent figures in a given collection.	4.9 (B) use translations, reflections, and rotations to verify that two shapes are congruent	2	IC	
4G.3 Relationships between geometric figures				
4G.3(a) Analyze or describe patterns of geometric figures by increasing number of sides, changing size or orientation (e.g., polygons with more and more sides).	3.8 (A) identify, classify, and describe two- and three-dimensional geometric figures by their attributes. The student compares two-dimensional figures, three-dimensional figures, or both by their attributes using formal geometry vocabulary	2	LG MC	
4G.3(b) Assemble simple plane shapes to construct a given shape.		1		
4G.3(c) Recognize two-dimensional faces of three-dimensional shapes.	4.8 (C) use essential attributes to define two- and three-dimensional geometric figures	2	IC	
4G.3(f) Describe and compare properties of simple and compound figures composed of triangles, squares, and rectangles.		1		
4G.4 Position, direction, and coordinate geometry				
4G.4(a) Describe relative positions of points and lines using the geometric ideas of parallelism or perpendicularity.		1		
4G.4(d) Construct geometric figures with vertices at points on a coordinate grid.	5.9 (A) locate and name points on a coordinate grid using ordered pairs of whole numbers.	2	HG IC	
4G.5 Mathematical reasoning in geometry				
4G.5(a) Distinguish which objects in a collection satisfy a given geometric definition and explain choices.		1		

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TABLE A1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 4 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Data analysis, statistics, and probability				
4P.1 Data representation				
The following representations of data are indicated for each grade level. Objectives in which only a subset of these representations is applicable are indicated in the parentheses associated with the objective: pictographs, bar graphs, circle graphs, line graphs, line plots, tables, and tallies.				
4P.1(a) Read or interpret a single set of data.	4.13 (A) use [concrete objects or] pictures to make generalizations about determining all possible combinations of a given set of data or of objects in a problem situation	2	IC	
4P.1(b) For a given set of data, complete a graph (limits of time make it difficult to construct graphs completely).	5.13 (C) graph a given set of data using an appropriate graphical representation such as a picture or line graph	2	HG	
4P.1(c) Solve problems by estimating and computing within a single set of data.		1		
4P.2 Characteristics of data sets				
4P.2(b) Given a set of data or a graph, describe the distribution of the data using median, range, or mode.	5.13 (B) describe characteristics of data presented in tables and graphs including median, mode, and range	2	HG	
4P.2(d) Compare two sets of related data.		1		
4P.4 Probability				
4P.4(a) Use informal probabilistic thinking to describe chance events (i.e., likely and unlikely, certain and impossible).	3.13 (C) use data to describe events as more likely than, less likely than, or equally likely as	3	LG	
4P.4(b) Determine a simple probability from a context that includes a picture.	4.13 (A) use [concrete objects or] pictures to make generalizations about determining all possible combinations of a given set of data or of objects in a problem situation	3		
4P.4(e) List all possible outcomes of a given situation or event.	4.13 (A) use [concrete objects or] pictures to make generalizations about determining all possible combinations of a given set of data or of objects in a problem situation	2	IC	
4P.4(g) Represent the probability of a given outcome using a picture or other graphic.		1		
Algebra				
4A.1 Patterns, relations, and functions				
4A.1(a) Recognize, describe, or extend numerical patterns.	3.7 (B) identify and describe patterns in a table of related number pairs based on a meaningful problem and extend the table	3	LG	
4A.1(b) Given a pattern or sequence, construct or explain a rule that can generate the terms of the pattern or sequence.	4.7 (A) describe the relationship between two sets of related data such as ordered pairs in a table	2	IC	

(CONTINUED)

TABLE A1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 4 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Algebra				
4A.1 Patterns, relations, and functions				
4A.1(c) Given a description, extend or find a missing term in a pattern or sequence.	3.6(A) identify and extend whole-number and geometric patterns to make predictions and solve problems	2	LC IC	
4A.1(d) Create a different representation of a pattern or sequence given a verbal description.		1		
4A.1(e) Recognize or describe a relationship in which quantities change proportionally.		1		
4A.2 Algebraic representations				
4A.2(a) Translate between the different forms of representations (symbolic, numerical, verbal, or pictorial) of whole number relationships (such as from a written description to an equation or from a function table to a written description).	4.15 (B) relate informal language to mathematical language and symbols	2	IC	
4A.2(c) Graph or interpret points with whole number or letter coordinates on grids or in the first quadrant of the coordinate plane.	4.7 (A) describe the relationship between two sets of related data such as ordered pairs in a table.	2	IC	Texas does not specify grids or the coordinate plane
4A.3 Variables, expressions, and operations				
4A.3(a) Use letters and symbols to represent an unknown quantity in a simple mathematical expression.		1		
4A.3(b) Express simple mathematical relationships using number sentences.	4.15 (B) relate informal language to mathematical language and symbols	2	IC	
4A.4 Equations and inequalities				
4A.4(a) Find the value of the unknown in a whole number sentence.	5.6 (A) select from and use diagrams and equations such as $y = 5 + 3$ to represent meaningful problem situations	2	HG MC	
4A.5 Mathematical reasoning in algebra				
4A.5(a) Verify a conclusion using algebraic properties.		1		

a. Rating is based on a scale of 1 to 3, where 1 indicates that the TAKS assessment standard or standards do not address the NAEP assessment standard, 2 that the TAKS assessment standard or standards partially address the NAEP assessment standard, and 3 that the TAKS assessment standard or standards fully address or exceed the NAEP assessment standard at the targeted grade level. A NAEP assessment standard is considered to be *fully addressed* by the TAKS assessment standard or standards if all of the content of the NAEP assessment standard is contained in one or more TAKS standards at the same or lower grade level. A NAEP standard is considered to be *partially addressed* by the TAKS assessment standard or standards if the TAKS assessment standard or standards address only part of the NAEP assessment standard; the NAEP assessment standard contains more content or more detailed content than the TAKS assessment standard or standards, or the TAKS assessment standard or standards imply but do not explicitly state the content found in the NAEP assessment standard; there is a matching TAKS assessment standard at a higher grade level than the NAEP assessment standard; or there is a matching TAKS assessment standard or standards at a lower grade level than the NAEP assessment standard but it does not address all the content addressed by NAEP assessment standard.

b. Codes: IC = implied content, LG = content covered at a lower grade level, HG = content covered at a higher grade level, MC = more content, MD = more detailed content.

Source: Expert content reviewers' analysis based on data from National Assessment Governing Board (2007) and Texas Education Agency (2007b,c,d,e).

TABLE A2

Texas Assessment of Knowledge and Skills (TAKS) grade 4 assessment standards not covered by the National Assessment of Educational Progress (NAEP) grade 4 assessment standards, January 2008

TAKS objective	TAKS grade 4 assessment standard not covered by NAEP
Patterns, relationships, and algebraic reasoning	4.6 (A)—Use patterns and relationships to develop strategies to remember basic multiplication and division facts (such as the patterns in related multiplication and division number sentences [fact families] such as 9 x 9 = 81 and 81 ÷ 9 = 9)
	4.6 (B)—Use patterns to multiply by 10 and 100
Geometry and spatial reasoning	4.8 (B)—Identify and describe parallel and intersecting (including perpendicular) lines using [concrete objects and] pictorial models
Measurement	4.11 (C)—Use [concrete] models of standard cubic units to measure volume
Probability and statistics	4.13 (B)—Interpret bar graphs
Mathematical processes and tools	4.14 (A)—Identify the mathematics in everyday situations
	4.16 (A)—Make generalizations from patterns or sets of examples and nonexamples

Source: Expert content reviewers' analysis based on data from National Assessment Governing Board (2007) and Texas Education Agency (2007c).

Appendix B
Details on the alignment of the National Assessment of Educational Progress grade 8 assessment standards and the Texas Assessment of Knowledge and Skills assessment standards

TABLE B1

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Number properties and operations				
8N.1 Number sense				
8N.1(a) Use place value to model and describe integers and decimals.	8.1 (A) compare and order rational numbers in various forms including integers, percents, and positive and negative fractions and decimals	2	IC	
8N.1(b) Model or describe rational numbers or numerical relationships using number lines and diagrams.	8.1 (A) compare and order rational numbers in various forms including integers, percents, and positive and negative fractions and decimals	2	IC	Diagrams not included in Texas standards
8N.1(d) Write or rename rational numbers.	8.1 (A) compare and order rational numbers in various forms including integers, percents, and positive and negative fractions and decimals 7.1 (B) convert between fractions, decimals, whole numbers, and percents mentally, on paper, [or with a calculator]	2	LG IC	
8N.1(e) Recognize, translate between, or apply multiple representations of rational numbers (fractions, decimals, and percents) in meaningful contexts.	8.1 (A) compare and order rational numbers in various forms including integers, percents, and positive and negative fractions and decimals 8.2 (A) select appropriate operations to solve problems involving rational numbers and justify the selections	2	IC	
8N.1(f) Express or interpret numbers using scientific notation from real-life contexts.	8.1 (D) express numbers in scientific notation, including negative exponents, in appropriate problem situations	2	IC	
8N.1(g) Find or model absolute value or apply to problem situations.		1		No mention of absolute value in grade 8 Texas standards
8N.1(h) Order or compare rational numbers (fractions, decimals, percents, or integers) using various models and representations (e.g., number line).	8.1 (A) compare and order rational numbers in various forms including integers, percents, and positive and negative fractions and decimals	2	IC	NAEP specifies using various models and representations
8N.1(i) Order or compare rational numbers including very large and small integers, and decimals and fractions close to zero.	8.1 (A) compare and order rational numbers in various forms including integers, percents, and positive and negative fractions and decimals	3		

(CONTINUED)

TABLE B1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Number properties and operations				
8N.2 Estimation				
8N.2(a) Establish or apply benchmarks for rational numbers and common irrational numbers (e.g., π) in contexts.	8.1 (B) select and use appropriate forms of rational numbers to solve real-life problems including those involving proportional relationships 8.2 (B) use appropriate operations to solve problems involving rational numbers in problem situations 8.1 (C) approximate (mentally [and with calculators]) the value of irrational numbers as they arise from problem situations (such as π, √2)	2	IC	
8N.2(b) Make estimates appropriate to a given situation by: • identifying when estimation is appropriate, • determining the level of accuracy needed, • selecting the appropriate method of estimation, or • analyzing the effect of an estimation method on the accuracy of results.	8.2 (C) evaluate a solution for reasonableness 8.3 (B) estimate and find solutions to application problems involving percents and other proportional relationships such as similarity and rates	2	IC	
8N.2(c) Verify solutions or determine the reasonableness of results in a variety of situations including calculator and computer results.	8.2 (C) evaluate a solution for reasonableness	2	IC	It is unclear whether the Texas skill would include using a calculator or computer
8N.2(d) Estimate square or cube roots of numbers less than 1,000 between two whole numbers.	8.1 (C) approximate (mentally [and with calculators]) the value of irrational numbers as they arise from problem situations (such as π, √2)	2	IC	Cube roots not specifically mentioned
8N.3 Number operations				
8N.3(a) Perform computations with rational numbers.	8.2 (A) select appropriate operations to solve problems involving rational numbers and justify the selections 8.2 (B) use appropriate operations to solve problems involving rational numbers in problem situations	3		

(CONTINUED)

TABLE B1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Number properties and operations				
8N.3 Number operations				
8N.3(d) Describe the effect of multiplying and dividing by numbers including the effect of multiplying or dividing a rational number by: • zero, or • a number less than zero, or • a number between zero and one, • one, or • a number greater than one.		1		NAEP is very specific related to the "effect" of multiplying and dividing
8N.3(e) Interpret rational number operations and the relationships between them.	8.2 (B) use appropriate operations to solve problems involving rational numbers in problem situations	2	IC	No "interpret" in Texas standards
8N.3(f) Solve application problems involving rational numbers and operations using exact answers or estimates as appropriate.	8.2 (A) select appropriate operations to solve problems involving rational numbers and justify the selections 8.2 (B) use appropriate operations to solve problems involving rational numbers in problem situations 8.2 (C) evaluate a solution for reasonableness	2	IC	
8N.4 Ratios and proportional reasoning				
8N.4(a) Use ratios to describe problem situations.	6.3 (A) use ratios to describe proportional situations	3	LG	
8N.4(b) Use fractions to represent and express ratios and proportions.	8.1 (B) select and use appropriate forms of rational numbers to solve real-life problems including those involving proportional relationships	2	IC	
8N.4(c) Use proportional reasoning to model and solve problems (including rates and scaling).	8.2 (D) use multiplication by a constant factor (unit rate) to represent proportional relationships 8.3 (B) estimate and find solutions to application problems involving percents and other proportional relationships such as similarity and rates	2	IC	No "scaling" in Texas
8N.4(d) Solve problems involving percentages (including percent increase and decrease, interest rates, tax, discount, tips, or part/whole relationships).	8.3 (B) estimate and find solutions to application problems involving percents and other proportional relationships such as similarity and rates	2	IC	
8N.5 Properties of numbers and operations				
8N.5(a) Describe odd and even integers and how they behave under different operations.		1		No mention of "odd" or "even" integer behavior in Texas

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TABLE B1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Number properties and operations				
8N.5 Properties of numbers and operations				
8N.5(b) Recognize, find, or use factors, multiples, or prime factorization.	6.1 (D) write prime factorizations using exponents 6.1 (E) identify factors of a positive integer, common factors, and the greatest common factor of a set of positive integers 6.1 (F) identify multiples of a positive integer and common multiples and the least common multiple of a set of positive integers	3	LG	
8N.5(c) Recognize or use prime and composite numbers to solve problems.	6.1 (D) write prime factorizations using exponents 5.5 (B) identify prime and composite numbers using [concrete objects] pictorial models, and patterns in factor pairs	2	LG MC	Texas standards do not include solving problems
8N.5(d) Use divisibility or remainders in problem settings.	5.3 (C) use division to solve problems involving whole numbers (no more than two-digit divisors and three-digit dividends without technology), including interpreting the remainder within a given context	3	LG	
8N.5(e) Apply basic properties of operations.	8.2 (B) use appropriate operations to solve problems involving rational numbers in problem situations	2	IC	NAEP is very broad and Texas is more specific
8N.6 Mathematical reasoning using numbers				
8N.6(a) Explain or justify a mathematical concept or relationship (e.g., explain why 17 is prime).	8.16 (B) validate his/her conclusions using mathematical properties and relationships	2	IC	
8N.6(b) Provide a mathematical argument to explain operations with two or more fractions.	8.16 (B) validate his/her conclusions using mathematical properties and relationships 7.2 (A) represent multiplication and division situations involving fractions and decimals with models, including [concrete objects,] pictures, words, and numbers	2	LG IC	
8M.1(b) Compare objects with respect to length, area, volume, angle measurement, weight, or mass.	8.9 (B) use proportional relationships in similar two-dimensional figures or similar three-dimensional figures to find missing measurements 8.10 (A) describe the resulting effects on perimeter and area when dimensions of a shape are changed proportionally 8.10 (B) describe the resulting effect on volume when dimensions of a solid are changed proportionally	2	IC	

(CONTINUED)

TABLE B1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Measurement				
8M.1 Measuring physical attributes				
8M.1(c) Estimate the size of an object with respect to a given measurement attribute (e.g., area).	8.8 (C) estimate measurements and use formulas to solve application problems involving lateral and total surface area and volume	2	IC	
8M.1(e) Select or use appropriate measurement instrument to determine or create a given length, area, volume, angle, weight, or mass.	6.8 (B) select and use appropriate units, tools, or formulas to measure and to solve problems involving length (including perimeter), area, time, temperature, volume, and weight	3	LG	
8M.1(f) Solve mathematical or real-world problems involving perimeter or area of plane figures such as composite figures.	7.9 (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes	3	LG	
8M.1(h) Solve problems involving volume or surface area of rectangular solids, cylinders, prisms, or composite shapes.	8.8 (A) find lateral and total surface area of prisms, pyramids, and cylinders using [concrete] models and nets (two-dimensional models) 8.8 (C) estimate measurements and use formulas to solve application problems involving lateral and total surface area and volume	2	IC	Texas standards do not include composite shapes
8M.1(i) Solve problems involving rates such as speed or population density.	8.3 (B) estimate and find solutions to application problems involving percents and other proportional relationships such as similarity and rates	2	IC	
8M.2 Systems of measurement				
8M.2(a) Select or use appropriate type of unit for the attribute being measured such as length, area, angle, time, or volume.	6.8 (B) select and use appropriate units, tools, or formulas to measure and to solve problems involving length (including perimeter), area, time, temperature, volume, and weight	3	LG	
8M.2(b) Solve problems involving conversions within the same measurement system such as conversions involving square inches and square feet.	6.8 (D) convert measures within the same measurement system (customary and metric) based on relationships between units	3	LG	

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TABLE B1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Measurement				
8M.2 Systems of measurement				
8M.2(c) Estimate the measure of an object in one system given the measure of that object in another system and the approximate conversion factor. For example: • Distance conversion: 1 kilometer is approximately ½ of a mile. • Money conversion: U.S. dollar is approximately 1.5 Canadian dollars. • Temperature conversion: Fahrenheit to Celsius.	7.9 (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes	3	LG	NAEP converts between measurement systems, while Texas does not
8M.2(d) Determine appropriate size of unit of measurement in problem situation involving such attributes as length, area, or volume.	7.9 (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes 7.9 (C) estimate measurements and solve application problems involving volume of prisms (rectangular and triangular) and cylinders	3	LG	
8M.2(e) Determine appropriate accuracy of measurement in problem situations (e.g., the accuracy of each of several lengths needed to obtain a specified accuracy of a total length) and find the measure to that degree of accuracy.	7.9 (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes	3	LG	
8M.3 Measurement in triangles				
8M.3(a) Solve problems involving indirect measurement such as finding the height of a building by comparing its shadow with the height and shadow of a known object.	8.9 (B) use proportional relationships in similar two-dimensional figures or similar three-dimensional figures to find missing measurements	2	IC	
Geometry				
8G.1 Dimension and shape				
8G.1(a) Draw or describe a path of shortest length between points to solve problems in context.	8.7 (C) use pictures or models to demonstrate the Pythagorean Theorem	2	IC	Texas standards are specific to the Pythagorean Theorem
8G.1(b) Identify a geometric object given a written description of its properties.	7.6 (C) use properties to classify three-dimensional figures, including pyramids, cones, prisms, and cylinders	3	LG	
8G.1(c) Identify, define, or describe geometric shapes in the plane and in three-dimensional space given a visual representation.	7.6 (C) use properties to classify three-dimensional figures, including pyramids, cones, prisms, and cylinders	2	LG IC	

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TABLE B1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Geometry				
8G.1 Dimension and shape				
8G.1(d) Draw or sketch from a written description polygons, circles, or semicircles.		1		
8G.1(e) Represent or describe a three-dimensional situation in a two-dimensional drawing from different views.	8.7 (A) draw three-dimensional figures from different perspectives 7.8 (A) sketch three-dimensional figures when given the top, side, and front views 7.8 (B) make a net (two-dimensional model) of the surface area of a three-dimensional figure	2	LG IC	
8G.1(f) Demonstrate an understanding about the two- and three-dimensional shapes in our world through identifying, drawing, modeling, building, or taking apart.	8.7 (A) draw three-dimensional figures from different perspectives 8.7 (B) use geometric concepts and properties to solve problems in fields such as art and architecture	2	IC	Texas refers only to drawing 3-D figures
8G.2 Transformation of shapes and preservation of properties				
8G.2(a) Identify lines of symmetry in plane figures or recognize and classify types of symmetries of plane figures.		1		
8G.2(c) Recognize or informally describe the effect of a transformation on two-dimensional geometric shapes (reflections across lines of symmetry, rotations, translations, magnifications, and contractions).	8.6 (A) generate similar figures using dilations including enlargements and reductions 8.6 (B) graph dilations, reflections, and translations on a coordinate plane	2	IC	Texas does not refer to rotations
8G.2(d) Predict results of combining, subdividing, and changing shapes of plane figures and solids (e.g., paper folding, tiling, and cutting up and rearranging pieces).		1		
8G.2(e) Justify relationships of congruence and similarity, and apply these relationships using scaling and proportional reasoning.		1		
8G.2(f) For similar figures, identify and use the relationships of conservation of angle and of proportionality of side length and perimeter.	8.9 (B) use proportional relationships in similar two-dimensional figures or similar three-dimensional figures to find missing measurements	2	IC	
8G.3(b) Apply geometric properties and relationships in solving simple problems in two and three dimensions.	8.7 (B) use geometric concepts and properties to solve problems in fields such as art and architecture 8.9 (B) use proportional relationships in similar two-dimensional figures or similar three-dimensional figures to find missing measurements	2	IC	

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TABLE B1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Geometry				
8G.3 Relationships between geometric figures				
8G.3(c) Represent problem situations with simple geometric models to solve mathematical or real-world problems.	8.7 (B) use geometric concepts and properties to solve problems in fields such as art and architecture 8.9 (B) use proportional relationships in similar two-dimensional figures or similar three-dimensional figures to find missing measurements	2	IC	It is unclear whether the Texas skill would include using "geometric models"
8G.3(d) Use the Pythagorean theorem to solve problems.	8.7 (C) use pictures or models to demonstrate the Pythagorean Theorem 8.9 (A) use the Pythagorean Theorem to solve real-life problems	3		
8G.3(f) Describe or analyze simple properties of, or relationships between, triangles, quadrilaterals, and other polygonal plane figures.	7.6 (B) use properties to classify triangles and quadrilaterals 7.6 (C) use properties to classify three-dimensional figures, including pyramids, cones, prisms, and cylinders	2	LG IC	Texas is "classifying" while NAEP is "analyzing"
8G.3(g) Describe or analyze properties and relationships of parallel or intersecting lines.		1		No parallel or perpendicular lines mentioned in Texas grades 6–8 standards
8G.4 Position, direction, and coordinate geometry				
8G.4(a) Describe relative positions of points and lines using the geometric ideas of midpoint, points on common line through a common point, parallelism, or perpendicularity.		1		
8G.4(b) Describe the intersection of two or more geometric figures in the plane (e.g., intersection of a circle and a line).		1		
8G.4(c) Visualize or describe the cross section of a solid.		1		
8G.4(d) Represent geometric figures using rectangular coordinates on a plane.	8.6 (B) graph dilations, reflections, and translations on a coordinate plane 8.7 (D) locate and name points on a coordinate plane using ordered pairs of rational numbers	2	IC	"Representing geometric figures" not specifically mentioned in Texas
8G.5 Mathematical reasoning in geometry				
8G.5(a) Make and test a geometric conjecture about regular polygons.		1		

(CONTINUED)

TABLE B1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Data analysis, statistics, and probability				
8P.1 Data representation				
The following representations of data are indicated for each grade level. Objectives in which only a subset of these representations is applicable are indicated in the parentheses associated with the objective: histograms, line graphs, scatter plots, box plots, circle graphs, stem and leaf plots, frequency distributions, tables, and bar graphs.				
8P.1(a) Read or interpret data, including interpolating or extrapolating from data.	8.12 (B) draw conclusions and make predictions by analyzing trends in scatterplots 8.13 (A) evaluate methods of sampling to determine validity of an inference made from a set of data	2	IC	
8P.1(b) For a given set of data, complete a graph and then solve a problem using the data in the graph (histograms, line graphs, scatter plots, circle graphs, and bar graphs).	8.12 (B) draw conclusions and make predictions by analyzing trends in scatterplots 8.12 (C) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plots, line graphs, [stem and leaf plots,] circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, [with and] without the use of technology	3		Texas also includes box-and-whisker and stem-and-leaf plots
8P.1(c) Solve problems by estimating and computing with data from a single set or across sets of data.	8.5 (A) predict, find, and justify solutions to application problems using appropriate tables, graphs, and algebraic equations	2	IC	
8P.1(d) Given a graph or a set of data, determine whether information is represented effectively and appropriately (histograms, line graphs, scatter plots, circle graphs, and bar graphs).	8.12 (C) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, [stem-and-leaf,] circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, [with and] without use of technology 8.13 (B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis	3		Texas also includes box-and-whisker and stem-and-leaf plots
8P.1(e) Compare and contrast the effectiveness of different representations of the same data.	8.13 (A) evaluate methods of sampling to determine validity of an inference made from a set of data	2	IC	
8P.2 Characteristics of data sets				
8P.2(a) Calculate, use, or interpret mean, median, mode, or range.	8.12 (A) select appropriate measure of central tendency or range to describe a set of data and justify the choice for a particular situation	2	IC	

(CONTINUED)

TABLE B1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Data analysis, statistics, and probability				
8P.2 Characteristics of data sets				
8P.2(b) Describe how mean, median, mode, range, or interquartile ranges relate to the shape of the distribution.	8.12 (A) select the appropriate measure of central tendency or range to describe a set of data and justify the choice for a particular situation	2	IC	NAEP specifies "relate to the shape of the distribution"
8P.2(c) Identify outliers and determine their effect on mean, median, mode, or range.		1		No mention of "outliers"
8P.2(d) Using appropriate statistical measures, compare two or more data sets describing the same characteristic for two different populations or subsets of the same population.	8.12 (A) select the appropriate measure of central tendency or range to describe a set of data and justify the choice for a particular situation	2	IC	No comparison of data sets required in Texas
8P.2(e) Visually choose the line that best fits given a scatter plot and informally explain the meaning of the line. Use the line to make predictions.	8.12 (B) draw conclusions and make predictions by analyzing trends in scatterplots	2	IC	
8P.3 Experiments and samples				
8P.3(a) Given a sample, identify possible sources of bias in sampling.	8.13 (A) evaluate methods of sampling to determine validity of an inference made from a set of data	2	IC	
8P.3(b) Distinguish between a random and non-random sample.	8.13 (A) evaluate methods of sampling to determine validity of an inference made from a set of data	2	IC	Random and nonrandom samples not delineated in Texas
8P.3(d) Evaluate the design of an experiment.		1		
8P.4 Probability				
8P.4(a) Analyze a situation that involves probability of an independent event.	8.11 (A) find the probabilities of dependent and independent events 8.11 (B) use theoretical probabilities and experimental results to make predictions and decisions	3		
8P.4(b) Determine the theoretical probability of simple and compound events in familiar contexts.	8.11(A) find the probabilities of dependent and independent events 8.11 (B) use theoretical probabilities and experimental results to make predictions and decisions	2	IC	
8P.4(c) Estimate the probability of simple and compound events through experimentation or simulation.	8.11 (B) use theoretical probabilities and experimental results to make predictions and decisions	2	IC	No "estimate" in Texas
8P.4(d) Use theoretical probability to evaluate or predict experimental outcomes.	8.11 (B) use theoretical probabilities and experimental results to make predictions and decisions	3		

(CONTINUED)

TABLE B1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Data analysis, statistics and probability				
8P.4 Probability				
8P.4(e) Determine the sample space for a given situation.	7.10 (A) construct sample spaces for simple or composite experiments	3	LG	
8P.4(f) Use a sample space to determine the probability of the possible outcomes of an event.	8.11 (A) find the probabilities of dependent and independent events	2	IC	
8P.4(g) Represent probability of a given outcome using fractions, decimals, and percents.	8.11 (A) find the probabilities of dependent and independent events	2	IC	
8P.4(h) Determine the probability of independent and dependent events. (Dependent events should be limited to linear functions with a small sample size.)	8.11 (A) find the probabilities of dependent and independent events	3		
8P.4(j) Interpret probabilities within a given context.	8.11 (B) use theoretical probabilities and experimental results to make predictions and decisions	2	IC	
Algebra				
8A.1 Patterns, relations, and functions				
8A.1(a) Recognize, describe, or extend numerical and geometric patterns using tables, graphs, words, or symbols.	8.5 (A) predict, find, and justify solutions to application problems using appropriate tables, graphs, and algebraic equations	2	IC	
8A.1(b) Generalize a pattern appearing in a numerical sequence or table or graph using words or symbols.		1		
8A.1(c) Analyze or create patterns, sequences, or linear functions given a rule.		1		
8A.1 (e) Identify functions as linear or nonlinear or contrast distinguishing properties of functions from tables, graphs, or equations.	8.5 (A) predict, find, and justify solutions to application problems using appropriate tables, graphs, and algebraic equations	2	IC	No mention of "functions" in Texas grades 6–8
8A.1(f) Interpret the meaning of slope or intercepts in linear functions.	9_A.6 (A) develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations	2	HG	
8A.2 Algebraic representations				
8A.2(a) Translate between different representations of linear expressions using symbols, graphs, tables, diagrams, or written descriptions.	8.4 (A) generate a different representation of data given another representation of data (such as a table, graph, equation, or verbal description)	3		
8A.2(b) Analyze or interpret linear relationships expressed in symbols, graphs, tables, diagrams, or written descriptions.	8.5 (A) predict, find, and justify solutions to application problems using appropriate tables, graphs, and algebraic equations	2	IC	

(CONTINUED)

TABLE B1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Algebra				
8A.2 Algebraic representations				
8A.2(c) Graph or interpret points that are represented by ordered pairs of numbers on a rectangular coordinate system.	8.7 (D) locate and name points on a coordinate plane using ordered pairs of rational numbers	2	IC	
8A.2(d) Solve problems involving coordinate pairs on the rectangular coordinate system.		1		
8A.2(f) Identify or represent functional relationships in meaningful contexts including proportional, linear, and common non-linear (e.g., compound interest, bacterial growth) in tables, graphs, words, or symbols.	8.3 (A) compare and contrast proportional and non-proportional linear relationships	2	MC	
8A.3 Variables, expressions, and operations				
8A.3(b) Write algebraic expressions, equations, or inequalities to represent a situation.	7.5 (B) formulate problem situations when given a simple equation and formulate an equation when given a problem situation	2	LG MC	No mention of "inequalities" in Texas standards
8A.3(c) Perform basic operations, using appropriate tools, on linear algebraic expressions (including grouping and order of multiple operations involving basic operations, exponents, roots, simplifying, and expanding).	7.2 (E) simplify numerical expressions involving order of operations and exponents	2	LG MD	
8A.4 Equations and inequalities				
8A.4(a) Solve linear equations or inequalities (e.g., $ax + b = c$ or $ax + b = cx + d$ or $ax + b > c$).		1		
8A.4(b) Interpret "=" as an equivalence between two expressions and use this interpretation to solve problems.		1		
8A.4(c) Analyze situations or solve problems using linear equations and inequalities with rational coefficients symbolically or graphically (e.g., $ax + b = c$ or $ax + b = cx + d$).	9_A.6 (C) investigate, describe, and predict the effects of changes in *m* and *b* on the graph of $y = mx + b$	2	HG	
8A.4(d) Interpret relationships between symbolic linear expressions and graphs of lines by identifying and computing slope and intercepts (e.g., know in $y = ax + b$, that a is the rate of change and b is the vertical intercept of the graph).	9_A.6 (C) investigate, describe, and predict the effects of changes in *m* and *b* on the graph of $y = mx + b$ 9_A.6 (F) interpret and predict the effects of changing slope and *y*-intercept in applied situations	2	HG	

(CONTINUED)

TABLE B1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Algebra				
8A.4 Equations and inequalities				
8A.4(e) Use and evaluate common formulas [e.g., relationship between a circle's circumference and diameter (C = pi d), distance and time under constant speed].	7.4 (A) generate formulas involving unit conversions, perimeter, area, circumference, volume, and scaling	2	LG IC	
8A.5 Mathematical reasoning in algebra				
8A.5(a) Make, validate, and justify conclusions and generalizations about linear relationships.	8.3 (A) compare and contrast proportional and non-proportional linear relationships 8.5 (A) predict, find, and justify solutions to application problems using appropriate tables, graphs, and algebraic equations	3		

a. Rating is based on a scale of 1 to 3, where 1 indicates that the TAKS assessment standard or standards do not address the NAEP assessment standard, 2 that the TAKS assessment standard or standards partially address the NAEP assessment standard, and 3 that the TAKS assessment standard or standards fully address or exceed the NAEP assessment standard at the targeted grade level. A NAEP assessment standard is considered to be *fully addressed* by the TAKS assessment standard or standards if all of the content of the NAEP assessment standard is contained in one or more TAKS standards at the same or lower grade level. A NAEP standard is considered to be *partially addressed* by the TAKS assessment standard or standards if the TAKS assessment standard or standards address only part of the NAEP assessment standard; the NAEP assessment standard contains more content or more detailed content than the TAKS assessment standard or standards, or the TAKS assessment standard or standards imply but do not explicitly state the content found in the NAEP assessment standard; there is a matching TAKS assessment standard at a higher grade level than the NAEP assessment standard; or there is a matching TAKS assessment standard or standards at a lower grade level than the NAEP assessment standard but it does not address all the content addressed by NAEP assessment standard.

b. Codes: IC = implied content, LG = content covered at a lower grade level, HG = content covered at a higher grade level, MC = more content, MD = more detailed content.

Source: Expert content reviewers' analysis based on data from National Assessment Governing Board (2007) and Texas Education Agency (2007d,e,f,g,h).

TABLE B2

Texas Assessment of Knowledge and Skills (TAKS) grade 8 assessment standards not covered by the National Assessment of Educational Progress (NAEP) grade 8 assessment standards, January 2008

TAKS objective	TAKS grade 8 assessment standards not covered by NAEP
Patterns, relationships, and algebraic reasoning	8.5 (A)—Find and evaluate an algebraic expression to determine any term in an arithmetic sequence (with a constant rate of change)
Mathematical processes and tools	8.14 (A)—Identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics
	8.14 (B)—Use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness
	8.14 (C)—Select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem
	8.15 (A)—Communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models
	8.16 (A)—Make conjectures from patterns or sets of examples and nonexamples

Source: Expert content reviewers' analysis based on data from National Assessment Governing Board (2007) and Texas Education Agency (2007g).

Appendix C
Details on the alignment of the National Assessment of Educational Progress grade 12 assessment standards and the Texas Assessment of Knowledge and Skills exit level assessment standards

TABLE C1

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Number properties and operations				
12N.1 Number sense				
12N.1(d) Represent, interpret or compare expressions for real numbers, including expressions utilizing exponents and logarithms.	9_8.1 (B) select and use appropriate forms of rational numbers to solve real-life problems including those involving proportional relationships 10_A.11 (A) use [patterns to generate] the laws of exponents and apply them in problem-solving situations	2	MC	The Texas standards do not specify logarithms
12N.1(f) Represent or interpret expressions involving very large or very small numbers in scientific notation.	8.1 (D) express numbers in scientific notation, including negative exponents, in appropriate problem situations	3	LG	
12N.1(g) Represent, interpret or compare expressions or problem situations involving absolute values.		1		
12N.1(i) Order or compare real numbers, including very large and very small real numbers.	8.1 (A) compare and order rational numbers in various forms including integers, percents, and positive and negative fractions and decimals 8.1 (C) approximate (mentally [and with calculators]) the value of irrational numbers as they arise from problem situations (such as π, √2)	2	LG IC	
12N.2 Estimation				
12N.2(b) Identify situations where estimation is appropriate, determine the needed degree of accuracy, and analyze* the effect of the estimation method on the accuracy of results.	6.2 (D) estimate and round to approximate reasonable results and to solve problems where exact answers are not required	2	LG MD	
12N.2(c) Verify solutions or determine the reasonableness of results in a variety of situations.	EX_8.14 (B) use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness	3		
12N.2(d) Estimate square or cube roots of numbers less than 1,000 between two whole numbers.	8.1 (C) approximate (mentally [and with calculators]) the value of irrational numbers as they arise from problem situations (such as π, √2)	2	LG MD	The Texas standard does not specify cube roots

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TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Number properties and operations				
12N.3 Number operations				
12N.3(a) Find integral or simple fractional powers of real numbers.	EX_A.11 (A) use [patterns to generate] the laws of exponents and apply them in problem-solving situations	2	IC MD	
12N.3(b) Perform arithmetic operations with real numbers, including common irrational numbers.	8.2 (B) use appropriate operations to solve problems involving rational numbers in problem situations 8.1 (C) approximate (mentally [and with calculators]) the value of irrational numbers as they arise from problem situations (such as π, √2)	2	LG MC	The Texas standards do not specify performing arithmetic operations with irrational numbers
12N.3(c) Perform arithmetic operations with expressions involving absolute value.		1		
12N.3(d) Describe the effect of multiplying and dividing by numbers including the effect of multiplying or dividing a real number by: Zero, or A number less than zero, or A number between zero and one, or One, or A number greater than one.		1		
12N.3(f) Solve application problems involving numbers, including rational and common irrationals.	8.2 (A) select appropriate operations to solve problems involving rational numbers and justify the selections 8.2 (B) use appropriate operations to solve problems involving rational numbers in problem situations 8.1 (C) approximate (mentally [and with calculators]) the value of irrational numbers as they arise from problem situations (such as π, √2)	2	LG MD	The Texas standards do not specify solving problems with irrational numbers
12N.4 Ratios and proportional reasoning				
12N.4(c) Use proportions to solve problems (including rates of change).	EX_8.3 (B) estimate and find solutions to application problems involving percents and other proportional relationships, such as similarity and rates	3		
12N.4(d) Solve multi-step problems involving percentages, including compound percentages.	EX_8.3 (B) estimate and find solutions to application problems involving percents and other proportional relationships, such as similarity and rates	3		
12N.5 Properties of number and operations				
12N.5(c) Solve problems using factors, multiples, or prime factorization.	6.1 (D) write prime factorizations using exponents	2	LG IC	

(CONTINUED)

TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Number properties and operations				
12N.5 Properties of number and operations				
12N.5(d) Use divisibility or remainders in problem settings.		1		
12N.5(e) Apply basic properties of operations, including conventions about the order of operations.	7.2 (E) simplify numerical expressions involving order of operations and exponents	3	LG	
12N.5(f) Recognize properties of the number system—whole numbers, integers, rational numbers, real numbers, and complex numbers—recognize how they are related to each other, and identify examples of each type of number.		1		
12N.6 Mathematical reasoning using numbers				
12N.6(a) Give a mathematical argument to establish the validity of a simple numerical property or relationship.	EX_8.16 (B) validate his/her conclusions using mathematical properties and relationships	3		
12N.6(b) * Analyze or interpret a proof by mathematical induction of a simple numerical relationship.	EX_8.16 (A) make conjectures from patterns or sets of examples and nonexamples EX_8.16 (B) validate his/her conclusions using mathematical properties and relationships	2	MD	The Texas standards do not specify proof by mathematical induction
Measurement				
12M.1 Measuring physical attributes				
12M.1(b) Determine the effect of proportions and scaling on length, areas, and volume.	EX_G.11 (B) use ratios to solve problems involving similar figures EX_G.11 (D) describe the effect on perimeter, area, and volume when one or more dimensions of a figure are changed and apply this idea in solving problems 10_8.10 (A) describe the resulting effects on perimeter and area when dimensions of a shape are changed proportionally 10_8.10 (B) describe the resulting effect on volume when dimensions of a solid are changed proportionally	3		

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TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Measurement				
12M.1 Measuring physical attributes				
12M.1(c) Estimate, or compare perimeters or areas of two-dimensional geometric figures.	EX_G.8 (A) find areas of regular polygons, circles, and composite figures EX_G.11 (D) describe the effect on perimeter, area, and volume when one or more dimensions of a figure are changed and apply this idea in solving problems 10_8.10 (A) describe the resulting effects on perimeter and area when dimensions of a shape are changed proportionally	3		
12M.1(d) Solve problems of angle measure, including those involving triangles or other polygons or parallel lines cut by a transversal.	EX_G.5 (B) use numeric and geometric patterns to make generalizations about geometric properties, including properties, ratios in similar figures and solids, and angle relationships in polygons and circles	2	MC	
12M.1(f) Solve problems involving perimeter or area of plane figures such as polygons, circles, or composite figures.	EX_G.8 (A) find areas of regular polygons, circles, and composite figures EX_G.8 (B) find areas of sectors and arc lengths of circles using proportional reasoning 10_8.10 (A) describe the resulting effects on perimeter and area when dimensions of a shape are changed proportionally	3		
12M.1(h) Solve problems by determining, estimating, or comparing volumes or surface areas of three-dimensional figures.	EX_G.8 (D) find surface areas and volumes of prisms, pyramids, spheres, cones, cylinders, and composites of these figures in problem situations. 10_8.8 (C) estimate measurements and use formulas to solve application problems involving lateral and total surface area and volume	3		
12M.1(i) Solve problems involving rates such as speed, density, population density, or flow rates.	EX_8.3 (B) estimate and find solutions to application problems involving percents and other proportional relationships, such as similarity and rates	3		
12M.2 Systems of measurement				
12M.2(a) Recognize that geometric measurements (length, area, perimeter, and volume) depend on the choice of a unit, and apply such units in expressions, equations, and problem solutions.	6.8 (B) select and use appropriate units, tools, or formulas to measure and to solve problems involving length (including perimeter), area, time, temperature, volume, and weight	3	LG	

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TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Measurement				
12M.2 Systems of measurement				
12M.2(b) Solve problems involving conversions within or between measurement systems, given the relationship between the units.	6.8 (D) convert measures within the same measurement system (customary and metric) based on relationships between units	2	LG MC	NAEP includes converting between measurement systems. The Texas standard converts only within systems
12M.2(d) Understand that numerical values associated with measurements of physical quantities are approximate, are subject to variation, and must be assigned units of measurement.	EX.8.15 (A) communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models	2	MD	
12M.2(e) Determine appropriate accuracy of measurement in problem situations (e.g., the accuracy of measurement of the dimensions to obtain a specified accuracy of area) and find the measure to that degree of accuracy.		1		
12M.2(f) Construct or solve problems involving scale drawings.	EX_8.3 (B) estimate and find solutions to application problems involving percents and other proportional relationships, such as similarity and rates	2	MD	
12M.3 Measurement in triangles				
12M.1(a) Solve problems involving indirect measurement such as finding the height of a building by finding the distance to the base of the building and the angle of elevation to the top.	EX_G.11 (C) [develop,] apply, and justify triangle similarity relationships, such as right triangle ratios, [trigonometric ratios,] and Pythagorean triples using a variety of methods	3		
12M.3(b) Solve problems using the fact that trigonometric ratios (sine, cosine, and tangent) stay constant in similar triangles.	EX_G.11 (B) use ratios to solve problems involving similar figures EX_G.11 (C) [develop,] apply, and justify triangle similarity relationships, such as right triangle ratios, [trigonometric ratios,] and Pythagorean triples using a variety of methods EX_8.3 (B) estimate and find solutions to application problems involving percents and other proportional relationships, such as similarity and rates	3		

(CONTINUED)

TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Measurement				
12M.3 Measurement in triangles				
12M.3(c) Use the definitions of sine, cosine, and tangent as ratios of sides in a right triangle to solve problems about length of sides and measure of angles.	EX_G.11 (C) [develop,] apply, and justify triangle similarity relationships, such as right triangle ratios, [trigonometric ratios,] and Pythagorean triples using a variety of methods	3		
12M.3(d) Interpret and use the identity $\sin 2q + \cos 2q = 1$ for angles q between 0° and 90°; recognize this identity as a special representation of the Pythagorean theorem.		1		
12M.3(e) * Determine the radian measure of an angle and explain how radian measurement is related to a circle of radius 1.		1		
12M.3(f) * Use trigonometric formulas such as addition and double angle formulas.		1		
12M.3(g) * Use the law of cosines and the law of sines to find unknown sides and angles of a triangle.		1		
Geometry				
12G.1 Dimension and shape				
12G.1(c) Give precise mathematical descriptions or definitions of geometric shapes in the plane and in three-dimensional space.	7.6 (B) use properties to classify triangles and quadrilaterals 7.6 (C) use properties to classify three-dimensional figures, including pyramids, cones, prisms, and cylinders 7.6 (D) use critical attributes to define similarity	3	LG	
12G.1(d) Draw or sketch from a written description plane figures and planar images of three-dimensional figures.	10_8.7 (A) draw three-dimensional figures from different perspectives	2	IC	
12G.1(e) Use two-dimensional representations of three-dimensional objects to visualize and solve problems.	EX_G.6 (B) use nets to represent [and construct] three-dimensional geometric figures EX_G.6 (C) use orthographic and isometric views of three-dimensional geometric figures to represent [and construct] three-dimensional geometric figures and solve problems	3		
12G.1(f) Analyze properties of three-dimensional figures including spheres and hemispheres.	EX_G.9 (D) analyze the characteristics of polyhedra and other three-dimensional figures and their component parts based on explorations and [concrete] models	3		

(CONTINUED)

TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Geometry				
12G.2 Transformation of shapes and preservation of properties				
12G.2(a) Recognize or identify types of symmetries (e.g., point, line, rotational, self-congruence) of two- and three-dimensional figures.		1		
12G.2(b) Give or recognize the precise mathematical relationship (e.g., congruence, similarity, orientation) between a figure and its image under a transformation.	EX_G.5 (C) use properties of transformations and their compositions to make connections between mathematics and the real world, such as tessellations 10_8.6 (B) graph dilations, reflections, and translations on a coordinate plane	2	IC	
12G.2(c) Perform or describe the effect of a single transformation on two- and three-dimensional geometric shapes (reflections across lines of symmetry, rotations, translations, and dilations).	10_8.6 (B) graph dilations, reflections, and translations on a coordinate plane	2	MC	
12G.2(d) Identify transformations, combinations or subdivisions of shapes that preserve the area of two-dimensional figures or the volume of three-dimensional figures.	EX_G.5 (C) use properties of transformations and their compositions to make connections between mathematics and the real world, such as tessellations 10_8.6 (B) graph dilations, reflections, and translations on a coordinate plane	2	MD	
12G.2(e) Justify relationships of congruence and similarity, and apply these relationships using scaling and proportional reasoning.	EX_G.10 (A) use congruence transformations to make conjectures and justify properties of geometric figures including figures represented on a coordinate plane EX_G.11 (A) use and extend similarity properties and transformations to explore and justify conjectures about geometric figures EX_G.11 (B) use ratios to solve problems involving similar figures EX_8.3 (B) estimate and find solutions to application problems involving percents and other proportional relationships, such as similarity and rates	3		
12G.2(g) Perform or describe the effects of successive transformations.	EX_G.5 (C) use properties of transformations and their compositions to make connections between mathematics and the real world, such as tessellations	2	IC	

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TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Geometry				
12G.3 Relationships between geometric figures				
12G.3(b) Apply geometric properties and relationships to solve problems in two and three dimensions.	EX_G.5 (B) use numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles 10_8.7 (B) use geometric concepts and properties to solve problems in fields such as art and architecture	2	IC	
12G.3(c) Represent problem situations with geometric models to solve mathematical or real world problems.	10_8.7 (B) use geometric concepts and properties to solve problems in fields such as art and architecture	3		
12G.3(d) Use the Pythagorean theorem to solve problems in two- or three-dimensional situations.	10_8.9 (A) use the Pythagorean Theorem to solve real-life problems	3		
12G.3(e) Recall and interpret definitions and basic properties of congruent and similar triangles, circles, quadrilaterals, polygons, parallel, perpendicular and intersecting lines, and associated angle relationships.	EX_G.5 (B) use numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles EX. G.7 (B) use slopes and equations of lines to investigate geometric properties relationships, including parallel lines, perpendicular lines, and [special segments of] triangles and other polygons EX_G.11 (A) use and extend similarity properties and transformations to explore and justify conjectures about geometric figures EX_G.10 (A) use congruence transformations to make conjectures and justify properties of geometric figures including figures represented on a coordinate plane	3		
12G.3(f) Analyze properties or relationships of triangles, quadrilaterals, and other polygonal plane figures.	EX_G.5 (B) use numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles	2	IC	

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TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Geometry				
12G.3 Relationships between geometric figures				
12G.3(g) Analyze properties and relationships of parallel, perpendicular, or intersecting lines, including the angle relationships that arise in these cases.	EX_G.5 (B) use numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles EX. G.7 (B) use slopes and equations of lines to investigate geometric properties relationships, including parallel lines, perpendicular lines, and [special segments of] triangles and other polygons	2	IC	
12G.3(h) Analyze properties of circles and the intersections of lines and circles (inscribed angles, central angles, tangents, secants, chords).	EX_G.5 (B) use numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles	2	MD	
12G.4 Position, direction, and coordinate geometry				
12G.4(a) Solve problems involving the coordinate plane such as the distance between two points, the midpoint of a segment, or slopes of perpendicular or parallel lines.	EX_G.7 (C) derive and use formulas involving length, slope, and midpoint EX_G.7 (B) use slopes and equations of lines to investigate geometric relationships, including parallel lines, perpendicular lines, and [special segments of] triangles and other polygons	3		
12G.4(b) Describe the intersections of lines in the plane and in space, intersections of a line and a plane, or of two planes in space.		1		
12G.4(c) Describe or identify conic sections and other cross sections of solids.		1		
12G.4(d) Represent two-dimensional figures algebraically using coordinates and/or equations.	EX_G.7 (A) use one- and two-dimensional coordinate systems to represent points, lines, rays, line segments, and figures	3		
12G.4(e) * Use vectors to represent velocity and direction; multiply a vector by a scalar and add vectors both algebraically and graphically.		1		
12G.4(f) Find an equation of a circle given its center and radius and, given an equation of a circle, find its center and radius.		1		

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TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Geometry				
12G.4 Position, direction, and coordinate geometry				
12G.4(g) *Graph ellipses and hyperbolas whose axes are parallel to the coordinate axes and demonstrate understanding of the relationship between their standard algebraic form and their graphical characteristics.		1		
12G.4(h) * Represent situations and solve problems involving polar coordinates.		1		
12G.5 Mathematical reasoning in geometry				
12G.5(a) Make, test, and validate geometric conjectures using a variety of methods including deductive reasoning and counterexamples.	EX_8.16 (A) make conjectures from patterns or sets of examples and nonexamples EX_8.16 (B) validate his/her conclusions using mathematical properties and relationships	3		
12G.5(b) Determine the role of hypotheses, logical implications, and conclusion, in proofs of geometric theorems.		1		
12G.5(c) Analyze or explain a geometric argument by contradiction	EX_8.16 (A) make conjectures from patterns or sets of examples and nonexamples	2	MD	
12G.5(d) Analyze or explain a geometric proof of the Pythagorean theorem.	10_8.7 (C) use pictures or models to demonstrate the Pythagorean Theorem	2	IC	The Texas standard does not specify using a geometric proof
12G.5(e) Prove basic theorems about congruent and similar triangles and circles.	EX_G.10 (A) use congruence transformations to make conjectures and justify properties of geometric figures including figures represented on a coordinate plane EX_G.11 (A) use and extend similarity properties and transformations to explore and justify conjectures about geometric figures	3		
Data analysis, statistics, and probability				
12P.1 Data representation				
The following representations of data are indicated for each grade level. Objectives in which only a subset of these representations is applicable are indicated in the parentheses associated with the objective: histograms, line graphs, scatterplots, box plots, circle graphs, stem and leaf plots, frequency distributions, and tables including two-way tables.				
12P.1(a) Read or interpret graphical or tabular representations of data.	EX_8.12 (C) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plots, line graphs, [stem and leaf plots,] circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, with and without the use of technology	2	IC	

(CONTINUED)

TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Data analysis, statistics, and probability				
12P.1 Data representation				
12P.1(b) For a given set of data, complete a graph and solve a problem using the data in the graph (histograms, scatterplots, line graphs)	EX_8.12 (C) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plots, line graphs, [stem and leaf plots,] circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, with and without the use of technology	2	IC MD	
12P.1(c) Solve problems involving univariate or bivariate data.	EX_8.12 (C) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plots, line graphs, [stem and leaf plots,] circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, [with and] without the use of technology EX_8.13 (B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis	2	IC	
12P.1(d) Given a graphical or tabular representation of a set of data, determine whether information is represented effectively and appropriately.	EX_8.12 (C) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plots, line graphs, [stem and leaf plots,] circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, with and without the use of technology EX_8.13 (B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis	2	IC	
12P.1(e) Compare and contrast different graphical representations of univariate and bivariate data.	EX_8.13 (B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis	2	IC	
12P.1(f) Organize and display data in a spreadsheet in order to recognize patterns and solve problems.	EX_8.12 (C) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plots, line graphs, [stem and leaf plots,] circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, with and without the use of technology	2	IC	

(CONTINUED)

TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Data analysis, statistics, and probability				
12P.2 Characteristics of data sets				
12P.2(a) Calculate, interpret, or use summary statistics for distributions of data including measures of typical value (mean, median), position (quartiles, percentiles), and spread (range, interquartile range, variance, standard deviation).	EX_8.12 (A) select the appropriate measure of central tendency or range to describe a set of data and justify the choice for a particular situation	2	IC MD	
12P.2(b) Recognize how linear transformations of one-variable data affect mean, median, mode, range, interquartile range, and standard deviation.		1		
12P.2(c) Determine the effect of outliers on mean, median, mode, range, interquartile range, or standard deviation.		1		
12P.2(d) Compare data sets using summary statistics (mean, median, mode, range, interquartile range, or standard deviation) describing the same characteristic for two different populations or subsets of the same population.		1		
12P.2(e) Approximate a trend line if a linear pattern is apparent in a scatterplot or use a graphing calculator to determine a least-squares regression line, and use the line or equation to make predictions.	EX_A.2 (D) [collect and] organize data, [make and] interpret scatterplots (including recognizing positive, negative, or no correlation for data approximating linear situations), and model, predict, and make decisions and critical judgments in problem situations	2	MC	
12P.2(f) Recognize that the correlation coefficient is a number from –1 to +1 that measures the strength of the linear relationship between two variables; visually estimate the correlation coefficient (e.g., positive or negative, closer to 0, .5, or 1.0) of a scatterplot.		1		
12P.2(g) Know and interpret the key characteristics of a normal distribution such as shape, center (mean), and spread (standard deviation).		1		
12P.3 Experiments and samples				
12P.3(a) Identify possible sources of bias in sample surveys, and describe how such bias can be controlled and reduced.	8.13 (A) evaluate methods of sampling to determine validity of an inference made from a set of data	2	LG MD	

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TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Data analysis, statistics, and probability				
12P.3 Experiments and samples				
12P.3(b) Recognize and describe a method to select a simple random sample.	8.13 (A) evaluate methods of sampling to determine validity of an inference made from a set of data	3	LG	
12P.3(c) * Draw inferences from samples, such as estimates of proportions in a population, estimates of population means, or decisions about differences in means for two "treatments."	8.13 (A) evaluate methods of sampling to determine validity of an inference made from a set of data	2	LG IC	
12P.3(d) Identify or evaluate the characteristics of a good survey or of a well-designed experiment.		1		
12P.3(e) * Recognize the differences in design and in conclusions between randomized experiments and observational studies.		1		
12P.4 Probability				
12P.4(a) Recognize whether two events are independent or dependent.	EX_8.11 (A) find the probabilities of dependent and independent events	2	IC	
12P.4(b) Determine the theoretical probability of simple and compound events in familiar or unfamiliar contexts.		1		
12P.4(c) Given the results of an experiment or simulation, estimate the probability of simple or compound events in familiar or unfamiliar contexts.		1		
12P.4(d) Use theoretical probability to evaluate or predict experimental outcomes.	EX_8.11 (B) use theoretical probabilities and experimental results to make predictions and decisions	3		
12P.4(e) Determine the number of ways an event can occur using tree diagrams, formulas for combinations and permutations, or other counting techniques.		1		
12P.4(h) Determine the probability of independent and dependent events.	EX_8.11 (A) find the probabilities of dependent and independent events	3		
12P.4(i) Determine conditional probability using two-way tables.		1		
12P.4(j) Interpret and apply probability concepts to practical situations.	EX_8.11 (B) use theoretical probabilities and experimental results to make predictions and decisions	3		
12P.4(k) *Use the binomial theorem to solve problems.		1		

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TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Data analysis, statistics, and probability				
12P.5 Mathematical reasoning with data				
12P.5(a) Identify misleading uses of data in real-world settings and critique different ways of presenting and using information.	EX_8.13 (B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis	3		
12P.5(b) Distinguish relevant from irrelevant information, identify missing information, and either find what is needed or make appropriate approximations.	EX_8.13 (B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis	2	IC	
12P.5(c)* Recognize, use, and distinguish between the processes of mathematical (deterministic) and statistical modeling.		1		
12P.5(d) Recognize when arguments based on data confuse correlation with causation.	EX_8.13 (B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis	2	IC	
12P.5(e) * Recognize and explain the potential errors caused by extrapolating from data.	EX_8.13 (B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis	2	IC	
Algebra				
12A.1 Patterns, relations, and functions				
12A.1(a) Recognize, describe, or extend numerical patterns, including arithmetic and geometric progressions.	EX_A.3 (B) look for patterns and represent generalizations algebraically	2	MC	
12A.1(b) Express linear and exponential functions in recursive and explicit form given a table, verbal description, or some terms of a sequence.	EX_A.1 (B) [gather and record data and] use data sets to determine functional relationships between quantities EX_A.1 (D) represent relationships among quantities using [concrete] models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities EX_A.3 (B) look for patterns and represent generalizations algebraically	2	MD	
12A.1(e) Identify or analyze distinguishing properties of linear, quadratic, rational, exponential, or *trigonometric functions from tables, graphs, or equations.	EX_A.6 (B) interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs EX_A.9 (D) analyze graphs of quadratic functions and draw conclusions	2	MC	

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TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Algebra				
12A.1 Patterns, relations, and functions				
12A.1(g) Determine whether a relation, given in verbal, symbolic, tabular, or graphical form, is a function.	EX_A.1 (B) [gather and record data and] use data sets to determine functional relationships between quantities EX_A.1 (D) represent relationships among quantities using [concrete] models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities	2	MD	
12A.1(h) Recognize and analyze the general forms of linear, quadratic, rational, exponential, or *trigonometric functions.	EX_A.2 (A) identify [and sketch] the general forms of linear ($y = x$) and quadratic ($y = x^2$) parent functions EX_A.6 (C) investigate, describe, and predict the effects of changes in m and b on the graph of $y = mx + b$ EX_A.9 (C) investigate, describe, and predict the effects of changes in c on the graph of $y = ax\,2 + c$	2	MC	The Texas standards do not specify rational, exponential, logarithmic, or trigonometric functions
12A.1(i) Determine the domain and range of functions given in various forms and contexts.	EX_A.2 (B) identify mathematical domains and ranges and determine reasonable domain and range values for given situations, both continuous and discrete	3		
12A.1(j) * Given a function, determine its inverse if it exists, and explain the contextual meaning of the inverse for a given situation.		1		
12A.2 Algebraic representations				
12A.2(a) Create and translate between different representations of algebraic expressions, equations, and inequalities (e.g., linear, quadratic, exponential, or *trigonometric) using symbols, graphs, tables, diagrams, or written descriptions.	EX_A.5 (C) use, translate, and make connections among algebraic, tabular, graphical, or verbal descriptions of linear functions EX_A.1 (D) represent relationships among quantities using [concrete] models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities EX_A.9 (D) analyze graphs of quadratic functions and draw conclusions	2	IC MC	
12A.2(b) Analyze or interpret relationships expressed in symbols, graphs, tables, diagrams (including Venn diagrams), or written descriptions and evaluate the relative advantages or disadvantages of different representations to answer specific questions.	EX_A.5 (A) determine whether or not given situations can be represented by linear functions EX_A.5 (C) use, translate, and make connections among algebraic, tabular, graphical, or verbal descriptions of linear functions	2	IC	

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TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Algebra				
12A.2 Algebraic representations				
12A.2(d) Perform or interpret transformations on the graphs of linear, quadratic, exponential, and *trigonometric functions.	EX_A.6 (C) investigate, describe, and predict the effects of changes in *m* and *b* on the graph of $y = mx + b$ EX_A.9 (B) investigate, describe, and predict the effects of changes in *a* on the graph of $y = ax\,2 + c$ EX_A.9 (C) investigate, describe, and predict the effects of changes in *c* on the graph of $y = ax\,2 + c$	2	MC	The Texas standards do not specify exponential or trigonometric functions
12A.2(e) Make inferences or predictions using an algebraic model of a situation.	EX_A.1 (E) interpret and make decisions, predictions, and critical judgments from functional relationships	3		
12A.2(f) Given a real-world situation, determine if a linear, quadratic, rational, exponential, logarithmic, or *trigonometric function fits the situation.	EX_A.5 (A) determine whether or not given situations can be represented by linear functions EX_A.1 (C) describe functional relationships for given problem situations and write equations or inequalities to answer questions arising from the situations	2	MD	The Texas standards do not specify rational, exponential, logarithmic, or trigonometric functions
12A.2(g) Solve problems involving exponential growth and decay.		1		
12A.2(h) * Analyze properties of exponential, logarithmic, and rational functions.		1		
12A.3 Variables, expressions, and operations				
12A.3(b) Write algebraic expressions, equations, or inequalities to represent a situation.	EX_A.3 (A) use symbols to represent unknowns and variables EX_A.3 (B) look for patterns and represent generalizations algebraically EX_A.7 (A) analyze situations involving linear functions and formulate linear equations or inequalities to solve problems	3		
12A.3(c) Perform basic operations, using appropriate tools, on algebraic expressions including polynomial and rational expressions.	EX_A.4 (B) use the commutative, associative, and distributive properties to simplify algebraic expressions EX_A.11 (A) use [patterns to generate] the laws of exponents and apply them in problem-solving situations EX_A.4 (A) find specific function values, simplify polynomial expressions, transform and solve equations, and factor as necessary in problem situations	2	IC	The Texas standards do not specify rational expressions

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TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Algebra				
12A.3 Variables, expressions, and operations				
12A.3(d) Write equivalent forms of algebraic expressions, equations, or inequalities to represent and explain mathematical relationships.	EX_A.3 (B) look for patterns and represent generalizations algebraically EX_A.7 (A) analyze situations involving linear functions and formulate linear equations or inequalities to solve problems	2	IC	
12A.3(e) Evaluate algebraic expressions, including polynomials and rational expressions.	EX_A.4 (A) find specific function values, simplify polynomial expressions, transform and solve equations, and factor as necessary in problem situations	2	IC	
12A.3(f) Use function notation to evaluate a function at a specified point in its domain and combine functions by addition, subtraction, multiplication, division, and composition.	EX_A.4 (A) find specific function values, simplify polynomial expressions, transform and solve equations, and factor as necessary in problem situations EX_A.4 (C) connect equation notation with function notation, such as $y = x + 1$ and $f(x) = x + 1$	2	IC	
12A.3(g) * Determine the sum of finite and infinite arithmetic and geometric series.		1		
12A.3(h) Use basic properties of exponents and *logarithms to solve problems.	EX_A.11 (A) use [patterns to generate] the laws of exponents and apply them in problem-solving situations	2	MC	The Texas standard does not specify logarithms
12A.4 Equations and inequalities				
12A.4(a) Solve linear, rational or quadratic equations or inequalities, including those involving absolute value.	EX_A.7 (B) investigate methods for solving linear equations and inequalities using [concrete] models, graphs, and the properties of equality, select a method, and solve the equations and inequalities EX_A.10 (A) solve quadratic equations using [concrete] models, tables, graphs, and algebraic methods	2	MC	Texas does not refer to rational or quadratic equations or inequalities or those involving absolute value
12A.4(c) Analyze situations, develop mathematical models, or solve problems using linear, quadratic, exponential, or logarithmic equations or inequalities symbolically or graphically.	EX_A.7 (B) investigate methods for solving linear equations and inequalities using [concrete] models, graphs, and the properties of equality, select a method, and solve the equations and inequalities EX_A.10 (A) solve quadratic equations using [concrete] models, tables, graphs, and algebraic methods EX_A.10 (B) make connections among the solutions (roots) of quadratic equations, the zeros of their related functions, and the horizontal intercepts (x-intercepts) of the graph of the function	2	MC	The Texas standards do not specify logarithmic or exponential equations or inequalities

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TABLE C1 (CONTINUED)

Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards, January 2008

NAEP assessment standards	Texas assessment standards	Overall rating[a]	Code[b]	Notes
Algebra				
12A.4 Equations and inequalities				
12A.4(d) Solve (symbolically or graphically) a system of equations or inequalities and recognize the relationship between the analytical solution and graphical solution.	EX_A.8 (B) solve systems of linear equations using [concrete] models, graphs, tables, and algebraic methods EX_A.8 (C) interpret and determine the reasonableness of solutions to systems of linear equations	3		
12A.4(e) Solve problems involving special formulas such as: $A = P(I + r)t$, $A = Pert$].		1		
12A.4(f) Solve an equation or formula involving several variables for one variable in terms of the others.		1		
12A.4(g) Solve quadratic equations with complex roots.	EX _A.10 (A) solve quadratic equations using [concrete] models, tables, graphs, and algebraic methods	2	IC	The Texas standard does not mention complex roots
12A.5 Mathematical reasoning in algebra				
12A.5(a) Use algebraic properties to develop a valid mathematical argument.	EX_8.16 (B) validate his/her conclusions using mathematical properties and relationships	3		
12A.5(b) Determine the role of hypotheses, logical implications, and conclusions in algebraic argument.	EX_8.16 (A) make conjectures from patterns or sets of examples and nonexamples EX_8.16 (B) validate his/her conclusions using mathematical properties and relationships	2	IC	
12A.5(c) Explain the use of relational conjunctions (and, or) in algebraic arguments.		1		

Note: NAEP grade 12 assessment standards marked with an asterisk (*) include content that is beyond what is usually taught in a standard three-year course of study and are selected less often for inclusion in the NAEP than are other assessment standards (National Assessment Governing Board 2007).

a. Rating is based on a scale of 1 to 3, where 1 indicates that the TAKS assessment standard or standards do not address the NAEP assessment standard, 2 that the TAKS assessment standard or standards partially address the NAEP assessment standard, and 3 that the TAKS assessment standard or standards fully address or exceed the NAEP assessment standard at the targeted grade level. A NAEP assessment standard is considered to be *fully addressed* by the TAKS assessment standard or standards if all of the content of the NAEP assessment standard is contained in one or more TAKS standards at the same or lower grade level. A NAEP standard is considered to be *partially addressed* by the TAKS assessment standard or standards if the TAKS assessment standard or standards address only part of the NAEP assessment standard; the NAEP assessment standard contains more content or more detailed content than the TAKS assessment standard or standards, or the TAKS assessment standard or standards imply but do not explicitly state the content found in the NAEP assessment standard; or there is a matching TAKS assessment standard or standards at a lower grade level than the NAEP assessment standard but it does not address all the content addressed by NAEP assessment standard.

b. Codes: IC = implied content, LG = content covered at a lower grade level, HG = content covered at a higher grade level, MC = more content, MD = more detailed content.

Source: Expert content reviewers' analysis based on data from National Assessment Governing Board (2007) and Texas Education Agency (2007a,f,g,h,i).

TABLE C2

Texas Assessment of Knowledge and Skills (TAKS) exit level assessment standards not covered by the National Assessment of Educational Progress (NAEP) grade 12 assessment standards, January 2008

TAKS objective	TAKS exit level assessment standards not covered by NAEP grade 12 assessment standards
Functional relationships	EX_A.1 (A)—Describe independent and dependent quantities in functional relationships
Properties and attributes of functions	EX_A.2 (C)—Interpret situations in terms of given graphs (or create situations that fit given graphs)
Linear functions	EX_A.6 (A)—Develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations
	EX_A.6 (D)—Graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and *y*-intercept
	EX_A.6 (E)—Determine the intercepts of the graphs of linear functions and zeros of linear functions from graphs, tables, and algebraic representations
	EX_A.6 (F)—Interpret and predict the effects of changing slope and *y*-intercept in applied situations
	EX_A.6 (G)—Relate direct variation to linear functions and solve problems involving proportional change
Linear equations and inequalities	EX_A.7 (C)—Interpret and determine the reasonableness of solutions to linear equations and inequalities
	EX_A.8 (A)—Analyze situations and formulate systems of linear equations in two unknowns to solve problems
Geometric relationships and spatial reasoning	EX_G.4 (A)—Select an appropriate representation ([concrete], pictorial, graphical, verbal, or symbolic) in order to solve problems
	EX_G.5 (A)—Use numeric and geometric patterns to develop algebraic expressions representing geometric properties
	EX_G.5 (D)—Identify and apply patterns from right triangles to solve meaningful problems, including special right triangles (45-45-90 and 30-60-90) and triangles whose sides are Pythagorean triples
Measurement	EX_G.8 (C)—[Derive], extend, and use the Pythagorean Theorem
Mathematical processes and tools	EX_8.14 (A)—Identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics
	EX_8.14 (C)—Select or develop an appropriate problemsolving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem

Source: Expert content reviewers' analysis based on data from National Assessment Governing Board (2007) and Texas Education Agency (2007a).

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