



# **Aligning mathematics assessment standards: New Mexico and the 2009 National Assessment of Educational Progress (NAEP)**

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October 2008

After receiving the 2007 REL Southwest alignment study of the New Mexico Standards Based Assessment (NMSBA) and the National Assessment of Educational Progress (NAEP) assessment standards in science (<http://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=76&productID=41>), the New Mexico Public Department of Education and the REL Southwest Governing Board requested that REL Southwest conduct a similar alignment study to learn how the NMSBA assessment standards align with the 2009 NAEP assessment standards in mathematics.

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## Summary

**This technical brief examines the current alignment between the New Mexico Standards Based Assessment (NMSBA) 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 New Mexico science standards with the 2009 NAEP, this study presents results for areas of full alignment, partial alignment, nonalignment, and areas where the NMSBA assessment standards go beyond the NAEP standards. The study finds that 92 percent of NAEP grade 4, 94 percent of NAEP grade 8, and 80 percent of NAEP grade 12 assessment standards (aligned with current NMSBA assessment standards) and 77 percent of NAEP grade 12 assessment standards (aligned with proposed NMSBA assessment standards) are either fully or partially addressed by the NMSBA assessment standards.**

The study analyzes the alignment of the NMSBA and 2009 NAEP mathematics assessment standards. It does not analyze individual items or the alignment of state standards with the NMSBA assessment items. The study does not make specific recommendations about whether a state should close gaps in alignment to 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 New Mexico Standards Based Assessment (NMSBA) assessment standards in science (Timms et al. 2007). After receiving the science alignment report, the New Mexico Public Education Department and the Regional Educational Laboratory Southwest Governing Board requested a similar alignment study to understand how the NMSBA mathematics assessment standards<sup>1</sup> align with the 2009 NAEP mathematics assessment standards.<sup>2</sup>

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 unique 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 on 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 in 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 New Mexico policymakers of specific areas in which NMSBA 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). The New Mexico Public Education Department finished revising their mathematics assessment standards for grades 9–12 at the outset of this study; these standards will be considered for final approval in October 2008. The New Mexico Public Education Department requested that REL Southwest conduct two separate alignment studies for the NAEP grade 12 mathematics assessment standards, one using the current assessment standards and one using the proposed assessment standards. Furthermore, it requested that results of both alignment studies be included in this technical brief. (Separate alignment tables are included in appendix C.)

## Results

Results are presented for grades 4, 8, and 12 for the research question: To what extent do current state assessment standards on the NMSBA cover the content on which 2009 NAEP

## 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 National Assessment of Educational Progress (NAEP) assessment standards and New Mexico Standards Based Assessment (NMSBA) assessment standards. First, they conducted gap analyses, identifying content in the grade-specific NAEP assessment standards that was absent in the grade-specific NMSBA assessment standards and content in the grade-specific NMSBA assessment standards that was absent in the grade-specific NAEP assessment standards. Second, reviewers examined order to determine whether grade-specific NAEP assessment standards were included at the same grade level as the matching content in the NMSBA 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 NMSBA 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.

assessments will be based? Results are presented for areas of full alignment, partial alignment, nonalignment, and areas where the NMSBA assessment standards go beyond the NAEP assessment standards. A NAEP assessment standard is considered to be *fully addressed* by an NMSBA assessment standard or standards if all of the content of the NAEP assessment standard is contained in one or more NMSBA assessment standards at the same or lower grade level. A NAEP assessment standard is considered to be *partially addressed* by the NMSBA assessment standard or standards if the NMSBA 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 NMSBA assessment standard or standards, or the NMSBA assessment standard or standards imply but do not explicitly state the content found in the NAEP assessment standard; there

is a matching NMSBA assessment standard at a higher grade level than the NAEP assessment standard; or there is a matching NMSBA 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 *New Mexico Mathematics Content Standards, Benchmarks, and Performance Standards* (New Mexico State Board of Education 2008). The 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.

TABLE 1

**Number of National Assessment of Educational Progress (NAEP) grade 4 mathematics assessment standards and number of New Mexico Standards Based Assessment (NMSBA) assessment standards by alignment with NAEP, by NAEP content area, April 2008**

NAEP content area	Number of NAEP assessment standards	Number of New Mexico assessment standards by alignment with NAEP <sup>a</sup>		
		Fully addressed	Partially addressed	Not addressed
Number properties and operations	20	9	9	2
Number sense	6	3	3	0
Estimation	3	2	1	0
Number operations	6	1	4	1
Ratios and proportional reasoning	1	0	1	0
Properties of numbers and operations	3	3	0	0
Mathematical reasoning using numbers	1	0	0	1
Measurement	10	6	4	0
Measuring physical attributes	6	4	2	0
Systems of measurement	4	2	2	0
Geometry	15	4	9	2
Dimension and shape	4	1	3	0
Transformation of shapes and preservation of properties	4	1	2	1
Relationships between geometric figures	4	1	2	1
Position, direction, and coordinate geometry	2	0	2	0
Mathematical reasoning in geometry	1	1	0	0
Data analysis, statistics, and probability	9	7	2	0
Data representations	3	2	1	0
Characteristics of data sets	2	2	0	0
Probability	4	3	1	0
Algebra	11	3	7	1
Patterns, relations, and functions	5	0	5	0
Algebraic representations	2	0	2	0
Variables, expressions, and operations	2	2	0	0
Equations and inequalities	1	1	0	0
Mathematical reasoning in algebra	1	0	0	1
All content	65	29	31	5

a. NAEP has 65 assessment standards at grade 4, and New Mexico has 84. Each New Mexico assessment standard may be mapped to more than one NAEP assessment standard.

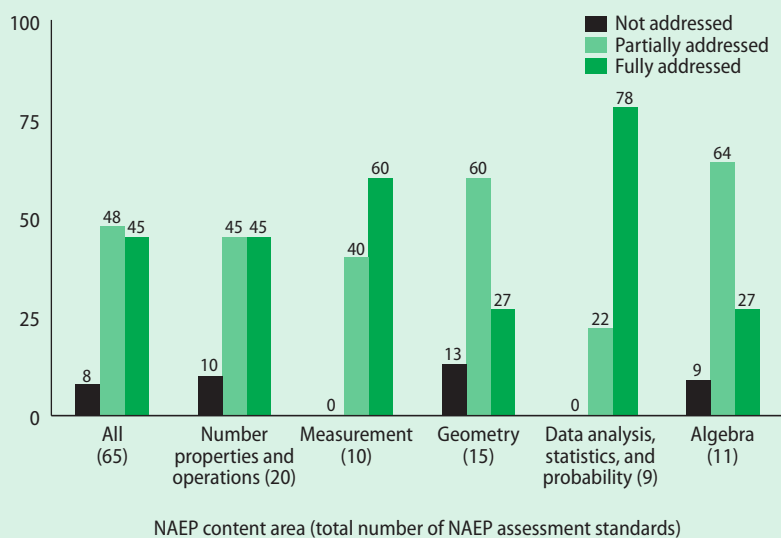
Source: Expert content reviewers' summary analysis of data in appendix table A1.

Twenty-nine of the NAEP assessment standards (45 percent) are fully addressed by the NMSBA assessment standards, 31 (48 percent) are partially addressed, and 5 (8 percent) are

not addressed (figure 1). (See appendix A for more detail on the alignment of the NAEP grade 4 assessment standards and NMSBA assessment standards and on the NMSBA

FIGURE 1

**Percentage of National Assessment of Educational Progress (NAEP) grade 4 mathematics assessment standards addressed by the New Mexico Standards Based Assessment (NMSBA) assessment standards, by NAEP content area, April 2008**



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

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.)

**Areas of full alignment.** Twenty-nine (45 percent) of the NAEP grade 4 assessment standards are fully addressed by the NMSBA assessment standards: 9 of 20 number properties and operations; 6 of 10 measurement; 4 of 15 geometry; 7 of 9 data analysis, statistics, and probability; and 3 of 11 algebra assessment standards. Of the 29 fully addressed NAEP grade 4 assessment standards, 4 are addressed at a lower grade in the NMSBA.

**Areas of partial alignment.** Thirty-one (48 percent) of the NAEP grade 4 mathematics assessment standards are partially addressed by the NMSBA assessment standards: 9 of 20 number properties and operations; 4 of 10 measurement; 9 of 15 geometry; 2 of 9 data analysis, statistics,

and probability, and 7 of 11 algebra assessment standards. Of the 31 partially addressed NAEP grade 4 assessment standards, 6 are addressed at a higher grade and 1 at both a higher and lower grade in the NMSBA assessment standards.

**Areas of nonalignment.** Five (8 percent) NAEP grade 4 mathematics assessment standards are not addressed by the NMSBA assessment standards: 2 of 20 number properties and operations, 2 of 15 geometry, and 1 of 11 algebra assessment standards.

**Areas where New Mexico assessment standards go beyond the NAEP assessment standards.** New Mexico has 84 assessment standards in the *New Mexico Mathematics Content Standards, Benchmarks, and Performance Standards* (New Mexico State Board of Education 2008). The NAEP assessment standards do not address 43 of these NMSBA assessment standards: 8 of number and operations; 13 of algebra; 9 of geometry; 8 of measurement; and 5 of data analysis and probability.

### 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 *New Mexico Mathematics Content Standards, Benchmarks, and Performance Standards* (New Mexico State Board of Education 2008). Because some grade 8 NAEP mathematics assessment standards are addressed at a higher grade by the NMSBA assessment standards, NAEP assessment standards were aligned with both the current assessment standards for grades 9–12 and proposed assessment standards. While two separate alignment tables are provided in appendix B (tables B1 and B2), the report provides only one summary because the same standards are addressed in the current and proposed standards. NAEP provides 100 distinct assessment

TABLE 2

**Number of National Assessment of Educational Progress (NAEP) grade 8 mathematics assessment standards and number of New Mexico Standards Based Assessment (NMSBA) assessment standards, by alignment with NAEP, by content area, April 2008**

NAEP content area	Number of NAEP assessment standards	Number of New Mexico assessment standards by alignment with NAEP <sup>a</sup>		
		Fully addressed	Partially addressed	Not addressed
Number properties and operations	27	12	12	3
Number sense	8	3	5	0
Estimation	4	1	3	0
Number operations	4	2	1	1
Ratios and proportional reasoning	4	3	1	0
Properties of numbers and operations	5	3	1	1
Mathematical reasoning using numbers	2	0	1	1
Measurement	12	4	8	0
Measuring physical attributes	6	3	3	0
Systems of measurement	5	1	4	0
Measurement in triangles	1	0	1	0
Geometry	21	5	14	2
Dimension and shape	6	0	6	0
Transformation of shapes and preservation of properties	5	2	3	0
Relationships between geometric figures	5	2	3	0
Position, direction, and coordinate geometry	4	1	1	2
Mathematical reasoning in geometry	1	0	1	0
Data analysis, statistics, and probability	22	10	11	1
Data representations	5	1	4	0
Characteristics of data sets	5	2	2	1
Experiments and samples	3	1	2	0
Probability	9	6	3	0
Algebra	18	4	14	0
Patterns relations, and functions	5	0	5	0
Algebraic representations	5	2	3	0
Variables, expressions, and operations	2	1	1	0
Equations and inequalities	5	1	4	0
Mathematical reasoning in algebra	1	0	1	0
All content	100	35	59	6

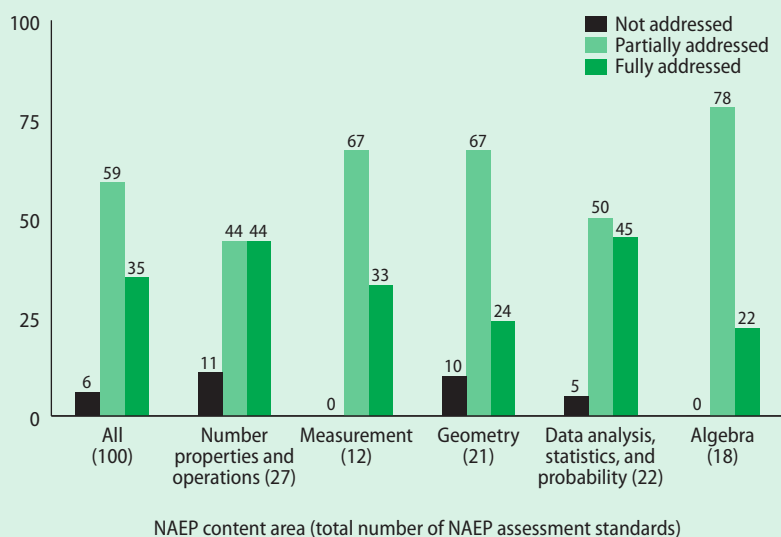
Note: Covers both current and proposed New Mexico assessment standards because the same standards are addressed in both.

a. NAEP has 100 assessment standards at grade 8, and New Mexico has 82. Each New Mexico assessment standard may be mapped to more than one NAEP assessment standard.

Source: Expert content reviewers' summary analysis of data in appendix tables B1 and B2.



FIGURE 2  
**Percentage of National Assessment of Educational Progress (NAEP) grade 8 mathematics assessment standards addressed by New Mexico Standards Based Assessment (NMSBA) assessment standards, by NAEP content area, April 2008**



Note: Covers both current and proposed New Mexico assessment standards because the same standards are addressed in both.

Source: Expert content reviewers' summary analysis of data in appendix tables B1 and B2.

standards for grade 8. The number of assessment standards per content area in each alignment rating category is shown in table 2.

Thirty-five of these assessment standards (35 percent) are fully addressed by the NMSBA assessment standards, 59 (59 percent) are partially addressed, and 6 (6 percent) are not addressed (figure 2). (See appendix B for more detail on the NAEP grade 8 assessment standards and NMSBA assessment standards and on the NMSBA grade 8 assessment standards not covered by 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 level.)

**Areas of full alignment.** Thirty-five (35 percent) of the NAEP grade 8 mathematics assessment standards are fully addressed by the NMSBA assessment standards: 12 of 27 number

properties and operations; 4 of 12 measurement; 5 of 21 geometry; 10 of 22 data analysis, statistics, and probability; and 4 of 18 algebra assessment standards. Of the 35 fully addressed NAEP grade 8 assessment standards, 15 are addressed at a lower grade in the NMSBA assessment standards.

**Areas of partial alignment.** Fifty-nine (59 percent) of the NAEP grade 8 mathematics assessment standards are partially addressed by the NMSBA assessment standards: 12 of 27 number properties and operations; 8 of 12 measurement; 14 of 21 geometry; 11 of 22 data analysis, statistics, and probability; and 14 of 18 algebra assessment standards. Of the 59 partially addressed NAEP grade 8 assessment standards, 9 are addressed at a higher grade, 6 are addressed at a lower grade, and 2 are addressed at both a higher and lower grade in the NMSBA assessment standards.

**Areas of nonalignment.** Six (6 percent) of the NAEP grade 8 mathematics assessment standards are not addressed in the NMSBA assessment standards: 3 of 27 number properties and operations; 2 of 21 geometry; and 1 of 22 data analysis, statistics, and probability assessment standards.

**Areas where New Mexico assessment standards go beyond the NAEP assessment standards.** New Mexico has 82 assessment standards in the *New Mexico Mathematics Content Standards, Benchmarks, and Performance Standards* (New Mexico State Board of Education 2008). The NAEP assessment standards do not address 23 of these NMSBA assessment standards: 5 of number and operations; 6 of algebra; 1 of geometry; and 11 of data analysis and probability.

#### Content alignment at grade 12: New Mexico current grade 12 assessment standards

The content reviewers compared the NAEP grade 12 assessment standards in the

TABLE 3

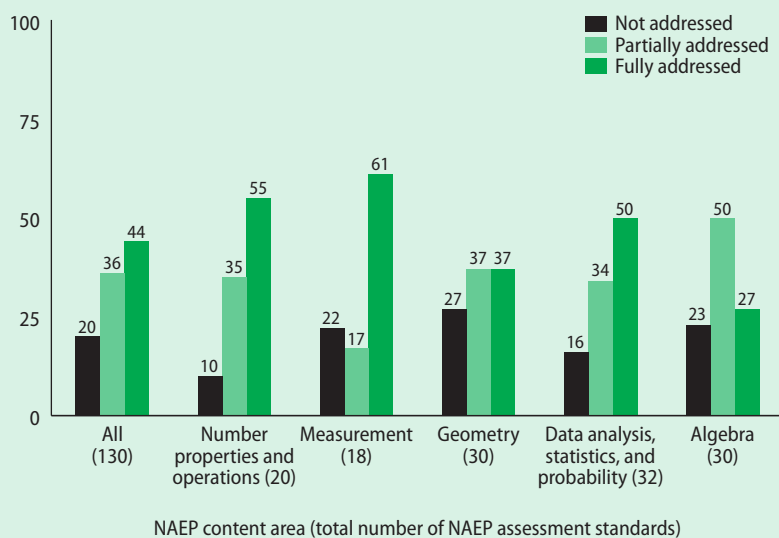
**Number of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and number of current New Mexico Standards Based Assessment (NMSBA) assessment standards by alignment with NAEP, by NAEP content area, April 2008**

NAEP content area	Number of NAEP assessment standards	Number of New Mexico assessment standards by alignment with NAEP <sup>a</sup>		
		Fully addressed	Partially addressed	Not addressed
Number properties and operations	20	11	7	2
Number sense	4	1	3	0
Estimation	3	2	1	0
Number operations	5	3	1	1
Ratios and proportional reasoning	2	1	1	0
Properties of numbers and operations	4	4	0	0
Mathematical reasoning using numbers	2	0	1	1
<b>Measurement</b>	<b>18</b>	<b>11</b>	<b>3</b>	<b>4</b>
Measuring physical attributes	6	5	1	0
Systems of measurement	5	3	2	0
Measurement in triangles	7	3	0	4
<b>Geometry</b>	<b>30</b>	<b>11</b>	<b>11</b>	<b>8</b>
Dimension and shape	4	1	2	1
Transformation of shapes and preservation of properties	6	3	3	0
Relationships between geometric figures	7	1	6	0
Position, direction, and coordinate geometry	8	1	0	7
Mathematical reasoning in geometry	5	5	0	0
<b>Data analysis, statistics, and probability</b>	<b>32</b>	<b>16</b>	<b>11</b>	<b>5</b>
Data representation	6	3	3	0
Characteristics of data sets	7	4	3	0
Experiments and samples	5	2	2	1
Probability	9	6	2	1
Mathematical reasoning with data	5	1	1	3
<b>Algebra</b>	<b>30</b>	<b>8</b>	<b>15</b>	<b>7</b>
Patterns, relations, and functions	7	3	3	1
Algebraic representations	7	1	5	1
Variables, expressions, and operations	7	3	3	1
Equations and inequalities	6	1	3	2
Mathematical reasoning in algebra	3	0	1	2
<b>All content</b>	<b>130</b>	<b>57</b>	<b>47</b>	<b>26</b>

a. NAEP has 130 assessment standards at grade 12, and New Mexico has 120. Each New Mexico 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 mathematics assessment standards addressed by the current New Mexico Standards Based Assessment (NMSBA) assessment standards by NAEP content area, April 2008**



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

*Mathematics Framework for 2009 National Assessment of Educational Progress* (National Assessment Governing Board 2007) with the assessment standards in the *New Mexico Mathematics Content Standard, Benchmarks, and Performance Standards* (New Mexico State Board of Education 2002). 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.

Fifty-seven of these assessment standards (44 percent) are fully addressed by the current NMSBA assessment standards, 47 (36 percent) are partially addressed, and 26 (20 percent) are not addressed (figure 3). (See appendix C for more detail on the alignment of the NAEP grade 12 assessment standards and the NMSBA assessment standards and on the NMSBA 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.** Fifty-seven (44 percent) of the NAEP grade 12 assessment standards are fully addressed by the current NMSBA assessment standards: 11 of 20 number properties and operations; 11 of 18 measurement; 11 of 30 geometry; 16 of 32 data analysis, statistics, and probability; and 8 of 30 algebra assessment standards. Of the 57 fully addressed NAEP grade 12 assessment standards, 16 are addressed at a lower grade in the current NMSBA assessment standards.

**Areas of partial alignment.** Forty-seven (36 percent) of the NAEP grade 12 mathematics assessment standards are partially addressed by the current NMSBA assessment standards: 7 of 20 number properties and operations; 3 of 18 measurement; 11 of 30 geometry; 11 of 32 data analysis, statistics, and probability; and 15 of 30 algebra assessment standards. Of the 47 partially addressed NAEP grade 12 assessment standards, 6 are addressed at a lower grade in the current NMSBA assessment standards.

**Areas of nonalignment.** Twenty-six (20 percent) of the NAEP grade 12 mathematics assessment standards are not addressed by the current NMSBA assessment standards: 2 of 20 number properties and operations; 4 of 18 measurement; 8 of 30 geometry; 5 of 32 data analysis, statistics, and probability; and 7 of 30 algebra assessment standards.

**Areas where current New Mexico assessment standards go beyond the NAEP assessment standards.** New Mexico has 120 assessment standards in the *New Mexico Mathematics Content Standard, Benchmarks, and Performance Standards* (New Mexico State Board of Education 2002). The NAEP assessment standards do not address 30 of these assessment standards: 21 of

TABLE 4

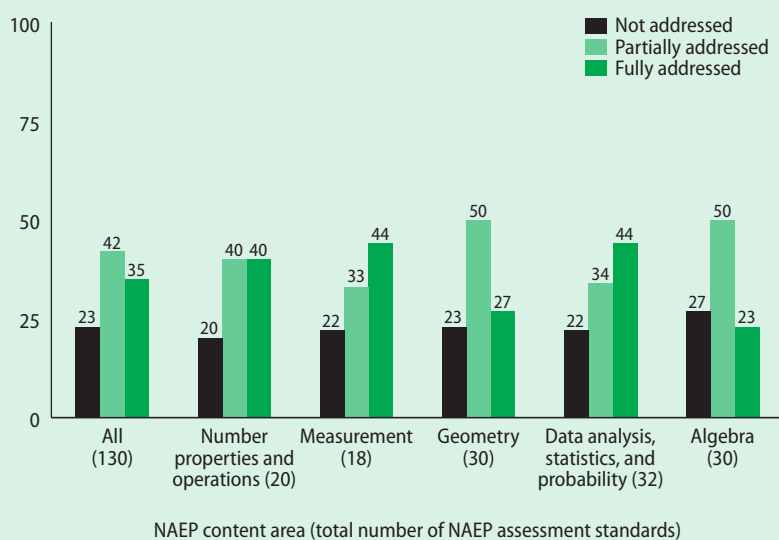
**Number of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and number of proposed New Mexico Standards Based Assessment (NMSBA) assessment standards by alignment with NAEP, by content area, April 2008**

NAEP content area	Number of NAEP assessment standards	Number of New Mexico assessment standards by alignment with NAEP <sup>a</sup>		
		Fully addressed	Partially addressed	Not addressed
Number properties and operations	20	8	8	4
Number sense	4	0	4	0
Estimation	3	1	1	1
Number operations	5	3	1	1
Ratios and proportional reasoning	2	1	1	0
Properties of numbers and operations	4	3	1	0
Mathematical reasoning using numbers	2	0	0	2
Measurement	18	8	6	4
Measuring physical attributes	6	3	3	0
Systems of measurement	5	2	3	0
Measurement in triangles	7	3	0	4
Geometry	30	8	15	7
Dimension and shape	4	1	2	1
Transformation of shapes and preservation of properties	6	1	5	0
Relationships between geometric figures	7	0	7	0
Position, direction, and coordinate geometry	8	1	1	6
Mathematical reasoning in geometry	5	5	0	0
Data analysis, statistics, and probability	32	14	11	7
Data representation	6	3	3	0
Characteristics of data sets	7	3	3	1
Experiments and samples	5	2	2	1
Probability	9	5	2	2
Mathematical reasoning with data	5	1	1	3
Algebra	30	7	15	8
Patterns, relations, and functions	7	1	3	3
Algebraic representations	7	1	5	1
Variables, expressions, and operations	7	3	3	1
Equations and inequalities	6	2	3	1
Mathematical reasoning in algebra	3	0	1	2
All content	130	45	55	30

a. NAEP has 130 assessment standards at grade 12, and New Mexico has 90 proposed assessment standards. Each New Mexico proposed revised assessment standard may be mapped to more than one NAEP assessment standard.

Source: Expert content reviewers' summary analysis of data in appendix table C6.

FIGURE 4  
**Percentage of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards addressed by the proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, by NAEP content area, April 2008**



Source: Expert content reviewers' summary analysis of data in appendix table C6.

algebra; 3 of geometry; and 6 of data analysis and probability.

#### Content alignment at grade 12: New Mexico proposed grade 12 assessment standards

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 *New Mexico Mathematics Content Standards, Benchmarks, and Performance Standards* (New Mexico State Board of Education 2008). The NAEP provides 130 assessment standards for grade 12. The number of proposed revised assessment standards per content area in each alignment rating category is shown in table 4.

Forty-five of these assessment standards (35 percent) are fully addressed by the NMSBA assessment standards, 55 (42 percent) are partially addressed, and 30 (23 percent) are not addressed (figure 4). (See appendix C for more

detail on the alignment of the NAEP grade 12 assessment standards and the proposed NMSBA assessment standards and on the proposed NMSBA 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 level).

**Areas of full alignment.** Forty-five (35 percent) of the NAEP grade 12 assessment standards are fully addressed by the proposed New Mexico assessment standards: 8 of 20 number properties and operations; 8 of 18 measurement; 8 of 30 geometry; 14 of 32 data analysis, statistics, and probability; and 7 of 30 algebra assessment standards. Of the 45 fully addressed NAEP grade 12 assessment standards, 16 are addressed at a lower grade in the proposed NMSBA assessment standards.

**Areas of partial alignment.** Fifty-five (42 percent) of the NAEP grade 12 mathematics assessment standards were partially aligned with the proposed NMSBA assessment standards: 8 of 20 number properties and operations; 6 of 18 measurement; 15 of 30 geometry; 11 of 32 data analysis, statistics, and probability; and 15 of 30 algebra assessment standards. Of the 55 partially addressed NAEP grade 12 assessment standards, 4 are addressed at a lower grade in the proposed NMSBA assessment standards.

**Areas of nonalignment.** Thirty (23 percent) of the NAEP grade 12 mathematics assessment standards are not addressed by the proposed NMSBA assessment standards: 4 of 20 number properties and operations; 4 of 18 measurement; 7 of 30 geometry; 7 of 32 data analysis, statistics, and probability; and 8 of 30 algebra assessment standards.

**Areas where the proposed New Mexico assessment standards go beyond the NAEP assessment standards.** New Mexico has 90 assessment standards

in the proposed revised *New Mexico Mathematics Content Standards, Benchmarks, and Performance Standards* (New Mexico State Board of Education 2008). The NAEP assessment standards do not address 30 of these proposed assessment standards: 15 of algebra; 6 of geometry; and 9 of data analysis and probability.

### Limitations

The study analyzed the alignment of the NMSBA mathematics assessment standards and 2009 NAEP mathematics assessment standards. It did not analyze individual items or the alignment of state assessment standards with NMSBA assessment items. The study was not designed to make specific recommendations about whether a state should close gaps in alignment to 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 change will bring to students.

### Notes

1. In discussing NMSBA, the term *assessment standard* refers to the NMSBA performance standards outlined in the *New Mexico Mathematics Content Standards, Benchmarks, and Performance Standards* (New Mexico State Board of Education 2002, 2008).
2. In discussing NAEP, the term *assessment standard* refers to the NAEP 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 New Mexico Standards Based**  
**Assessment (NMSBA) assessment standards**

TABLE A1

**Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and New Mexico Standards Based Assessments (NMSBA) grade 4 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>4N.1 Number sense</b>				
4N.1(a) Identify the place value and actual value of digits in whole numbers.	4.N.1.1 Exhibit an understanding of the place-value structure of the base-ten number system by reading, modeling, writing, and interpreting whole numbers up to 100,000; compare and order the numbers	3		
4N.1(b) Represent numbers using models such as base 10 representations, number lines, and two-dimensional models.	4.N.1.1 Exhibit an understanding of the place-value structure of the base-ten number system by reading, modeling, writing, and interpreting whole numbers up to 100,000; compare and order the numbers	2	IC	The New Mexico assessment standard is not as specific about the types of models used
4N.1(c) Compose or decompose whole quantities by place value (e.g., write whole numbers in expanded notation using place value: $342 = 300 + 40 + 2$ ).	4.N.1.1a Recognize equivalent representations for the same number and generate them by decomposing and combining numbers (e.g., $853 = 8 \times 100 + 5 \times 10 + 3$ ; $853 = 85 \times 10 + 3$ ; $853 = 900 - 50 + 3$ )	3		
4N.1(d) Write or rename whole numbers (e.g., $10: 5 + 5, 12 - 2, 2 \times 5$ ).	4.N.1.1a Recognize equivalent representations for the same number and generate them by decomposing and combining numbers (e.g., $853 = 8 \times 100 + 5 \times 10 + 3$ ; $853 = 85 \times 10 + 3$ ; $853 = 900 - 50 + 3$ )	3		
4N.1(e) Connect model, number word, or number using various models and representations for whole numbers, fractions, and decimals.	4.N.1.2 Identify fractions as parts of unit wholes, as parts of groups, and as locations on number lines 4.N.1.2b Use models to show how whole numbers and decimals (to the hundredths place) relate to simple fractions (e.g., $\frac{1}{2}, 5/10, 0.5$ )	2	IC	

(CONTINUED)

TABLE A1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and New Mexico Standards Based Assessments (NMSBA) grade 4 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>4N.1 Number sense</b>				
4N.1(i) Order or compare whole numbers, decimals, or fractions.	4.N.1.1 Exhibit an understanding of the place-value structure of the base-ten number system by reading, modeling, writing, and interpreting whole numbers up to 100,000; compare and order the numbers 4.N.1.2 Identify fractions as parts of unit wholes, as parts of groups, and as locations on number lines 4.N.1.2b Use models to show how whole numbers and decimals (to the hundredths place) relate to simple fractions (e.g., $\frac{1}{2}$ , $\frac{5}{10}$ , 0.5)	2	IC	
<b>4N.2 Estimation</b>				
4N.2(a) Use benchmarks (well-known numbers used as meaningful points for comparison) for whole numbers, decimals, or fractions in contexts (e.g., $\frac{1}{2}$ and .5 may be used as benchmarks for fractions and decimals between 0 and 1.00).	3.N.1.1c Recognizing the position of a given number in the base-ten number system and its relationship to benchmark numbers such as 10, 50, 100, 500	3	LG	
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.N.3.4 Use strategies to estimate computations involving fractions and decimals 4.N.3.3 Use a variety of strategies (e.g., rounding and regrouping) to estimate the results of whole number computations and judge the reasonableness of the answers	3		
4N.2(c) Verify solutions or determine the reasonableness of results in meaningful contexts.	4.N.3.3 Use a variety of strategies (e.g., rounding and regrouping) to estimate the results of whole number computations and judge the reasonableness of the answers	2	IC	

(CONTINUED)



TABLE A1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and New Mexico Standards Based Assessments (NMSBA) grade 4 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
Number properties and operations				
4N.3 Number operations				
4N.3(a) Add and subtract: • whole numbers, or • fractions with like denominators, or • decimals through hundredths.	4.N.1.3 Add and subtract fractions with common and uncommon denominators using a variety of strategies (e.g., manipulatives, numbers, pictures) 4.N.2.1a Demonstrate an understanding of and the ability to use: Standard algorithms for the addition and subtraction of multi-digit numbers 4.N.2.3 Extend the uses of whole numbers to the addition and subtraction of simple decimals (positive numbers to two places)	3		
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.N.2.4 Demonstrate commutative, associative, identity, and zero properties of operations on whole numbers (e.g., $37 \times 46 = 46 \times 37$ and $(6 \times 2) \times 5 = 6 \times (2 \times 5)$ ) 4.N.2.1b Demonstrate an understanding of and the ability to use: Standard algorithms for multiplying a multi-digit number by a two-digit number and for dividing a multi-digit number by a one-digit number	2	MC	The New Mexico assessment standards do not specify use of 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.N.2.1b Demonstrate an understanding of and the ability to use: Standard algorithms for multiplying a multi-digit number by a two-digit number and for dividing a multi-digit number by a one-digit number	2	MC	The New Mexico assessment standard does not specify use of 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.N.2.1a Demonstrate an understanding of and the ability to use: Standard algorithms for the addition and subtraction of multi-digit numbers 4.N.2.1b Demonstrate an understanding of and the ability to use: Standard algorithms for multiplying a multi-digit number by a two-digit number and for dividing a multi-digit number by a one-digit number	2	IC	

(CONTINUED)

TABLE A1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and New Mexico Standards Based Assessments (NMSBA) grade 4 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>4N.3 Number operations</b>				
4N.3(f) Solve application problems involving numbers and operations.	4.N.2.2 Select and use appropriate operations (addition, subtraction, multiplication, and division) to solve problems	2	IC	The New Mexico assessment standard does not specify solving application problems
<b>4N.4 Ratios and proportional reasoning</b>				
4N.4(a) Use simple ratios to describe problem situations.	6.N.3.6 Interpret and use ratios in different contexts	2	HG	
<b>4N.5 Properties of numbers and operations</b>				
4N.5(a) Identify odd and even numbers.	4.N.1.4 Recognize classes of numbers (e.g., odd, even, factors, multiples, square numbers) and apply these concepts in problem-solving situations	3		
4N.5(b) Identify factors of whole numbers.	4.N.1.4 Recognize classes of numbers (e.g., odd, even, factors, multiples, square numbers) and apply these concepts in problem-solving situations	3		
4N.5(e) Apply basic properties of operations.	4.N.2.2 Select and use appropriate operations (addition, subtraction, multiplication, and division) to solve problems	3		
<b>4N.6 Mathematical reasoning using numbers</b>				
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 $3-7$ ).		1		
<b>Measurement</b>				
<b>4M.1 Measuring physical attributes</b>				
4M.1(a) Identify the attribute that is appropriate to measure in a given situation.	3.M.1.5 Identify properties (e.g., length, area, weight, volume) and select the appropriate type of unit for measuring each property	3	LG	
4M.1(b) Compare objects with respect to a given attribute, such as length, area, volume, time, or temperature.	2.M.1.2 Use direct comparison to compare and order objects according to length, mass, and area	3	LG	
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.M.2.1 Estimate perimeters, areas of rectangles, triangles, and irregular shapes 4.M.2.3 Estimate, measure, and solve problems involving length, area, mass, time, and temperature using appropriate standard units and tools	3		

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TABLE A1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and New Mexico Standards Based Assessments (NMSBA) grade 4 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Measurement</b>				
<b>4M.1 Measuring physical attributes</b>				
4M.1(e) Select or use appropriate measurement instruments such as ruler, meter stick, clock, thermometer, or other scaled instruments.	3.M.1.2 Choose and use the appropriate units and measurement tools to quantify the properties of objects (e.g., length [ruler], width [ruler], or mass [balance scale]) 5.M.2.1 Solve measurement problems using appropriate tools involving length, perimeter, weight, capacity, time, and temperature	2	LG HG	
4M.1(f) Solve problems involving perimeter of plane figures.	4.M.2.1 Estimate perimeters, areas of rectangles, triangles, and irregular shapes	2	MC	
4M.1(g) Solve problems involving area of squares and rectangles.	4.M.2.2 Find the area of rectangles, related triangles, and parallelograms	3		
<b>4M.2 Systems of measurement</b>				
4M.2(a) Select or use appropriate type of unit for the attribute being measured such as length, time, or temperature.	3.M.1.2 Choose and use the appropriate units and measurement tools to quantify the properties of objects (e.g., length [ruler], width [ruler], or mass [balance scale])	3	LG	
4M.2(b) Solve problems involving conversions within the same measurement system such as conversions involving inches and feet or hours and minutes.	4.M.1.6 Carry out simple conversions within a system of measurement (e.g., hours to minutes, meters to centimeters)	3		
4M.2(d) Determine appropriate size of unit of measurement in problem situation involving such attributes as length, time, capacity, or weight.	4.M.2.3 Estimate, measure, and solve problems involving length, area, mass, time, and temperature using appropriate standard units and tools	2	IC	
4M.2(e) Determine situations in which a highly accurate measurement is important.	5.M.1.2 Select and use appropriate units and tools to measure according to the degree of accuracy required in a particular problem-solving situation	2	HG	
<b>Geometry</b>				
<b>4G.1 Dimension and shape</b>				
4G.1(a) Explore properties of paths between points.	4.G.2.2 Use ordered pairs to graph, locate, identify points, and describe paths in the first quadrant of the coordinate plane	2	IC	

(CONTINUED)

TABLE A1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and New Mexico Standards Based Assessments (NMSBA) grade 4 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>4G.1 Dimension and shape</b>				
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).	4.G.1.1 Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes	2	MD	
4G.1(c) Identify or draw angles and other geometric figures in the plane.	4.G.1.1a Build, draw, create, and describe geometric objects	2	IC	The New Mexico assessment standard does not specify angles
4G.1(f) Describe attributes of two- and three-dimensional shapes.	4.G.1.1 Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes	3		
<b>4G.2 Transformation of shapes and preservation of properties</b>				
4G.2(a) Identify whether a figure is symmetrical, or draw lines of symmetry.	4.G.3.1 Create and describe rotational designs using language of transformational symmetry	2	IC	
4G.2(c) Identify the images resulting from flips (reflections), slides (translations), or turns (rotations).	4.G.3.1 Create and describe rotational designs using language of transformational symmetry	3		
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.G.1.1c Identify and compare congruent and similar figures	2	IC	
<b>4G.3 Relationships between geometric figures</b>				
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).		1		
4G.3(b) Assemble simple plane shapes to construct a given shape.	4.G.1.1a Build, draw, create, and describe geometric objects	2	IC	
4G.3(c) Recognize two-dimensional faces of three-dimensional shapes.	4.G.1.2a Visualize, describe, and make models of geometric solids in terms of the number of faces, edges, and vertices 4.G.1.2b Interpret two-dimensional representations of three-dimensional objects	3		

(CONTINUED)

TABLE A1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and New Mexico Standards Based Assessments (NMSBA) grade 4 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>4G.3 Relationships between geometric figures</b>				
4G.3(f) Describe and compare properties of simple and compound figures composed of triangles, squares, and rectangles.	4.G.1.1 Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes	2	IC	The New Mexico assessment standard does not specify compound figures
<b>4G.4 Position, direction, and coordinate geometry</b>				
4G.4(a) Describe relative positions of points and lines using the geometric ideas of parallelism or perpendicularity.	4.G.1.1b Identify lines that are parallel or perpendicular	2	MC	
4G.4(d) Construct geometric figures with vertices at points on a coordinate grid.	4.G.2.2 Use ordered pairs to graph, locate, identify points, and describe paths in the first quadrant of the coordinate plane	2	IC	
<b>4G.5 Mathematical reasoning in geometry</b>				
4G.5(a) Distinguish which objects in a collection satisfy a given geometric definition and explain choices.	4.G.1.2 Classify two- and three-dimensional shapes according to their properties and develop definitions of classes like triangles and pyramids 4.G.1.3 Make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions	3		
<b>Data analysis, statistics, and probability</b>				
<b>4P.1 Data representation</b>				
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.D.1.1 Organize, represent, and interpret numerical and categorical data and clearly communicate findings	3		
4P.1(b) For a given set of data, complete a graph (limits of time make it difficult to construct graphs completely).	4.D.1.2 Design investigations and represent data using tables and graphs (e.g., line plots, bar graphs, line graphs)	3		
4P.1(c) Solve problems by estimating and computing within a single set of data.	6.D.1.5 Solve problems by collecting, organizing, displaying and interpreting data	2	HG	
<b>4P.2 Characteristics of data sets</b>				
4P.2(b) Given a set of data or a graph, describe the distribution of the data using median, range, or mode.	4.D.2.2 Use the concepts of median, mode, maximum, minimum, and range and draw conclusions about a data set	3		
4P.2(d) Compare two sets of related data.	4.D.2.1 Compare and describe related data sets	3		

(CONTINUED)

TABLE A1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and New Mexico Standards Based Assessments (NMSBA) grade 4 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>4P.4 Probability</b>				
4P.4(a) Use informal probabilistic thinking to describe chance events (i.e., likely and unlikely, certain and impossible).	4.D.4.1 Describe events as “likely,” “unlikely,” or “impossible” and quantify simple probability situations	3		
4P.4(b) Determine a simple probability from a context that includes a picture.	4.D.4.1b Express outcomes of experimental probability situations verbally and numerically (e.g., three out of four, $\frac{3}{4}$ ) 4.D.4.1a Represent all possible outcomes for a simple probability situation in an organized way (e.g., tables, grids, tree diagrams)	2	MD	The NAEP standard is very specific about a context that includes a picture while the New Mexico assessment standards are not
4P.4(e) List all possible outcomes of a given situation or event.	4.D.4.1a Represent all possible outcomes for a simple probability situation in an organized way (e.g., tables, grids, tree diagrams) 4.D.4.2 List all the possible combinations of objects from three sets (e.g., spinners, number of outfits from three different shirts, two skirts, and two hats)	3		
4P.4(g) Represent the probability of a given outcome using a picture or other graphic.	4.D.4.1a Represent all possible outcomes for a simple probability situation in an organized way (e.g., tables, grids, tree diagrams)	3		
<b>Algebra</b>				
<b>4A.1 Patterns, relations, and functions</b>				
4A.1(a) Recognize, describe, or extend numerical patterns.	4.A.1.2 Create and describe numeric and geometric patterns including multiplication and division patterns	2	MC	The New Mexico assessment standard does not include extending the pattern
4A.1(b) Given a pattern or sequence, construct or explain a rule that can generate the terms of the pattern or sequence.	4.A.1.2 Create and describe numeric and geometric patterns including multiplication and division patterns	2	MD	
4A.1(c) Given a description, extend or find a missing term in a pattern or sequence.	5.A.1.3 Identify, describe, and continue patterns presented in a variety of formats (e.g., numeric, visual, oral, written, kinesthetic, pictorial)	2	HG	
4A.1(d) Create a different representation of a pattern or sequence given a verbal description.	5.A.1.3 Identify, describe, and continue patterns presented in a variety of formats (e.g., numeric, visual, oral, written, kinesthetic, pictorial)	2	HG	

(CONTINUED)

TABLE A1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 4 mathematics and New Mexico Standards Based Assessments (NMSBA) grade 4 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>4A.1 Patterns, relations, and functions</b>				
4A.1(e) Recognize or describe a relationship in which quantities change proportionally.	6.A.1.4 Explain and use the relationships among ratios, proportions, and percents	2	HG IC	
<b>4A.2 Algebraic representations</b>				
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.A.1.4 Use and interpret variables, mathematical symbols, and properties to write and simplify expressions and sentences	2	IC	The New Mexico assessment standard does not specify translating
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.G.2.2 Use ordered pairs to graph, locate, identify points, and describe paths in the first quadrant of the coordinate plane	2	IC	
<b>4A.3 Variables, expressions, and operations</b>				
4A.3(a) Use letters and symbols to represent an unknown quantity in a simple mathematical expression.	4.A.1.4a Use letters, boxes, or other symbols to stand for any number in simple expressions or equations (e.g., demonstrate an understanding of the concept of a variable) 4.A.2.1 Identify symbols and letters that represent the concept of a variable as an unknown quantity	3		
4A.3(b) Express simple mathematical relationships using number sentences.	4.A.2.3 Express mathematical relationships using equations	3		
<b>4A.4 Equations and inequalities</b>				
4A.4(a) Find the value of the unknown in a whole number sentence.	4.A.2.4 Determine the value of variables in simple equations (e.g., $80 \times 15 = 40 \times \text{?}$ )	3		
<b>4A.5 Mathematical reasoning in algebra</b>				
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 NMSBA assessment standard or standards do not address the NAEP assessment standard, 2 that the NMSBA assessment standard or standards partially address the NAEP assessment standard, and 3 that the NMSBA 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 NMSBA assessment standard or standards if all of the content in the NAEP assessment standard is contained in one or more NMSBA assessment standards at the same or lower grade level. A NAEP standard is considered to be *partially addressed* by the NMSBA assessment standard or standards if the NMSBA assessment standard or standards address only one part of the NAEP standard; the NAEP standard contains more content or more detailed content than the NMSBA assessment standard or standards or the NMSBA assessment standard or standard imply but do not explicitly state the content found in the NAEP assessment standard; there is a matching NMSBA assessment standard or standards at a higher state grade level than the NAEP assessment standard; or there is a matching NMSBA assessment standard or standards at a lower grade level than the NAEP assessment standard, but it does not address all the content addressed by the 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 New Mexico State Board of Education (2002).

TABLE A2  
**Number of New Mexico Standards Based Assessment (NMSBA) grade 4 assessment standards not covered by the National Assessment of Educational Progress (NAEP) grade 4 assessment standards, April 2008**

NMSBA strand	Number of assessment standards not covered
Number properties and operations	8
Measurement	8
Geometry	9
Data analysis and probability	5
Algebra	13
Total	43

Source: New Mexico State Board of Education (2002).



TABLE A3

**New Mexico Standards Based Assessment (NMSBA) grade 4 assessment standards not covered by the National Assessment of Educational Progress (NAEP) grade 4 assessment standards, April 2008**

NMSBA strand	NMSBA grade 4 assessment standard not covered in NAEP
Number properties and operations	4.N.1.1b Identify the numbers less than zero by extending the number line and using negative numbers through familiar applications (e.g., temperature, money)
	4.N.1.2a Use visual models and other strategies to compare and order commonly used fractions
	4.N.1.2c Identify different interpretations of fractions: <ul style="list-style-type: none"> <li>• division of whole numbers by whole numbers</li> <li>• ratio</li> <li>• equivalence</li> <li>• ordering of fractions</li> <li>• parts of a whole or parts of a set</li> </ul>
	4.N.1.3a Recognize and generate equivalent decimal forms of commonly used fractions (e.g., halves, quarters, tenths, fifths)
	4.N.1.3b Identify the numbers less than zero by extending the number line and using negative numbers through familiar applications (e.g., temperature, money)
	4.N.2.5 Demonstrate the concept of distributive of multiplication over addition and subtraction (e.g., $7 \times 28$ is equivalent to $(7 \times 20) + (7 \times 8)$ or $(7 \times 30) - (7 \times 2)$ )
	4.N.3.1 Demonstrate multiplication combinations through $12 \times 12$ and related division facts, and use them to solve problems mentally and compute related problems (e.g., $4 \times 5$ is related to $40 \times 50$ , $400 \times 5$ , and $40 \times 500$ )
	4.N.3.2 Add, subtract, and multiply up to two double-digits accurately and efficiently
Measurement	4.M.1.1 Select the appropriate type of unit for measuring perimeter and size of an angle
	4.M.1.2 Understand the need for measuring with standard units and become familiar with the standard units in customary and metric system
	4.M.1.3 Identify the inverse relationship between the size of the units and the number of units
	4.M.1.4 Develop formulas to determine the surface areas of rectangular solids
	4.M.1.5 Develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms
	4.M.2.4 Identify common measurements of turns (e.g., 360 degrees in one turn, 90 degrees in a quarter-turn)
	4.M.2.5 Compute elapsed time and make and interpret schedules
4.M.2.6 Use tools to measure angles (e.g., protractor, compass)	
Geometry	4.G.2.1 Describe location and movement using common language and geometric vocabulary
	4.G.2.3 Use a variety of methods for measuring distances between locations on a grid
	4.G.3.2 Describe a motion or set of motions that will show that two shapes are congruent
	4.G.4.1 Develop and use mental images of geometric shapes to solve problems (e.g., represent three-dimensional shapes in two dimensions)
	4.G.4.2 Use geometric models such as number lines, arrays, and computer simulations to investigate number relationships (e.g., patterns)
	4.G.4.3 Explore relationships involving perimeter and area
	4.G.4.3a Measure area of rectangular shapes and use appropriate units
	4.G.4.3b Recognize that area can have the same perimeter but different areas and vice versa
	4.G.4.3c Use models and formulas to solve problems involving perimeter and area of rectangles and squares (e.g., arrays)

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TABLE A3 (CONTINUED)

**New Mexico Standards Based Assessment (NMSBA) grade 4 assessment standards not covered by the National Assessment of Educational Progress (NAEP) grade 4 assessment standards, April 2008**

NMSBA strand	NMSBA grade 4 assessment standard not covered in NAEP
Data analysis and probability	4.D.1.1a Choose and construct representations that are appropriate for the data set
	4.D.1.1b Recognize the differences in representing categorical and numerical data
	4.D.2.3 Use data analysis to make reasonable inferences/predictions and to develop convincing arguments from data described in a variety of formats (e.g. bar graphs, Venn diagrams, charts, tables, line graphs, and pictographs)
	4.D.3.1 Propose and justify conclusions and predictions based on data
	4.D.3.2 Develop convincing arguments from data displayed in a variety of formats
Algebra	4.A.1.1 Represent and analyze patterns and simple functions using words, tables, and graphs.
	4.A.1.3 Express mathematical relationships using equations
	4.A.1.4b Interpret and evaluate mathematical expressions using parentheses
	4.A.1.4c Use and interpret formulas (e.g., $\text{Area} = \text{Length} \times \text{Width}$ or $A = L \times W$ ) to answer questions about quantities and their relationships
	4.A.2.2 Explore the uses of properties (commutative, distributive, associative) in the computation of whole numbers
	4.A.2.5 Develop simple formulas in exploring quantities and their relationships (e.g., $A = L \times W$ )
	4.A.3.1 Solve problems involving proportional relationships (including unit pricing and map interpretations; e.g., one inch = five miles; therefore, five inches = $x$ miles)
	4.A.3.2 Model problem situations and use graphs, tables, pictures, and equations to draw conclusions (e.g., different patterns of change)
	4.A.3.3 Use and interpret formulas (e.g., $\text{Area} = \text{Length} \times \text{Width}$ or $A = L \times W$ ) to answer questions about quantities and their relationships
	4.A.4.1 Identify and describe situations with constant or varying rates of change and compare them
	4.A.4.2 Determine how a change in one variable relates to a change in a second variable (e.g., data tables, input-output machines)
	4.A.4.3 Find and analyze patterns using data tables (e.g., T tables)
	4.A.4.4 Demonstrate and describe varying rates of change in relation to real-world situations (e.g., plant growth, students' heights)

Source: New Mexico State Board of Education (2002).

**Appendix B**  
**Details on the alignment of the National Assessment of Educational Progress**  
**grade 8 assessment standards and the New Mexico Standards Based**  
**Assessment (NMSBA) assessment standards**

TABLE B1

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>8N.1 Number sense</b>				
8N.1(a) Use place value to model and describe integers and decimals.	5.N.1.3 Represent place value using concrete or illustrated models up to one billion (1,000,000,000)	2	LG IC	
8N.1(b) Model or describe rational numbers or numerical relationships using number lines and diagrams.	6.N.1.5 Identify and represent on a number line decimals, fractions, mixed numbers, and positive and negative integers	3	LG	
8N.1(d) Write or rename rational numbers.	6.N.1.2 Use equivalent representations for rational numbers (e.g., integers, decimals, fractions, percents, ratios, numbers with whole-number exponents)	2	LG IC	
8N.1(e) Recognize, translate between, or apply multiple representations of rational numbers (fractions, decimals, and percents) in meaningful contexts.	7.N.1.3 Use properties of the real-number system to explain reasoning and to formulate and solve real-world problems 6.N.1.2 Use equivalent representations for rational numbers (e.g., integers, decimals, fractions, percents, ratios, numbers with whole-number exponents) 6.N.1.3 Use appropriate representations of positive rational numbers in the context of real-life applications	2	LG IC	
8N.1(f) Express or interpret numbers using scientific notation from real-life contexts.	7.N.1.4 Read, write, and compare rational numbers in scientific notation (e.g., positive and negative powers of 10) with approximate numbers using scientific notation	3	LG	
8N.1(g) Find or model absolute value or apply to problem situations.	7.N.1.1 Determine the absolute value of rational numbers 9-12.A.1.9 Explain and use the concept of absolute value	2	LG HG	
8N.1(h) Order or compare rational numbers (fractions, decimals, percents, or integers) using various models and representations (e.g., number line).	6.N.1.1 Compare and order rational numbers	3	LG	

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>8N.1 Number sense</b>				
8N.1(i) Order or compare rational numbers including very large and small integers, and decimals and fractions close to zero.	8.N.1.2 Demonstrate the magnitude of rational numbers (e.g., trillions to millions)	2	MC	
<b>8N.2 Estimation</b>				
8N.2(a) Establish or apply benchmarks for rational numbers and common irrational numbers (e.g., $\pi$ ) in contexts.	9-12.A.1.7 Know, explain, and use equivalent representations for the same real number including: integers decimals percents	2	HG MC	
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.	7.N.3.1 Use estimation to check reasonableness of results, and use this information to make predictions in situations involving rational numbers, pi, and simple algebraic equations	2	LG MC	
8N.2(c) Verify solutions or determine the reasonableness of results in a variety of situations including calculator and computer results.	7.N.3.1 Use estimation to check reasonableness of results, and use this information to make predictions in situations involving rational numbers, pi, and simple algebraic equations	3	LG	
8N.2(d) Estimate square or cube roots of numbers less than 1,000 between two whole numbers.	8.N.2.3 Find roots of real numbers using calculators	2	IC	This New Mexico assessment standard does not specify estimating
<b>8N.3 Number operations</b>				
8N.3(a) Perform computations with rational numbers.	8.N.2.1 Use real number properties (e.g., commutative, associative, distributive) to perform various computational procedures 8.N.3.5 Perform and explain computations with rational numbers, pi, and first-degree algebraic expressions in one variable in a variety of situations	3		

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>8N.3 Number operations</b>				
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, or • one, or • a number greater than one.		1		
8N.3(e) Interpret rational number operations and the relationships between them.	8.N.2.2 Perform arithmetic operations and their inverses (e.g., addition/subtraction, multiplication/division, square roots of perfect squares, cube roots of perfect cubes) on real numbers	2	IC	
8N.3(f) Solve application problems involving rational numbers and operations using exact answers or estimates as appropriate.	8.N.3.5 Perform and explain computations with rational numbers, pi, and first-degree algebraic expressions in one variable in a variety of situations 8.N.3.6 Select and use appropriate forms of rational numbers to solve real-world problems including those involving proportional relationships 8.N.3.2 Use a variety of computational methods to estimate quantities involving real numbers 8.N.3.9 Estimate answers and use formulas to solve application problems involving surface area and volume	3		
<b>8N.4 Ratios and proportional reasoning</b>				
8N.4(a) Use ratios to describe problem situations.	8.N.3.6 Select and use appropriate forms of rational numbers to solve real-world problems including those involving proportional relationships	2	IC	
8N.4(b) Use fractions to represent and express ratios and proportions.	6.N.3.6 Interpret and use ratios in different contexts 6.N.2.4 Use proportions to solve problems	3	LG	

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>8N.4 Ratios and proportional reasoning</b>				
8N.4(c) Use proportional reasoning to model and solve problems (including rates and scaling).	8.M.2.7 Solve simple problems involving rates and derived measurements for such properties as velocity and density 8.M.2.3 Use proportional relationships in similar shapes to find missing measurements 8.N.3.6 Select and use appropriate forms of rational numbers to solve real-world problems including those involving proportional relationships	3		
8N.4(d) Solve problems involving percentages (including percent increase and decrease, interest rates, tax, discount, tips, or part/whole relationships).	7.N.2.3 Calculate given percentages of quantities and use them to solve problems (e.g., discounts of sales, interest earned, tips, markups, commission, profit, simple interest)	3	LG	
<b>8N.5 Properties of number and operations</b>				
8N.5(a) Describe odd and even integers and how they behave under different operations.		1		
8N.5(b) Recognize, find, or use factors, multiples, or prime factorization.	6.N.1.4 Identify greatest common factor and least common multiples for a set of whole numbers 6.N.2.2 Factor a whole number into a product of its primes	3	LG	
8N.5(c) Recognize or use prime and composite numbers to solve problems.	8.N.1.1 Sort numbers by their properties (e.g., prime, composite, square, square root)	2	MC	This New Mexico assessment standard does not specify solving problems
8N.5(d) Use divisibility or remainders in problem settings.	6.N.2.5a Explain and perform: whole number division and express remainders as decimals or appropriately in the context of the problem	3	LG	
8N.5(e) Apply basic properties of operations.	8.N.2.1 Use real number properties (e.g., commutative, associative, distributive) to perform various computational procedures	3		
<b>8N.6 Mathematical reasoning using numbers</b>				
8N.6(a) Explain or justify a mathematical concept or relationship (e.g., explain why 17 is prime).		1		

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>8N.6 Mathematical reasoning using numbers</b>				
8N.6(b) Provide a mathematical argument to explain operations with two or more fractions.	8.N.3.5 Perform and explain computations with rational numbers, pi, and first-degree algebraic expressions in one variable in a variety of situations	2	MD	This NAEP skill is very specific while the New Mexico assessment standard is not
<b>Measurement</b>				
<b>8M.1 Measuring physical attributes</b>				
8M.1(b) Compare objects with respect to length, area, volume, angle measurement, weight, or mass.	7.M.1.3 Compare masses, weights, capacities, geometric measures, times, and temperatures within measurement systems	3	LG	
8M.1(c) Estimate the size of an object with respect to a given measurement attribute (e.g., area).	8.M.2.6 Estimate volume in cubic units 8.M.2.2 Use estimation to solve problems	2	IC	
8M.1(e) Select or use appropriate measurement instrument to determine or create a given length, area, volume, angle, weight, or mass.	7.M.1.2 Select and use the appropriate size and type of unit for a given measurement situation	2	LG IC	
8M.1(f) Solve mathematical or real-world problems involving perimeter or area of plane figures such as triangles, rectangles, circles or composite figures.	7.M.2.2 Select and use formulas to determine the circumference of circles and the area of triangles, parallelograms, trapezoids, and circles 7.G.4.1 Compute the perimeter and area of common geometric shapes and use the results to find measures of less common objects	3	LG	
8M.1(h) Solve problems involving volume or surface area of rectangular solids, cylinders, prisms, or composite shapes.	8.M.2.4 Apply strategies to determine the surface area and volume of prisms, pyramids, and cylinders 8.M.1.1 Understand the concept of volume and use the appropriate units in common measuring systems (e.g., cubic centimeter, cubic inch, cubic yard) to compute the volume of rectangular solids	2	MC	These New Mexico assessment standards do not specify composite shapes
8M.1(i) Solve problems involving rates such as speed or population density.	8.M.2.7 Solve simple problems involving rates and derived measurements for such properties as velocity and density	3		
<b>8M.2 Systems of measurement</b>				
8M.2(a) Select or use appropriate type of unit for the attribute being measured such as length, area, angle, time, or volume.	8.M.1.1 Understand the concept of volume and use the appropriate units in common measuring systems (e.g., cubic centimeter, cubic inch, cubic yard) to compute the volume of rectangular solids	2	MC	This New Mexico assessment standard only refers to volume

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Measurement</b>				
<b>8M.2 Systems of measurement</b>				
8M.2(b) Solve problems involving conversions within the same measurement system such as conversions involving square inches and square feet.	8.M.1.2 Use changes in measurement units (e.g., square inches, cubic feet) to perform conversions from one-, two-, and three-dimensional shapes	3		
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: <ul style="list-style-type: none"> <li>• Distance conversion: 1 kilometer is approximately 5/8 of a mile.</li> <li>• Money conversion: U.S. dollar is approximately 1.5 Canadian dollars.</li> <li>• Temperature conversion: Fahrenheit to Celsius</li> </ul>	8.M.2.5 Perform conversions with multiple terms between metric and U.S. standard measurement systems	2	IC	
8M.2(d) Determine appropriate size of unit of measurement in problem situation involving such attributes as length, area, or volume.	8.M.1.1 Understand the concept of volume and use the appropriate units in common measuring systems (e.g., cubic centimeter, cubic inch, cubic yard) to compute the volume of rectangular solids	2	MC	This New Mexico assessment standard only refers to volume
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.M.1.5 Use measures expressed as rates and measures expressed as products to solve problems, check the units of the solutions, and analyze the reasonableness of the answer	2	LG IC	
<b>8M.3 Measurement in triangles</b>				
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.M.2.1 Use ratios and proportions to measure hard-to-measure objects	2	MD	
<b>Geometry</b>				
<b>8G.1 Dimension and shape</b>				
8G.1(a) Draw or describe a path of shortest length between points to solve problems in context.	8.G.2.1 Represent, formulate, and solve distance and geometry problems using the language and symbols of algebra and the coordinate plane and space (e.g., ordered triplets)	2	IC	

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>8G.1 Dimension and shape</b>				
8G.1(b) Identify a geometric object given a written description of its properties.	8.G.1.1 Recognize, classify, and discuss properties of all geometric figures including point, line, and plane	2	IC	
8G.1(c) Identify, define, or describe geometric shapes in the plane and in three-dimensional space given a visual representation.	8.G.1.1 Recognize, classify, and discuss properties of all geometric figures including point, line, and plane	2	MC	
8G.1(d) Draw or sketch from a written description polygons, circles, or semicircles.	9-12.G.1.1 Interpret and draw two-dimensional objects and find the area and perimeter of basic figures (e.g., rectangles, circles, triangles, other polygons [e.g., rhombi, parallelograms, trapezoids])	2	HG IC	
8G.1(e) Represent or describe a three-dimensional situation in a two-dimensional drawing from different views.	8.G.4.5 Construct two-dimensional patterns for three-dimensional models (e.g., cylinders, prisms, cones)	2	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.	9-12.G.1.1 Interpret and draw two-dimensional objects and find the area and perimeter of basic figures (e.g., rectangles, circles, triangles, other polygons [e.g., rhombi, parallelograms, trapezoids]) 9-12.G.1.4 Interpret and draw three-dimensional objects and find the surface area and volume of basic figures (e.g., spheres, rectangular solids, prisms, polygonal cones), and calculate the surface areas and volumes of these figures as well as figures constructed from unions of rectangular solids and prisms with faces in common, given the formulas for these figures	2	HG MC	
<b>8G.2 Transformation of shapes and preservation of properties</b>				
8G.2(a) Identify lines of symmetry in plane figures or recognize and classify types of symmetries of plane figures.	8.G.3.1 Describe the symmetry of three-dimensional figures	2	MD	
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.G.3.2 Describe and perform single and multiple transformations that include rotation, reflection, translation, and dilation (i.e., shrink or magnify) to two-dimensional figures	3		

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>8G.2 Transformation of shapes and preservation of properties</b>				
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).	9-12.G.1.2 Find the area and perimeter of a geometric figure composed of a combination of two or more rectangles, triangles, and/or semicircles with just edges in common	2	HG IC	
8G.2(e) Justify relationships of congruence and similarity, and apply these relationships using scaling and proportional reasoning.	8.G.4.2 Recognize and apply properties of corresponding parts of similar and congruent triangles and quadrilaterals	2	MC	This New Mexico assessment standard does not specify justifying
8G.2(f) For similar figures, identify and use the relationships of conservation of angle and of proportionality of side length and perimeter.	8.M.2.3 Use proportional relationships in similar shapes to find missing measurements 8.G.4.2 Recognize and apply properties of corresponding parts of similar and congruent triangles and quadrilaterals	3		
<b>8G.3 Relationships between geometric figures</b>				
8G.3(b) Apply geometric properties and relationships in solving simple problems in two and three dimensions.	8.M.2.4 Apply strategies to determine the surface area and volume of prisms, pyramids, and cylinders 8.G.4.4 Develop and use formulas for area, perimeter, circumference, and volume	2	IC	
8G.3(c) Represent problem situations with simple geometric models to solve mathematical or real-world problems.	8.G.4.3 Represent and solve problems relating to size, shape, area, and volume using geometric models	3		
8G.3(d) Use the Pythagorean theorem to solve problems.	8.G.1.3 Use the Pythagorean theorem and its converse to find the missing side of a right triangle and the lengths of the other line segments	3		
8G.3(f) Describe or analyze simple properties of, or relationships between, triangles, quadrilaterals, and other polygonal plane figures.	8.G.1.1 Recognize, classify, and discuss properties of all geometric figures including point, line, and plane 8.G.4.2 Recognize and apply properties of corresponding parts of similar and congruent triangles and quadrilaterals	2	IC	
8G.3(g) Describe or analyze properties and relationships of parallel or intersecting lines.	8.G.4.1 Understand angle relationships formed by parallel lines cut by a transversal	2	MC	

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>8G.4 Position, direction, and coordinate geometry</b>				
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.	8.G.1.1 Recognize, classify, and discuss properties of all geometric figures including point, line, and plane	2	IC	
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.	7.G.2.1 Construct and use coordinate graphs to plot simple figures, determine lengths and areas related to them, and determine the image under translations and reflections	3	LG	
<b>8G.5 Mathematical reasoning in geometry</b>				
8G.5(a) Make and test a geometric conjecture about regular polygons.	9-12.G.1.7 Write geometric proofs (including proofs by contradiction).	2	HG	
<b>Data analysis, statistics and probability</b>				
<b>8P.1 Data representation</b>				
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.D.1.2 Generate, organize, and interpret real numbers in a variety of situations 8.D.2.3 Analyze data to make decisions and to develop convincing arguments from data displayed in a variety of formats including: plots, distributions, graphs, scatter plots, diagrams, pictorial displays, charts and graphs, and Venn diagrams	2	IC	These New Mexico assessment standards do not specify interpolating or extrapolating

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
Data analysis, statistics and probability				
8P.1 Data representation				
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.D.1.1 Represent two numerical variables on a plot, describe how the data points are distributed, and identify relationships that exist between the two variables 8.D.1.3 Organize, analyze, and display appropriate quantitative and qualitative data to address specific questions including: a. frequency distributions b. plots c. histograms d. bar, line, and pie graphs e. diagram and pictorial displays f. charts and tables	3		
8P.1(c) Solve problems by estimating and computing with data from a single set or across sets of data.	8.D.2.3 Analyze data to make decisions and to develop convincing arguments from data displayed in a variety of formats including: plots, distributions, graphs, scatter plots, diagrams, pictorial displays, charts and graphs, and Venn diagrams	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.D.1.3 Organize, analyze, and display appropriate quantitative and qualitative data to address specific questions including: a. frequency distributions b. plots c. histograms d. bar, line, and pie graphs e. diagram and pictorial displays f. charts and tables	2	MD	
8P.1(e) Compare and contrast the effectiveness of different representations of the same data.	8.D.1.3 Organize, analyze, and display appropriate quantitative and qualitative data to address specific questions including: a. frequency distributions b. plots c. histograms d. bar, line, and pie graphs e. diagram and pictorial displays f. charts and tables 8.D.2.7 Identify simple graphic misrepresentations and distortions of sets of data (e.g., unequal interval sizes, omission of parts of axis range, scaling)	2	IC	

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>8P.2 Characteristics of data sets</b>				
8P.2(a) Calculate, use, or interpret mean, median, mode, or range.	8.D.1.4 Select the appropriate measure of central tendency to describe a set of data for a particular problem situation	2	IC	
8P.2(b) Describe how mean, median, mode, range, or interquartile ranges relate to the shape of the distribution.	9-12.D.2.3 For univariate data, be able to display the distribution and describe its shape using appropriate summary statistics, and understand the distinction between a statistic and a parameter	2	HG	
8P.2(c) Identify outliers and determine their effect on mean, median, mode, or range.	8.D.2.6 Use appropriate central tendency and spread as a means for effective decision-making in analyzing data and outliers	3		
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.		1		
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.D.1.1 Represent two numerical variables on a plot, describe how the data points are distributed, and identify relationships that exist between the two variables 8.D.2.4 Interpret and analyze data from graphical representations and draw simple conclusions (e.g., line of best fit)	3		
<b>8P.3 Experiments and samples</b>				
8P.3(a) Given a sample, identify possible sources of bias in sampling.	8.D.3.2 Describe how reader bias, measurement errors, and display distortion can affect the interpretation of data, predictions, and inferences based on data	2	IC	
8P.3(b) Distinguish between a random and non-random sample.	7.D.2.5 Use data samples of a population and describe the characteristics and limitations of the sample	3	LG	
8P.3(d) Evaluate the design of an experiment.	9-12.D.1.3 Know the characteristics of a well-designed and well-conducted experiment	2	HG	
<b>8P.4 Probability</b>				
8P.4(a) Analyze a situation that involves probability of an independent event.	8.D.4.4 Use theoretical or experimental probability to make predictions about real-world events	2	IC	
8P.4(b) Determine the theoretical probability of simple and compound events in familiar contexts.	8.D.4.4 Use theoretical or experimental probability to make predictions about real-world events	2	IC	

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>8P.4 Probability</b>				
8P.4(c) Estimate the probability of simple and compound events through experimentation or simulation.	8.D.4.2 Design and use an appropriate simulation to estimate the probability of a real-world event (e.g., disk toss, cube toss)	3		
8P.4(d) Use theoretical probability to evaluate or predict experimental outcomes.	8.D.4.4 Use theoretical or experimental probability to make predictions about real-world events	3		
8P.4(e) Determine the sample space for a given situation.	5.D.3.3 Use counting strategies to determine all the possible outcomes of a particular familiar event 6.D.4.4 Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome	3	LG	
8P.4(f) Use a sample space to determine the probability of the possible outcomes of an event.	6.D.4.4 Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome	3	LG	
8P.4(g) Represent probability of a given outcome using fractions, decimals, and percents.	7.D.4.3 Describe the probability of events using fractions, decimals, and percents	3	LG	
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.D.4.6 Understand that the probability of two unrelated events occurring is the sum of the two individual possibilities and that the probability of one event following another, in independent trials, is the product of the two probabilities	2	IC	
8P.4(j) Interpret probabilities within a given context.	8.D.4.4 Use theoretical or experimental probability to make predictions about real-world events 8.D.4.5 Use probability to generate convincing arguments, draw conclusions, and make decisions in a variety of situations	3		
<b>Algebra</b>				
<b>8A.1 Patterns, relations, and functions</b>				
8A.1(a) Recognize, describe, or extend numerical and geometric patterns using tables, graphs, words, or symbols.	8.A.1.2 Use variables to generalize patterns and information presented in tables, charts, and graphs	2	IC	
8A.1(b) Generalize a pattern appearing in a numerical sequence or table or graph using words or symbols.	8.A.4.6 Generalize a pattern of change using algebra and show the relationship among the equation, graph, and table of values	2	IC	

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>8A.1 Patterns, relations, and functions</b>				
8A.1(c) Analyze or create patterns, sequences, or linear functions given a rule.	8.A.4.1 Use graphs, tables, and algebraic representations to make predictions and solve problems that involve change 8.A.4.7 Recognize the same general pattern of change presented in different representations	2	IC	These New Mexico assessment standards do not specify using a rule
8A.1(e) Identify functions as linear or nonlinear or contrast distinguishing properties of functions from tables, graphs, or equations.	9-12.A.2.3 Describe the concept of a graph of a function	2	HG MC	
8A.1(f) Interpret the meaning of slope or intercepts in linear functions.	8.A.1.2a Graph linear functions noting that the vertical change per unit of horizontal change (the slope of the graph) is always the same 8.A.4.6 Generalize a pattern of change using algebra and show the relationship among the equation, graph, and table of values	2	MC	These New Mexico assessment standards do not specify intercepts
<b>8A.2 Algebraic representations</b>				
8A.2(a) Translate between different representations of linear expressions using symbols, graphs, tables, diagrams, or written descriptions.	8.A.1.1 Move between numerical, tabular, and graphical representations of linear relationships	3		
8A.2(b) Analyze or interpret linear relationships expressed in symbols, graphs, tables, diagrams, or written descriptions.	8.A.4.1 Use graphs, tables, and algebraic representations to make predictions and solve problems that involve change 8.A.4.5 Analyze problems that involve change by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing, and observing patterns	3		
8A.2(c) Graph or interpret points that are represented by ordered pairs of numbers on a rectangular coordinate system.	8.A.2.5 Graph solution sets of linear equations in two variables on the coordinate plane	2	IC	
8A.2(d) Solve problems involving coordinate pairs on the rectangular coordinate system.	8.A.2.5 Graph solution sets of linear equations in two variables on the coordinate plane	2	MC	

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>8A.2 Algebraic representations</b>				
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.	9-12.A.3.1 Model real-world phenomena using linear and quadratic equations and linear inequalities (e.g., apply algebraic techniques to solve rate problems, work problems, and percent mixture problems; solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest; apply quadratic equations to model throwing a baseball in the air)	2	HG	
<b>8A.3 Variables, expressions, and operations</b>				
8A.3(b) Write algebraic expressions, equations, or inequalities to represent a situation.	8.A.2.7 Use symbols, variables, expressions, inequalities, equations, and simple systems of equations to represent problem situations that involve variables or unknown quantities	3		
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.A.1.3 Simplify numerical expressions by applying properties of rational numbers, and justify the process used 7.A.1.4 Interpret and evaluate expressions involving integer powers and simple roots 9-12.A.1.2 Simplify numerical expressions using the order of operations, including exponents	2	LG HG	
<b>8A.4 Equations and inequalities</b>				
8A.4(a) Solve linear equations or inequalities (e.g., $ax + b = c$ or $ax + b = cx + d$ or $ax + b > c$ ).	8.A.2.2 Solve two-step linear equations and inequalities in one variable with rational solutions	3		
8A.4(b) Interpret “=” as an equivalence between two expressions and use this interpretation to solve problems.	8.A.2.1 Demonstrate the difference between an equation and an expression	2	MD	
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 $ax + b = cx + d$ ).	8.A.2.2 Solve two-step linear equations and inequalities in one variable with rational solutions 8.A.2.7 Use symbols, variables, expressions, inequalities, equations, and simple systems of equations to represent problem situations that involve variables or unknown quantities	2	IC	

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TABLE B1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 8 mathematics and current New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>8A.4 Equations and inequalities</b>				
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).	8.A.4.7 Recognize the same general pattern of change presented in different representations	2	MC	
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].	8.A.2.3 Evaluate formulas using substitution	2	MC	
<b>8A.5 Mathematical reasoning in algebra</b>				
8A.5(a) Make, validate, and justify conclusions and generalizations about linear relationships.	8.A.4.2 Estimate, find, and justify solutions to problems that involve change using tables, graphs, and algebraic expressions	2	IC	

a. Rating is based on a scale of 1 to 3, where 1 indicates that the NMSBA assessment standard or standards do not address the NAEP assessment standard, 2 that the NMSBA assessment standard or standards partially address the NAEP assessment standard, and 3 that the NMSBA 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 NMSBA assessment standard or standards if all of the content in the NAEP assessment standard is contained in one or more NMSBA assessment standards at the same or lower grade level. A NAEP standard is considered to be *partially addressed* by the NMSBA assessment standard or standards if the NMSBA assessment standard or standards address only one part of the NAEP standard; the NAEP standard contains more content or more detailed content than the NMSBA assessment standard or standards or the NMSBA assessment standard or standard imply but do not explicitly state the content found in the NAEP assessment standard; there is a matching NMSBA assessment standard or standards at a higher state grade level than the NAEP assessment standard; or there is a matching NMSBA assessment standard or standards at a lower grade level than the NAEP assessment standard, but it does not address all the content addressed by the 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 New Mexico State Board of Education (2002).

TABLE B2

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>8N.1 Number sense</b>				
8N.1(a) Use place value to model and describe integers and decimals.	5.N.1.3 Represent place value using concrete or illustrated models up to one billion (1,000,000,000)	2	LG IC	
8N.1(b) Model or describe rational numbers or numerical relationships using number lines and diagrams.	6.N.1.5 Identify and represent on a number line decimals, fractions, mixed numbers, and positive and negative integers	3	LG	
8N.1(d) Write or rename rational numbers.	6.N.1.2 Use equivalent representations for rational numbers (e.g., integers, decimals, fractions, percents, ratios, numbers with whole-number exponents)	2	LG IC	
8N.1(e) Recognize, translate between, or apply multiple representations of rational numbers (fractions, decimals, and percents) in meaningful contexts.	7.N.1.3 Use properties of the real-number system to explain reasoning and to formulate and solve real-world problems 6.N.1.2 Use equivalent representations for rational numbers (e.g., integers, decimals, fractions, percents, ratios, numbers with whole-number exponents) 6.N.1.3 Use appropriate representations of positive rational numbers in the context of real-life applications	2	LG IC	
8N.1(f) Express or interpret numbers using scientific notation from real-life contexts.	7.N.1.4 Read, write, and compare rational numbers in scientific notation (e.g., positive and negative powers of 10) with approximate numbers using scientific notation	3	LG	
8N.1(g) Find or model absolute value or apply to problem situations.	9-12R.A.1.4 Explain that the distance between two numbers on the number line is the absolute value of their difference. 9-12R.A.1.14 Evaluate polynomial, rational, radical, and absolute value expression for one more variables.	2	HG	
8N.1(h) Order or compare rational numbers (fractions, decimals, percents, or integers) using various models and representations (e.g., number line).	6.N.1.1 Compare and order rational numbers	3	LG	
8N.1(i) Order or compare rational numbers including very large and small integers, and decimals and fractions close to zero.	8.N.1.2 Demonstrate the magnitude of rational numbers (e.g., trillions to millions)	2	MC	

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TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>8N.2 Estimation</b>				
8N.2(a) Establish or apply benchmarks for rational numbers and common irrational numbers (e.g., $\pi$ ) in contexts.	9-12R.A.1.3 Determine the relative position on the number line and the relative magnitude of integers, decimals, rationals, irrationals, and numbers in scientific notation	2	HG IC	
8N.2(b) Make estimates appropriate to a given situation by: <ul style="list-style-type: none"> <li>identifying when estimation is appropriate,</li> <li>determining the level of accuracy needed,</li> <li>selecting the appropriate method of estimation, or</li> <li>analyzing the effect of an estimation method on the accuracy of results.</li> </ul>	7.N.3.1 Use estimation to check reasonableness of results, and use this information to make predictions in situations involving rational numbers, $\pi$ , and simple algebraic equations	2	LG MC	
8N.2(c) Verify solutions or determine the reasonableness of results in a variety of situations including calculator and computer results.	7.N.3.1 Use estimation to check reasonableness of results, and use this information to make predictions in situations involving rational numbers, $\pi$ , and simple algebraic equations	3	LG	
8N.2(d) Estimate square or cube roots of numbers less than 1,000 between two whole numbers.	8.N.2.3 Find roots of real numbers using calculators	2	IC	This New Mexico assessment standard does not specify estimating
<b>8N.3 Number operations</b>				
8N.3(a) Perform computations with rational numbers.	8.N.2.1 Use real number properties (e.g., commutative, associative, distributive) to perform various computational procedures 8.N.3.5 Perform and explain computations with rational numbers, $\pi$ , and first-degree algebraic expressions in one variable in a variety of situations	3		
8N.3(d) Describe the effect of multiplying and dividing by numbers including the effect of multiplying or dividing a rational number by: <ul style="list-style-type: none"> <li>zero, or</li> <li>a number less than zero, or</li> <li>a number between zero and one,</li> <li>one, or</li> <li>a number greater than one.</li> </ul>		1		

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TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>8N.3 Number operations</b>				
8N.3(e) Interpret rational number operations and the relationships between them.	8.N.2.2 Perform arithmetic operations and their inverses (e.g., addition/subtraction, multiplication/division, square roots of perfect squares, cube roots of perfect cubes) on real numbers	2	IC	
8N.3(f) Solve application problems involving rational numbers and operations using exact answers or estimates as appropriate.	8.N.3.5 Perform and explain computations with rational numbers, pi, and first-degree algebraic expressions in one variable in a variety of situations 8.N.3.6 Select and use appropriate forms of rational numbers to solve real-world problems including those involving proportional relationships 8.N.3.2 Use a variety of computational methods to estimate quantities involving real numbers 8.N.3.9 Estimate answers and use formulas to solve application problems involving surface area and volume	3		
<b>8N.4 Ratios and proportional reasoning</b>				
8N.4(a) Use ratios to describe problem situations.	8.N.3.6 Select and use appropriate forms of rational numbers to solve real-world problems including those involving proportional relationships	2	IC	
8N.4(b) Use fractions to represent and express ratios and proportions.	6.N.3.6 Interpret and use ratios in different contexts 6.N.2.4 Use proportions to solve problems	3	LG	
8N.4(c) Use proportional reasoning to model and solve problems (including rates and scaling).	8.M.2.7 Solve simple problems involving rates and derived measurements for such properties as velocity and density 8.M.2.3 Use proportional relationships in similar shapes to find missing measurements 8.N.3.6 Select and use appropriate forms of rational numbers to solve real-world problems including those involving proportional relationships	3		
8N.4(d) Solve problems involving percentages (including percent increase and decrease, interest rates, tax, discount, tips, or part/whole relationships).	7.N.2.3 Calculate given percentages of quantities and use them to solve problems (e.g., discounts of sales, interest earned, tips, markups, commission, profit, simple interest)	3	LG	

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TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>8N.5 Properties of numbers and operations</b>				
8N.5(a) Describe odd and even integers and how they behave under different operations.		1		
8N.5(b) Recognize, find, or use factors, multiples, or prime factorization.	6.N.1.4 Identify greatest common factor and least common multiples for a set of whole numbers 6.N.2.2 Factor a whole number into a product of its primes	3	LG	
8N.5(c) Recognize or use prime and composite numbers to solve problems.	8.N.1.1 Sort numbers by their properties (e.g., prime, composite, square, square root)	2	MC	This New Mexico assessment standard does not specify solving problems
8N.5(d) Use divisibility or remainders in problem settings.	6.N.2.5a Explain and perform: whole number division and express remainders as decimals or appropriately in the context of the problem	3	LG	
8N.5(e) Apply basic properties of operations.	8.N.2.1 Use real number properties (e.g., commutative, associative, distributive) to perform various computational procedures	3		
<b>8N.6 Mathematical reasoning using numbers</b>				
8N.6(a) Explain or justify a mathematical concept or relationship (e.g., explain why 17 is prime).		1		
8N.6(b) Provide a mathematical argument to explain operations with two or more fractions.	8.N.3.5 Perform and explain computations with rational numbers, pi, and first-degree algebraic expressions in one variable in a variety of situations	2	MD	This NAEP assessment standard more specific than the New Mexico assessment standard
<b>Measurement</b>				
<b>8M.1 Measuring physical attributes</b>				
8M.1(b) Compare objects with respect to length, area, volume, angle measurement, weight, or mass.	7.M.1.3 Compare masses, weights, capacities, geometric measures, times, and temperatures within measurement systems	3	LG	
8M.1(c) Estimate the size of an object with respect to a given measurement attribute (e.g., area).	8.M.2.6 Estimate volume in cubic units 8.M.2.2 Use estimation to solve problems	2	IC	

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TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Measurement</b>				
<b>8M.1 Measuring physical attributes</b>				
8M.1(e) Select or use appropriate measurement instrument to determine or create a given length, area, volume, angle, weight, or mass.	7.M.1.2 Select and use the appropriate size and type of unit for a given measurement situation	2	LG IC	
8M.1(f) Solve mathematical or real-world problems involving perimeter or area of plane figures such as triangles, rectangles, circles or composite figures.	7.M.2.2 Select and use formulas to determine the circumference of circles and the area of triangles, parallelograms, trapezoids, and circles 7.G.4.1 Compute the perimeter and area of common geometric shapes and use the results to find measures of less common objects	3	LG	
8M.1(h) Solve problems involving volume or surface area of rectangular solids, cylinders, prisms, or composite shapes.	8.M.2.4 Apply strategies to determine the surface area and volume of prisms, pyramids, and cylinders 8.M.1.1 Understand the concept of volume and use the appropriate units in common measuring systems (e.g., cubic centimeter, cubic inch, cubic yard) to compute the volume of rectangular solids	2	MC	These New Mexico assessment standards do not specify composite shapes
8M.1(i) Solve problems involving rates such as speed or population density.	8.M.2.7 Solve simple problems involving rates and derived measurements for such properties as velocity and density	3		
<b>8M.2 Systems of measurement</b>				
8M.2(a) Select or use appropriate type of unit for the attribute being measured such as length, area, angle, time, or volume.	8.M.1.1 Understand the concept of volume and use the appropriate units in common measuring systems (e.g., cubic centimeter, cubic inch, cubic yard) to compute the volume of rectangular solids	2	MC	This New Mexico assessment standard only refers to volume
8M.2(b) Solve problems involving conversions within the same measurement system such as conversions involving square inches and square feet.	8.M.1.2 Use changes in measurement units (e.g., square inches, cubic feet) to perform conversions from one-, two-, and three-dimensional shapes	3		
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 5/8 of a mile. • Money conversion: U.S. dollar is approximately 1.5 Canadian dollars. • Temperature conversion: Fahrenheit to Celsius	8.M.2.5 Perform conversions with multiple terms between metric and U.S. standard measurement systems	2	IC	

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TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Measurement</b>				
<b>8M.2 Systems of measurement</b>				
8M.2(d) Determine appropriate size of unit of measurement in problem situation involving such attributes as length, area, or volume.	8.M.1.1 Understand the concept of volume and use the appropriate units in common measuring systems (e.g., cubic centimeter, cubic inch, cubic yard) to compute the volume of rectangular solids	2	MC	This New Mexico assessment standard only refers to volume
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.M.1.5 Use measures expressed as rates and measures expressed as products to solve problems, check the units of the solutions, and analyze the reasonableness of the answer	2	LG IC	
<b>8M.3 Measurement in triangles</b>				
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.M.2.1 Use ratios and proportions to measure hard-to-measure objects	2	MD	
<b>Geometry</b>				
<b>8G.1 Dimension and shape</b>				
8G.1(a) Draw or describe a path of shortest length between points to solve problems in context.	8.G.2.1 Represent, formulate, and solve distance and geometry problems using the language and symbols of algebra and the coordinate plane and space (e.g., ordered triplets)	2	IC	
8G.1(b) Identify a geometric object given a written description of its properties.	8.G.1.1 Recognize, classify, and discuss properties of all geometric figures including point, line, and plane	2	IC	
8G.1(c) Identify, define, or describe geometric shapes in the plane and in three-dimensional space given a visual representation.	8.G.1.1 Recognize, classify, and discuss properties of all geometric figures including point, line, and plane	2	MC	
8G.1(d) Draw or sketch from a written description polygons, circles, or semicircles.	9-12R.G.1.3 Draw three-dimensional objects and calculate the surface areas and volumes of these figures (e.g. prisms, cylinders, pyramids, cones, spheres) as well as figures constructed from unions of prisms with faces in common give the formulas for these figures.	2	HG IC	
8G.1(e) Represent or describe a three-dimensional situation in a two-dimensional drawing from different views.	8.G.4.5 Construct two-dimensional patterns for three-dimensional models (e.g., cylinders, prisms, cones)	2	IC	

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TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>8G.1 Dimension and shape</b>				
8G.1(f) Demonstrate an understanding about the two- and three-dimensional shapes in our world through identifying, drawing, modeling, building, or taking apart.	9-12R.G.1.3 Draw three-dimensional objects and calculate the surface areas and volumes of these figures (e.g. prisms, cylinders, pyramids, cones, spheres) as well as figures constructed from unions of prisms with faces in common give the formulas for these figures.	2	HG MC	
<b>8G.2 Transformation of shapes and preservation of properties</b>				
8G.2(a) Identify lines of symmetry in plane figures or recognize and classify types of symmetries of plane figures.	8.G.3.1 Describe the symmetry of three-dimensional figures	2	MD	
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.G.3.2 Describe and perform single and multiple transformations that include rotation, reflection, translation, and dilation (i.e., shrink or magnify) to two-dimensional figures	3		
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).	9-12R.G.1.2 Find the area and perimeter of a geometric figure composed of a combination of two or more rectangles, triangles, and/or semicircles with just edges in common.	2	HG IC	
8G.2(e) Justify relationships of congruence and similarity, and apply these relationships using scaling and proportional reasoning.	8.G.4.2 Recognize and apply properties of corresponding parts of similar and congruent triangles and quadrilaterals	2	MC	This New Mexico assessment standard does not specify justifying
8G.2(f) For similar figures, identify and use the relationships of conservation of angle and of proportionality of side length and perimeter.	8.M.2.3 Use proportional relationships in similar shapes to find missing measurements 8.G.4.2 Recognize and apply properties of corresponding parts of similar and congruent triangles and quadrilaterals	3		
<b>8G.3 Relationships between geometric figures</b>				
8G.3(b) Apply geometric properties and relationships in solving simple problems in two and three dimensions.	8.M.2.4 Apply strategies to determine the surface area and volume of prisms, pyramids, and cylinders 8.G.4.4 Develop and use formulas for area, perimeter, circumference, and volume	2	IC	

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TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>8G.3 Relationships between geometric figures</b>				
8G.3(c) Represent problem situations with simple geometric models to solve mathematical or real-world problems.	8.G.4.3 Represent and solve problems relating to size, shape, area, and volume using geometric models	3		
8G.3(d) Use the Pythagorean theorem to solve problems.	8.G.1.3 Use the Pythagorean theorem and its converse to find the missing side of a right triangle and the lengths of the other line segments	3		
8G.3(f) Describe or analyze simple properties of, or relationships between, triangles, quadrilaterals, and other polygonal plane figures.	8.G.1.1 Recognize, classify, and discuss properties of all geometric figures including point, line, and plane 8.G.4.2 Recognize and apply properties of corresponding parts of similar and congruent triangles and quadrilaterals	2	IC	
8G.3(g) Describe or analyze properties and relationships of parallel or intersecting lines.	8.G.4.1 Understand angle relationships formed by parallel lines cut by a transversal	2	MC	
<b>8G.4 Position, direction, and coordinate geometry</b>				
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.	8.G.1.1 Recognize, classify, and discuss properties of all geometric figures including point, line, and plane	2	IC	
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.	7.G.2.1 Construct and use coordinate graphs to plot simple figures, determine lengths and areas related to them, and determine the image under translations and reflections	3	LG	
<b>8G.5 Mathematical reasoning in geometry</b>				
8G.5(a) Make and test a geometric conjecture about regular polygons.	9-12R.G.1.9 Write geometric proofs, including proofs by contradiction, and perform and explain basic geometric constructions related to: theorems involving the properties of parallel and perpendicular lines, circles, and polygons; theorems involving complementary, supplementary, and congruent angles; theorems involving congruence and similarity; and the Pythagorean theorem	2	HG	

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TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	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.D.1.2 Generate, organize, and interpret real numbers in a variety of situations 8.D.2.3 Analyze data to make decisions and to develop convincing arguments from data displayed in a variety of formats including: plots, distributions, graphs, scatter plots, diagrams, pictorial displays, charts and graphs, and Venn diagrams	2	IC	These New Mexico assessment standards do not specify interpolating or extrapolating
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.D.1.1 Represent two numerical variables on a plot, describe how the data points are distributed, and identify relationships that exist between the two variables 8.D.1.3 Organize, analyze, and display appropriate quantitative and qualitative data to address specific questions including: a. frequency distributions b. plots c. histograms d. bar, line, and pie graphs e. diagram and pictorial displays f. charts and tables	3		
8P.1(c) Solve problems by estimating and computing with data from a single set or across sets of data.	8.D.2.3 Analyze data to make decisions and to develop convincing arguments from data displayed in a variety of formats including: plots, distributions, graphs, scatter plots, diagrams, pictorial displays, charts and graphs, and Venn diagrams	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.D.1.3 Organize, analyze, and display appropriate quantitative and qualitative data to address specific questions including: a. frequency distributions b. plots c. histograms d. bar, line, and pie graphs e. diagram and pictorial displays f. charts and tables	2	MD	

(CONTINUED)

TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>8P.1 Data representation</b>				
8P.1(e) Compare and contrast the effectiveness of different representations of the same data.	8.D.1.3 Organize, analyze, and display appropriate quantitative and qualitative data to address specific questions including: a. frequency distributions b. plots c. histograms d. bar, line, and pie graphs e. diagram and pictorial displays f. charts and tables 8.D.2.7 Identify simple graphic misrepresentations and distortions of sets of data (e.g., unequal interval sizes, omission of parts of axis range, scaling)	2	IC	
<b>8P.2 Characteristics of data sets</b>				
8P.2(a) Calculate, use, or interpret mean, median, mode, or range.	8.D.1.4 Select the appropriate measure of central tendency to describe a set of data for a particular problem situation	2	IC	
8P.2(b) Describe how mean, median, mode, range, or interquartile ranges relate to the shape of the distribution.	9-12R.D.2.3 Display the distribution of univariate data, describe its shape using appropriate summary statistics, and understand the distinction between a statistic and a parameter	2	HG	
8P.2(c) Identify outliers and determine their effect on mean, median, mode, or range.	8.D.2.6 Use appropriate central tendency and spread as a means for effective decision-making in analyzing data and outliers	3		
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.		1		
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.D.1.1 Represent two numerical variables on a plot, describe how the data points are distributed, and identify relationships that exist between the two variables 8.D.2.4 Interpret and analyze data from graphical representations and draw simple conclusions (e.g., line of best fit)	3		
<b>8P.3 Experiments and samples</b>				
8P.3(a) Given a sample, identify possible sources of bias in sampling.	8.D.3.2 Describe how reader bias, measurement errors, and display distortion can affect the interpretation of data, predictions, and inferences based on data	2	IC	

(CONTINUED)

TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>8P.3 Experiments and samples</b>				
8P.3(b) Distinguish between a random and non-random sample.	7.D.2.5 Use data samples of a population and describe the characteristics and limitations of the sample	3	LG	
8P.3(d) Evaluate the design of an experiment.	9-12R.D.1.3 Describe the characteristics of a well-designed and well-conducted experiment by differentiating between experiments and observational studies, and recognizing the sources of bias in poorly designed experiments	2	HG	
<b>8P.4 Position, direction, and coordinate geometry</b>				
8P.4(a) Analyze a situation that involves probability of an independent event.	8.D.4.4 Use theoretical or experimental probability to make predictions about real-world events	2	IC	
8P.4(b) Determine the theoretical probability of simple and compound events in familiar contexts.	8.D.4.4 Use theoretical or experimental probability to make predictions about real-world events	2	IC	
8P.4(c) Estimate the probability of simple and compound events through experimentation or simulation.	8.D.4.2 Design and use an appropriate simulation to estimate the probability of a real-world event (e.g., disk toss, cube toss)	3		
8P.4(d) Use theoretical probability to evaluate or predict experimental outcomes.	8.D.4.4 Use theoretical or experimental probability to make predictions about real-world events	3		
8P.4(e) Determine the sample space for a given situation.	5.D.3.3 Use counting strategies to determine all the possible outcomes of a particular familiar event 6.D.4.4 Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome	3	LG	
8P.4(f) Use a sample space to determine the probability of the possible outcomes of an event.	6.D.4.4 Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome	3	LG	
8P.4(g) Represent probability of a given outcome using fractions, decimals, and percents.	7.D.4.3 Describe the probability of events using fractions, decimals, and percents	3	LG	
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.D.4.6 Understand that the probability of two unrelated events occurring is the sum of the two individual possibilities and that the probability of one event following another, in independent trials, is the product of the two probabilities	2	IC	

(CONTINUED)

TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>8P.4 Probability</b>				
8P.4(j) Interpret probabilities within a given context.	8.D.4.4 Use theoretical or experimental probability to make predictions about real-world events 8.D.4.5 Use probability to generate convincing arguments, draw conclusions, and make decisions in a variety of situations	3		
<b>Algebra</b>				
<b>8A.1 Patterns, relations, and functions</b>				
8A.1(a) Recognize, describe, or extend numerical and geometric patterns using tables, graphs, words, or symbols.	8.A.1.2 Use variables to generalize patterns and information presented in tables, charts, and graphs	2	IC	
8A.1(b) Generalize a pattern appearing in a numerical sequence or table or graph using words or symbols.	8.A.4.6 Generalize a pattern of change using algebra and show the relationship among the equation, graph, and table of values	2	IC	
8A.1(c) Analyze or create patterns, sequences, or linear functions given a rule.	8.A.4.1 Use graphs, tables, and algebraic representations to make predictions and solve problems that involve change 8.A.4.7 Recognize the same general pattern of change presented in different representations	2	IC	These New Mexico assessment standards do not specify using a rule
8A.1(e) Identify functions as linear or nonlinear or contrast distinguishing properties of functions from tables, graphs, or equations.	9-12R.A.2.2 Determine whether a relation defined by a graph, a set of ordered pairs, a table of values, an equation, or a rule is a function.	2	HG IC	
8A.1(f) Interpret the meaning of slope or intercepts in linear functions.	8.A.1.2a Graph linear functions noting that the vertical change per unit of horizontal change (the slope of the graph) is always the same 8.A.4.6 Generalize a pattern of change using algebra and show the relationship among the equation, graph, and table of values	2	MC	These New Mexico assessment standards do not specify intercepts
<b>8A.2 Algebraic representations</b>				
8A.2(a) Translate between different representations of linear expressions using symbols, graphs, tables, diagrams, or written descriptions.	8.A.1.1 Move between numerical, tabular, and graphical representations of linear relationships	3		

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TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>8A.2 Algebraic representations</b>				
8A.2(b) Analyze or interpret linear relationships expressed in symbols, graphs, tables, diagrams, or written descriptions.	8.A.4.1 Use graphs, tables, and algebraic representations to make predictions and solve problems that involve change 8.A.4.5 Analyze problems that involve change by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing, and observing patterns	3		
8A.2(c) Graph or interpret points that are represented by ordered pairs of numbers on a rectangular coordinate system.	8.A.2.5 Graph solution sets of linear equations in two variables on the coordinate plane	2	IC	
8A.2(d) Solve problems involving coordinate pairs on the rectangular coordinate system.	8.A.2.5 Graph solution sets of linear equations in two variables on the coordinate plane	2	MC	
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.	9-12R.A.3.1 Model real-world phenomena using linear equations and linear inequalities interpret resulting solutions, and use estimation to detect errors. 9-12R.A.3.2 Model real-world phenomena using quadratic equations, interpret resulting solutions, and use estimation to detect errors. 9-12R.A.3.3 Model real-world phenomena using exponential equations, interpret resulting solutions, and use estimation to detect errors.	2	HG	
<b>8A.3 Variables, expressions, and operations</b>				
8A.3(b) Write algebraic expressions, equations, or inequalities to represent a situation.	8.A.2.7 Use symbols, variables, expressions, inequalities, equations, and simple systems of equations to represent problem situations that involve variables or unknown quantities	3		
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).	9-12R.A.1.6 Simplify numerical expressions using the order of operations, including integer exponents.	2	HG	
<b>8A.4 Equations and inequalities</b>				
8A.4(a) Solve linear equations or inequalities (e.g., $ax + b = c$ or $ax + b = cx + d$ or $ax + b > c$ ).	8.A.2.2 Solve two-step linear equations and inequalities in one variable with rational solutions	3		

(CONTINUED)

TABLE B2 (CONTINUED)

**Alignment of the National Assessment of Educational Progress (NAEP) grade 8 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>8A.4 Equations and inequalities</b>				
8A.4(b) Interpret “=” as an equivalence between two expressions and use this interpretation to solve problems.	8.A.2.1 Demonstrate the difference between an equation and an expression	2	MD	
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 $ax + b = cx + d$ ).	8.A.2.2 Solve two-step linear equations and inequalities in one variable with rational solutions 8.A.2.7 Use symbols, variables, expressions, inequalities, equations, and simple systems of equations to represent problem situations that involve variables or unknown quantities	2	IC	
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).	8.A.4.7 Recognize the same general pattern of change presented in different representations	2	MC	
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].	8.A.2.3 Evaluate formulas using substitution	2	MC	
<b>8A.5 Mathematical reasoning in algebra</b>				
8A.5(a) Make, validate, and justify conclusions and generalizations about linear relationships.	8.A.4.2 Estimate, find, and justify solutions to problems that involve change using tables, graphs, and algebraic expressions	2	IC	

a. Rating is based on a scale of 1 to 3, where 1 indicates that the NMSBA assessment standard or standards do not address the NAEP assessment standard, 2 that the NMSBA assessment standard or standards partially address the NAEP assessment standard, and 3 that the NMSBA 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 NMSBA assessment standard or standards if all of the content in the NAEP assessment standard is contained in one or more NMSBA assessment standards at the same or lower grade level. A NAEP standard is considered to be *partially addressed* by the NMSBA assessment standard or standards if the NMSBA assessment standard or standards address only one part of the NAEP standard; the NAEP standard contains more content or more detailed content than the NMSBA assessment standard or standards or the NMSBA assessment standard or standard imply but do not explicitly state the content found in the NAEP assessment standard; there is a matching NMSBA assessment standard or standards at a higher state grade level than the NAEP assessment standard; or there is a matching NMSBA assessment standard or standards at a lower grade level than the NAEP assessment standard, but it does not address all the content addressed by the 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 New Mexico State Board of Education (2002).

TABLE B3

**Number of New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards not covered by the National Assessment of Educational Progress grade 8 assessment standards, by strand, April 2008**

NMSBA strand	Number of standards not covered
Number properties and operations	5
Geometry	1
Data analysis and probability	11
Algebra	6
<b>Total</b>	<b>23</b>

Source: New Mexico State Board of Education (2002).



TABLE B4

**New Mexico Standards Based Assessment (NMSBA) grade 8 assessment standards not covered by the National Assessment of Educational Progress (NAEP) grade 8 assessment standards, April 2008**

NMSBA strand	NMSBA grade 8 assessment standard not covered in NAEP
Number properties and operations	8.N.3.1 Formulate algebraic expressions that include real numbers to describe and solve real-world problems
	8.N.3.3 Differentiate between rational and irrational numbers
	8.N.3.4 Use real number properties to perform various computational procedures and explain how they were used
	8.N.3.7 Approximate, mentally and with calculators, the value of irrational numbers as they arise from problem situations
	8.N.3.8 Express numbers in scientific notation (including negative exponents) in appropriate problem situations using a calculator
Geometry	8.G.1.2 Identify arc, chord, and semicircle and explain their attributes
Data analysis and probability	8.D.1.5 Simulate an event selecting and using different models
	8.D.1.6 Develop an appropriate strategy using a variety of data from surveys, samplings, estimations, and inferences to address a specific problem
	8.D.2.1 Use changes in scales, intervals, or categories to help support a particular interpretation of data
	8.D.2.2 Generate, organize, and interpret real number and other data in a variety of situations
	8.D.2.5 Evaluate and defend the reasonableness of conclusions drawn from data analysis
	8.D.2.8 Use appropriate technology to display data as lists, tables, matrices, graphs, and plots and to analyze the relationships of variables in the data displayed
	8.D.3.1 Describe how changes in scale, intervals, or categories influence arguments for a particular interpretation of the data
	8.D.3.3 Conduct simple experiments and/or simulations, record results in charts, tables, or graphs, and use the results to draw conclusions and make predictions
	8.D.3.4 Compare expected results with experimental results and information used in predictions and inferences
	8.D.4.1 Calculate the odds of a desired outcome in a simple experiment
	8.D.4.3 Explain the relationship between probability and odds and calculate the odds of a desired outcome in a simple experiment
Algebra	8.A.1.2b Plot the values of quantities whose ratios are always the same, fit a line to the plot, and understand that the slope of the line equals the quantities
	8.A.2.4 Demonstrate understanding of the relationships between ratios, proportions, and percents and solve for a missing term in a proportion
	8.A.2.6 Formulate and solve problems involving simple linear relationships, find percents of a given number, variable situations, and unknown quantities
	8.A.3.1 Generate different representations to model a specific numerical relationship given one representation of data (e.g., a table, a graph, an equation, a verbal description)
	8.A.4.3 Use appropriate problem-solving strategies (e.g., drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table or graph, working a simpler problem, writing an algebraic expression or working backward) to solve problems that involve change
	8.A.4.4 Solve multi-step problems that involve changes in rate, average speed, distance, and time

Source: New Mexico State Board of Education (2002).

## Appendix C

### Details on the alignment of the National Assessment of Educational Progress grade 12 assessment standards and the current and proposed New Mexico Standards Based Assessment (NMSBA) assessment standards

TABLE C1

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>12N.1 Number sense</b>				
12N.1(d) Represent, interpret or compare expressions for real numbers, including expressions utilizing exponents and logarithms.	9-12.A.1.7 Know, explain, and use equivalent representations for the same real number including: a. integers b. decimals c. percents d. ratios e. scientific notation f. numbers with integer exponents g. inverses (reciprocal) h. prime factoring	2	MC	This New Mexico assessment standard does not include logarithms
12N.1(f) Represent or interpret expressions involving very large or very small numbers in scientific notation.	9-12.A.1.7 Know, explain, and use equivalent representations for the same real number including: a. integers b. decimals c. percents d. ratios e. scientific notation f. numbers with integer exponents g. inverses (reciprocal) h. prime factoring	2	IC	
12N.1(g) Represent, interpret or compare expressions or problem situations involving absolute values.	9-12.A.1.9 Explain and use the concept of absolute value 9-12.A.3.6 Evaluate numerical and algebraic absolute value expressions	3		
12N.1(i) Order or compare real numbers, including very large and very small real numbers.	6.N.1.1 Compare and order rational numbers	2	LG MC	This New Mexico assessment standard does not include irrational numbers
<b>12N.2 Estimation</b>				
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.	7.N.3.1 Use estimation to check reasonableness of results, and use this information to make predictions in situations involving rational numbers, pi, and simple algebraic equations	3	LG	

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>12N.2 Estimation</b>				
12N.2(c) Verify solutions or determine the reasonableness of results in a variety of situations.	7.N.3.1 Use estimation to check reasonableness of results, and use this information to make predictions in situations involving rational numbers, pi, and simple algebraic equations	3	LG	
12N.2(d) Estimate square or cube roots of numbers less than 1,000 between two whole numbers.	9-12.A.1.12 Calculate powers and roots of real numbers, both rational and irrational	2	IC	
<b>12N.3 Number operations</b>				
12N.3(a) Find integral or simple fractional powers of real numbers.	9-12.A.1.12 Calculate powers and roots of real numbers, both rational and irrational 9-12.A.3.11a Understand and use: such operations as taking the inverse, finding the reciprocal, taking a root, and raising to a fractional power	3		
12N.3(b) Perform arithmetic operations with real numbers, including common irrational numbers.	8.N.2.2 Perform arithmetic operations and their inverses (e.g., addition/subtraction, multiplication/division, square roots of perfect squares, cube roots of perfect cubes) on real numbers	3	LG	
12N.3(c) Perform arithmetic operations with expressions involving absolute value.	9-12.A.3.6 Evaluate numerical and algebraic absolute value expressions	2	IC	
12N.3(d) Describe the effect of multiplying and dividing by numbers including the effect of multiplying or dividing a real number by: <ul style="list-style-type: none"> <li>• Zero, or</li> <li>• A number less than zero, or</li> <li>• A number between zero and one, or</li> <li>• One, or</li> <li>• A number greater than one.</li> </ul>		1		
12N.3(f) Solve application problems involving numbers, including rational and common irrationals.	8.N.3.6 Select and use appropriate forms of rational numbers to solve real-world problems including those involving proportional relationships 8.N.3.7 Approximate, mentally and with calculators, the value of irrational numbers as they arise from problem situations	3	LG	

(CONTINUED)

TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>12N.4 Ratios and proportional reasoning</b>				
12N.4(c) Use proportions to solve problems (including rates of change).	9-12.A.4.2 Solve routine two- and three-step problems relating to change using concepts such as: a. exponents b. factoring c. ratio d. proportion e. average f. percent	3		
12N.4(d) Solve multi-step problems involving percentages, including compound percentages.	9-12.A.4.3 Calculate the percentage of increase and decrease of a quantity 9-12.A.4.2 Solve routine two- and three-step problems relating to change using concepts such as: a. exponents b. factoring c. ratio d. proportion e. average f. percent	2	MC	These New Mexico assessment standards do not specify compound percentages
<b>12N.5 Properties of number and operations</b>				
12N.5(c) Solve problems using factors, multiples, or prime factorization.	6.N.2.2 Factor a whole number into a product of its primes 6.N.2.6 Determine the least common multiple and the greatest common divisor of whole numbers and use them to solve problems with fractions	3	LG	
12N.5(d) Use divisibility or remainders in problem settings.	6.N.2.5a Explain and perform: whole number division and express remainders as decimals or appropriately in the context of the problem	3	LG	
12N.5(e) Apply basic properties of operations, including conventions about the order of operations.	9-12.A.1.2 Simplify numerical expressions using the order of operations, including exponents 9-12.A.1.8 Simplify algebraic expressions using the distributive property	3		
<b>Measurement</b>				
<b>12M.2 Systems of measurement</b>				
12M.2(f) Construct or solve problems involving scale drawings.	9-12.G.4.1 Solve real-world problems using congruence and similarity relationships of triangles (e.g., find the height of a pole given the length of its shadow)	2	IC	This New Mexico assessment standard does not specify involving scale drawings

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Measurement</b>				
<b>12M.3 Measurement in triangles</b>				
12M.3(a) Solve problems involving indirect measurement.	9-12.G.4.1 Solve real-world problems using congruence and similarity relationships of triangles (e.g., find the height of a pole given the length of its shadow)	3		
12M.3(b) Solve problems using the fact that trigonometric ratios (sine, cosine, and tangent) stay constant in similar triangles.	9-12.G.4.5 Understand and use elementary relationships of basic trigonometric functions defined by the angles of a right triangle (e.g., "What is the radius of a circle with an inscribed regular octagon with the length of each side being exactly 2 feet?")	3		
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.	9-12.G.4.5 Understand and use elementary relationships of basic trigonometric functions defined by the angles of a right triangle (e.g., "What is the radius of a circle with an inscribed regular octagon with the length of each side being exactly 2 feet?") 9-12.G.4.6 Use trigonometric functions to solve for the length of the second leg of a right triangle given the angles and the length of the first leg. (e.g., "A surveyor determines that the angle subtended by a two-foot stick at right angles to his transit is exactly one degree. What is the distance from the transit to the base of the measuring stick?")	3		
12M.3(d) Interpret and use the identity $\sin^2 q + \cos^2 q = 1$ for angles $q$ between $0^\circ$ and $90^\circ$ ; 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		

(CONTINUED)

TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.1 Dimension and shape</b>				
12G.1(c) Give precise mathematical descriptions or definitions of geometric shapes in the plane and in three-dimensional space.				
12G.1(d) Draw or sketch from a written description plane figures and planar images of three-dimensional figures.	9-12.G.1.1 Interpret and draw two-dimensional objects and find the area and perimeter of basic figures (e.g., rectangles, circles, triangles, other polygons [e.g., rhombi, parallelograms, trapezoids]) 9-12.G.1.4 Interpret and draw three-dimensional objects and find the surface area and volume of basic figures (e.g., spheres, rectangular solids, prisms, polygonal cones), and calculate the surface areas and volumes of these figures as well as figures constructed from unions of rectangular solids and prisms with faces in common, given the formulas for these figures	2	MD	These New Mexico assessment standards do not specify drawing or sketching from a written description
12G.1(e) Use two-dimensional representations of three-dimensional objects to visualize and solve problems.	8.G.4.5 Construct two-dimensional patterns for three-dimensional models (e.g., cylinders, prisms, cones) 6.G.1.1c Visualize and draw two-dimensional views of three-dimensional objects made from rectangular solids	3	LG	
12G.1(f) Analyze properties of three-dimensional figures including spheres and hemispheres.	9-12.G.1.4 Interpret and draw three-dimensional objects and find the surface area and volume of basic figures (e.g., spheres, rectangular solids, prisms, polygonal cones), and calculate the surface areas and volumes of these figures as well as figures constructed from unions of rectangular solids and prisms with faces in common, given the formulas for these figures	2	IC	This New Mexico assessment standard does not specify analyzing properties
<b>12G.2 Transformation of shapes and preservation of properties</b>				
12G.2(a) Recognize or identify types of symmetries (e.g., point, line, rotational, self-congruence) of two- and three-dimensional figures.	6.G.3.1 Identify line of symmetry with rotation and scaling 8.G.3.1 Describe the symmetry of three-dimensional figures	2	LG MC	

(CONTINUED)

TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.2 Transformation of shapes and preservation of properties</b>				
12G.2(b) Give or recognize the precise mathematical relationship (e.g., congruence, similarity, orientation) between a figure and its image under a transformation.	9-12.G.3.2a Identify congruency and similarity in terms of transformations 9-12.G.3.1 Describe the effect of rigid motions on figures in the coordinate plane and space that include rotations, translations, and reflections	3		
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).	9-12.G.3.1 Describe the effect of rigid motions on figures in the coordinate plane and space that include rotations, translations, and reflections 9-12.G.3.1b Sketch the planar figure that is the result of a given transformation of this type 9-12.G.3.1a Determine whether a given pair of figures on a coordinate plane represents the effect of a translation, reflection, rotation, and/or dilation	3		
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.	9-12.G.3.2b Determine the effects of the above transformations on linear and area measurements of the original planar figure 9-12.G.1.2 Find the area and perimeter of a geometric figure composed of a combination of two or more rectangles, triangles, and/or semicircles with just edges in common 9-12.G.1.4 Interpret and draw three-dimensional objects and find the surface area and volume of basic figures (e.g., spheres, rectangular solids, prisms, polygonal cones), and calculate the surface areas and volumes of these figures as well as figures constructed from unions of rectangular solids and prisms with faces in common, given the formulas for these figures	3		
12G.2(e) Justify relationships of congruence and similarity, and apply these relationships using scaling and proportional reasoning.	9-12.G.1.7c Write geometric proofs (including proofs by contradiction), including: theorems involving congruence and similarity Pythagorean (tangram proofs) 9-12.G.3.2a Identify congruency and similarity in terms of transformations	2	IC	

(CONTINUED)

TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.2 Transformation of shapes and preservation of properties</b>				
12G.2(g) Perform or describe the effects of successive transformations.	9-12.G.3.1 Describe the effect of rigid motions on figures in the coordinate plane and space that include rotations, translations, and reflections	2	IC	This New Mexico assessment standard does not specify the effects of successive transformations
<b>12G.3 Relationships between geometric figures</b>				
12G.3(b) Apply geometric properties and relationships to solve problems in two and three dimensions.	<p>9-12.G.4.1 Solve real-world problems using congruence and similarity relationships of triangles (e.g., find the height of a pole given the length of its shadow)</p> <p>9-12.G.4.2 Solve problems involving complementary, supplementary, and congruent angles</p> <p>9-12.G.4.3 Solve problems involving the perimeter, circumference, area, volume, and surface area of common geometric figures (e.g., “Determine the surface area of a can of height <math>h</math> and radius <math>r</math>. How does the surface area change when the height is changed to <math>3h</math>? How does the surface area change when the radius is changed to <math>3r</math>? How does the surface area change when both <math>h</math> and <math>r</math> are doubled?”)</p> <p>9-12.G.4.4 Solve problems using the Pythagorean theorem (e.g., “Given the length of a ladder and the distance of the base of the ladder from a wall, determine the distance up the wall to the top of the ladder”)</p> <p>9-12.G.4.6 Use trigonometric functions to solve for the length of the second leg of a right triangle given the angles and the length of the first leg. (e.g., “A surveyor determines that the angle subtended by a two-foot stick at right angles to his transit is exactly one degree. What is the distance from the transit to the base of the measuring stick?”)</p> <p>9-12.G.4.7 Know and use angle and side relationships in problems with special right triangles (e.g., 30-, 45-, 60-, and 90-degree triangles)</p>	3		

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.3 Relationships between geometric figures</b>				
12G.3(c) Represent problem situations with geometric models to solve mathematical or real world problems.	9-12.G.4.1 Solve real-world problems using congruence and similarity relationships of triangles (e.g., find the height of a pole given the length of its shadow) 9-12.G.4.4 Solve problems using the Pythagorean theorem (e.g., “Given the length of a ladder and the distance of the base of the ladder from a wall, determine the distance up the wall to the top of the ladder”) 9-12.G.4.6 Use trigonometric functions to solve for the length of the second leg of a right triangle given the angles and the length of the first leg. (e.g., “A surveyor determines that the angle subtended by a two-foot stick at right angles to his transit is exactly one degree. What is the distance from the transit to the base of the measuring stick?”)	2	IC	These New Mexico assessment standards do not specify geometric models; however, the benchmark title of G.4 does
12G.3(d) Use the Pythagorean theorem to solve problems in two- or three-dimensional situations.	9-12.G.4.4 Solve problems using the Pythagorean theorem (e.g., “Given the length of a ladder and the distance of the base of the ladder from a wall, determine the distance up the wall to the top of the ladder”)	2	IC	This New Mexico assessment standard does not specify solving problems in three dimensions
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.	9-12.G.1.3 Find and use measures of sides and interior and exterior angles of triangles and polygons to classify figures (e.g., scalene, isosceles, and equilateral triangles; rectangles [square and non-square]; other convex polygons) 9-12.G.1.7a Write geometric proofs (including proofs by contradiction), including: theorems involving the properties of parallel lines cut by a transversal line and the properties of quadrilaterals 9-12.G.4.1 Solve real-world problems using congruence and similarity relationships of triangles (e.g., find the height of a pole given the length of its shadow)	2	IC	

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.3 Relationships between geometric figures</b>				
12G.3(f) Analyze properties or relationships of triangles, quadrilaterals, and other polygonal plane figures.	9-12.G.1.3 Find and use measures of sides and interior and exterior angles of triangles and polygons to classify figures (e.g., scalene, isosceles, and equilateral triangles; rectangles [square and non-square]; other convex polygons)	2	IC	
12G.3(g) Analyze properties and relationships of parallel, perpendicular, or intersecting lines, including the angle relationships that arise in these cases.	9-12.G.1.7a Write geometric proofs (including proofs by contradiction), including: theorems involving the properties of parallel lines cut by a transversal line and the properties of quadrilaterals 9-12.G.1.7b Write geometric proofs (including proofs by contradiction), including: theorems involving complementary, supplementary, and congruent angles 9-12.G.4.2 Solve problems involving complementary, supplementary, and congruent angles	2	IC	
12G.3(h) Analyze properties of circles and the intersections of lines and circles (inscribed angles, central angles, tangents, secants, chords).	8.G.1.2 Identify arc, chord, and semicircle and explain their attributes	2	LG MC	This New Mexico assessment standard does not include angles, tangents, or secants
<b>12G.4 Position, direction, and coordinate geometry</b>				
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.	9-12.G.2.2 Determine the midpoint and distance between two points within a coordinate system and relate these ideas to geometric figures in the plane (e.g., find the center of a circle given two endpoints of a diameter of the circle) 9-12.G.2.3 Given two linear equations, determine whether the lines are parallel, perpendicular, or coincide	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		

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.4 Position, direction, and coordinate geometry</b>				
12G.4(d) Represent two-dimensional figures algebraically using coordinates and/or equations.		1		
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		
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		
<b>12G.5 Mathematical reasoning in geometry</b>				
12G.5(a) Make, test, and validate geometric conjectures using a variety of methods including deductive reasoning and counterexamples.	9-12.G.1.5a Identify the hypothesis and conclusion in logical deduction 9-12.G.1.5b Use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient to refute an assertion 9-12.G.1.6a For inductive reasoning, demonstrate understanding that showing a statement is true for a finite number of examples does not show it is true for all cases unless the cases verified are all cases 9-12.G.1.6b For deductive reasoning, prove simple theorems	3		
12G.5(b) Determine the role of hypotheses, logical implications, and conclusion, in proofs of geometric theorems.	9-12.G.1.5 Demonstrate an understanding of simple aspects of a logical argument 9-12.G.1.5a Identify the hypothesis and conclusion in logical deduction 9-12.G.1.6a For inductive reasoning, demonstrate understanding that showing a statement is true for a finite number of examples does not show it is true for all cases unless the cases verified are all cases	3		

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.5 Mathematical reasoning in geometry</b>				
12G.5(c) Analyze or explain a geometric argument by contradiction	9-12.G.1.7 Write geometric proofs (including proofs by contradiction) 9-12.G.1.7a Write geometric proofs (including proofs by contradiction), including: theorems involving the properties of parallel lines cut by a transversal line and the properties of quadrilaterals 9-12.G.1.7b Write geometric proofs (including proofs by contradiction), including: theorems involving complementary, supplementary, and congruent angles 9-12.G.1.7c Write geometric proofs (including proofs by contradiction), including: theorems involving congruence and similarity Pythagorean (tangram proofs)	3		Seems like words are missing from the New Mexico assessment standard 9-12.G.1.7c
12G.5(d) Analyze or explain a geometric proof of the Pythagorean theorem.	9-12.G.1.7c Write geometric proofs (including proofs by contradiction), including: theorems involving congruence and similarity Pythagorean (tangram proofs)	3		
12G.5(e) Prove basic theorems about congruent and similar triangles and circles.	9-12.G.1.7c Write geometric proofs (including proofs by contradiction), including: theorems involving congruence and similarity Pythagorean (tangram proofs)	3		
<b>Data analysis, statistics, and probability</b>				
<b>12P.1 Data representation</b>				
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, bar graphs, 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.	9-12.D.2.3a Construct and interpret frequency tables, histograms, stem and leaf plots, and box and whisker plots	2	IC	
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)	9-12.D.2.4 For bivariate data, be able to display a scatter plot and describe its shape 9-12.D.2.3a Construct and interpret frequency tables, histograms, stem and leaf plots, and box and whisker plots 9-12.D.3.2a Make predictions from a linear pattern in data	3		

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>12P.1 Data representation</b>				
12P.1(c) Solve problems involving univariate or bivariate data.	9-12.D.3.1 Compare and draw conclusions between two or more sets of univariate data using basic data analysis techniques and summary statistics 9-12.D.3.2 Draw conclusions concerning the relationships among bivariate data	3		
12P.1(d) Given a graphical or tabular representation of a set of data, determine whether information is represented effectively and appropriately.	7.D.1.2 Select and use appropriate representation for presenting collected data and justify the selection	3	LG	
12P.1(e) Compare and contrast different graphical representations of univariate and bivariate data.	9-12.D.2.3c Compare distributions of univariate data using back-to-back stem and leaf plots and parallel box and whisker plots 9-12.D.3.1 Compare and draw conclusions between two or more sets of univariate data using basic data analysis techniques and summary statistics	2	MC	
12P.1(f) Organize and display data in a spreadsheet in order to recognize patterns and solve problems.	9-12.D.2.4b Describe and interpret the relationship/ correlation between two variables using technological tools	2	IC	
<b>12P.2 Characteristics of data sets</b>				
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).	9-12.D.2.3 For univariate data, be able to display the distribution and describe its shape using appropriate summary statistics, and understand the distinction between a statistic and a parameter 9-12.D.2.3b Calculate and apply measures of central tendency (mean, median, and mode) and measures of variability (range, quartiles, standard deviation) 9-12.D.3.1 Compare and draw conclusions between two or more sets of univariate data using basic data analysis techniques and summary statistics	3		
12P.2(b) Recognize how linear transformations of one-variable data affect mean, median, mode, range, interquartile range, and standard deviation.	6.D.2.3a Understand how additional data added to data sets may affect the computations of central tendency	2	LG MC	This New Mexico assessment standard does not include range, interquartile range, and standard deviation

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>12P.2 Characteristics of data sets</b>				
12P.2(c) Determine the effect of outliers on mean, median, mode, range, interquartile range, or standard deviation.	6.D.2.3b Understand how the inclusion or exclusion of outliers affects measures of central tendency	2	LG MC	This New Mexico assessment standard does not include range, interquartile range, and standard deviation
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.	9-12.D.3.1 Compare and draw conclusions between two or more sets of univariate data using basic data analysis techniques and summary statistics	3		
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.	9-12.D.3.2a Make predictions from a linear pattern in data 9-12.D.2.4a Fit a linear model to a set of data using technological tools	3		
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.	9-12.D.3.2b Determine the strength of the relationship between two sets of data by examining the correlation	2	MC	This New Mexico assessment standard does not include visually estimating the correlation coefficient
12P.2(g) Know and interpret the key characteristics of a normal distribution such as shape, center (mean), and spread (standard deviation).	9-12.D.2.3 For univariate data, be able to display the distribution and describe its shape using appropriate summary statistics, and understand the distinction between a statistic and a parameter 9-12.D.2.3b Calculate and apply measures of central tendency ( mean, median, and mode) and measures of variability (range, quartiles, standard deviation)	3		
<b>12P.3 Experiments and samples</b>				
12P.3(a) Identify possible sources of bias in sample surveys, and describe how such bias can be controlled and reduced.	9-12.D.1.3b Recognize sources of bias in poorly designed experiments. 9-12.D.1.2b Differentiate between a biased and an unbiased sample	2	IC	

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>12P.3 Experiments and samples</b>				
12P.3(b) Recognize and describe a method to select a simple random sample.	9-12.D.3.3 Use simulations to explore the variability of sample statistics from a known population and construct sampling distributions 9-12.D.3.4 Understand how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal inference	2	IC	
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”.		1		
12P.3(d) Identify or evaluate the characteristics of a good survey or of a well-designed experiment.	9-12.D.1.2 Know the characteristics of a well-designed and well-conducted survey 9-12.D.1.3 Know the characteristics of a well-designed and well-conducted experiment 9-12.D.1.4 Understand the role of randomization in well-designed surveys and experiments	3		
12P.3(e) * Recognize the differences in design and in conclusions between randomized experiments and observational studies.	9-12.D.1.3a Differentiate between an experiment and an observational study 9-12.D.3.5 Evaluate published reports that are based on data by examining the design of the study, the appropriateness of the data analysis, and the validity of conclusions 9-12.D.1.4 Understand the role of randomization in well-designed surveys and experiments	3		
<b>12P.4 Probability</b>				
12P.4(a) Recognize whether two events are independent or dependent.	9-12.D.4.4 Distinguish between independent and dependent events	3		
12P.4(b) Determine the theoretical probability of simple and compound events in familiar or unfamiliar contexts.	9-12.D.4.5 Understand how to compute the probability of an event using the basic rules of probability: a. complement rule b. addition rule (disjoint and joint events) c. multiplication rule (independent events) d. conditional probability 9-12.D.4.3 Use simulations to compute the expected value and probabilities of random variables in simple cases	3		

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>12P.4 Probability</b>				
12P.4(c) Given the results of an experiment or simulation, estimate the probability of simple or compound events in familiar or unfamiliar contexts.	9-12.D.4.3 Use simulations to compute the expected value and probabilities of random variables in simple cases	2	MC	
12P.4(d) Use theoretical probability to evaluate or predict experimental outcomes.	8.D.4.4 Use theoretical or experimental probability to make predictions about real-world events	3	LG	
12P.4(e) Determine the number of ways an event can occur using tree diagrams, formulas for combinations and permutations, or other counting techniques.	6.D.4.4 Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome	3	LG	
12P.4(h) Determine the probability of independent and dependent events.	9-12.D.4.5 Understand how to compute the probability of an event using the basic rules of probability: a. complement rule b. addition rule (disjoint and joint events) c. multiplication rule (independent events) d. conditional probability	3		
12P.4(i) Determine conditional probability using two-way tables.	9-12.D.4.5 Understand how to compute the probability of an event using the basic rules of probability: a. complement rule b. addition rule (disjoint and joint events) c. multiplication rule (independent events) d. conditional probability	2	MD	This New Mexico assessment standard does not specify using two way tables
12P.4(j) Interpret and apply probability concepts to practical situations.	8.D.4.4 Use theoretical or experimental probability to make predictions about real-world events 8.D.4.5 Use probability to generate convincing arguments, draw conclusions, and make decisions in a variety of situations	3	LG	
12P.4(k) *Use the binomial theorem to solve problems.		1		
<b>12P.5 Mathematical reasoning with data</b>				
12P.5(a) Identify misleading uses of data in real-world settings and critique different ways of presenting and using information.	9-12.D.3.5 Evaluate published reports that are based on data by examining the design of the study, the appropriateness of the data analysis, and the validity of conclusions	2	IC	

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>12P.5 Mathematical reasoning with data</b>				
12P.5(b) Distinguish relevant from irrelevant information, identify missing information, and either find what is needed or make appropriate approximations.		1		
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.	9-12.D.3.2c Understand that correlation does not imply a cause-and-effect relationship	3		
12P.5(e) * Recognize and explain the potential errors caused by extrapolating from data.		1		
<b>Algebra</b>				
<b>12A.1 Patterns, relations, and functions</b>				
12A.1(a) Recognize, describe, or extend numerical patterns, including arithmetic and geometric progressions.		1		
12A.1(b) Express linear and exponential functions in recursive and explicit form given a table, verbal description, or some terms of a sequence.	9-12.A.1.6 Represent and analyze relationships using written and verbal expressions, tables, equations, and graphs, and describe the connections among those representations	2	IC	
12A.1(e) Identify or analyze distinguishing properties of linear, quadratic, rational, exponential, or *trigonometric functions from tables, graphs, or equations.	9-12.A.4.1 Analyze the effects of parameter changes on these functions: a. linear (e.g., changes in slope or coefficients) b. quadratic (e.g., $f[x-a]$ changes coefficients and constants) c. exponential (e.g., changes caused by increasing $x[x + c]$ or $[ax]$ ) d. polynomial (e.g., changes caused by positive or negative values of $a$ , or in a constant $c$ )	2	IC	This New Mexico assessment standard does not specify rational and trigonometric functions
12A.1(g) Determine whether a relation, given in verbal, symbolic, tabular, or graphical form, is a function.	9-12.A.2.2 Determine whether a relation defined by a graph, a set of ordered pairs, a table of values, an equation, or a rule is a function	3		

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>12A.1 Patterns, relations, and functions</b>				
12A.1(h) Recognize and analyze the general forms of linear, quadratic, rational, exponential, or *trigonometric functions.	9-12.A.4.1 Analyze the effects of parameter changes on these functions: a. linear (e.g., changes in slope or coefficients) b. quadratic (e.g., $f[x-a]$ changes coefficients and constants) c. exponential (e.g., changes caused by increasing $x[x + c]$ or $[ax]$ ) d. polynomial (e.g., changes caused by positive or negative values of $a$ , or in a constant $c$ )	2	IC	This New Mexico assessment standard does not specify rational and trigonometric functions
12A.1(i) Determine the domain and range of functions given in various forms and contexts.	9-12.A.2.6 Determine the domain of independent variables and the range of dependent variables defined by a graph, a set of ordered pairs, or a symbolic expression	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.	9-12.A.3.11a Understand and use: such operations as taking the inverse, finding the reciprocal, taking a root, and raising to a fractional power	3		
<b>12A.2 Algebraic representations</b>				
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.	9-12.A.1.6 Represent and analyze relationships using written and verbal expressions, tables, equations, and graphs, and describe the connections among those representations 9-12.A.1.10 Know, explain, and use equivalent representations for algebraic expressions 9-12.A.2.4 Translate among tabular, symbolic, and graphical representations of functions	2	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.	9-12.A.1.6 Represent and analyze relationships using written and verbal expressions, tables, equations, and graphs, and describe the connections among those representations	2	MD	

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>12A.2 Algebraic representations</b>				
12A.2(d) Perform or interpret transformations on the graphs of linear, quadratic, exponential, and *trigonometric functions.	9-12.A.4.1 Analyze the effects of parameter changes on these functions: a. linear (e.g., changes in slope or coefficients) b. quadratic (e.g., $f[x-a]$ changes coefficients and constants) c. exponential (e.g., changes caused by increasing $x[x + c]$ or $[ax]$ ) d. polynomial (e.g., changes caused by positive or negative values of $a$ , or in a constant $c$ )	2	MC	This New Mexico assessment standard does not specify trigonometric functions
12A.2(e) Make inferences or predictions using an algebraic model of a situation.	8.A.4.1 Use graphs, tables, and algebraic representations to make predictions and solve problems that involve change	3	LG	
12A.2(f) Given a real-world situation, determine if a linear, quadratic, rational, exponential, logarithmic, or *trigonometric function fits the situation.	9-12.A.3.1 Model real-world phenomena using linear and quadratic equations and linear inequalities (e.g., apply algebraic techniques to solve rate problems, work problems, and percent mixture problems; solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest; apply quadratic equations to model throwing a baseball in the air) 9-12.A.3.9 Generate an algebraic sentence to model real-life situations	2	IC	
12A.2(g) Solve problems involving exponential growth and decay.		1		
12A.2(h) * Analyze properties of exponential, logarithmic, and rational functions.	9-12.A.4.1 Analyze the effects of parameter changes on these functions: a. linear (e.g., changes in slope or coefficients) b. quadratic (e.g., $f[x-a]$ changes coefficients and constants) c. exponential (e.g., changes caused by increasing $x[x + c]$ or $[ax]$ ) d. polynomial (e.g., changes caused by positive or negative values of $a$ , or in a constant $c$ ) 9-12.A.2.9 Understand symmetry of graphs	2	MC	These New Mexico assessment standards do not specify logarithmic and rational functions

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TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>12A.3 Variables, expressions, and operations</b>				
12A.3(b) Write algebraic expressions, equations, or inequalities to represent a situation.	<p>9-12.A.1.6a Translate from verbal expression to algebraic formulae (e.g., “Set up the equations that represent the data in the following equation: John’s father is 23 years older than John. John is 4 years older than his sister Jane</p> <p>9-12.A.1.6b Translate from verbal expression to algebraic formulae (e.g., “Set up the equations that represent the data in the following equation: John’s mother is 3 years younger than John’s father. John’s mother is 9 times as old as Jane. How old are John, Jane, John’s mother, and John’s father?”)</p> <p>9-12.A.3.1 Model real-world phenomena using linear and quadratic equations and linear inequalities (e.g., apply algebraic techniques to solve rate problems, work problems, and percent mixture problems; solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest; apply quadratic equations to model throwing a baseball in the air)</p>	3		
12A.3(c) Perform basic operations, using appropriate tools, on algebraic expressions including polynomial and rational expressions.	<p>9-12.A.1.4 Simplify algebraic monomial expressions raised to a power (e.g., <math>[5xy^2]^3</math>) and algebraic binomial (e.g., <math>[5x^2 + y]^2</math>) expressions raised to a power</p> <p>9-12.A.1.17 Use the four basic operations (+, -, <math>\times</math>, <math>\div</math>) with: a. linear expressions b. polynomial expressions c. rational expressions</p>	3		
12A.3(d) Write equivalent forms of algebraic expressions, equations, or inequalities to represent and explain mathematical relationships.	9-12.A.1.10 Know, explain, and use equivalent representations for algebraic expressions	2	MC	This New Mexico assessment standard only includes expressions, not equations or inequalities
12A.3(e) Evaluate algebraic expressions, including polynomials and rational expressions.	<p>9-12.A.1.3 Evaluate the numerical value of expressions of one or more variables that are:</p> <p>a. polynomial b. rational c. radical</p>	3		

(CONTINUED)

TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>12A.3 Variables, expressions, and operations</b>				
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.	9-12.A.2.5 Explain and use function notation 9-12.A.2.11 Work with composition of functions (e.g., find $f$ of $g$ when $f(x) = 2x - 3$ and $g(x) = 3x - 2$ ), and find the domain, range, intercepts, zeros, and local maxima or minima of the final function	2	MD	These New Mexico assessment standards do not specify combining functions by addition, subtraction, multiplication, or division
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.	9-12.A.3.11b Understand and use: the rules of exponents	2	MC	This New Mexico assessment standard does not specify logarithms
<b>12A.4 Equations and inequalities</b>				
12A.4(a) Solve linear, rational or quadratic equations or inequalities, including those involving absolute value.	9-12.A.3.4b Solve linear inequalities and equations in one variable	2	MC	
12A.4(c) Analyze situations, develop mathematical models, or solve problems using linear, quadratic, exponential, or logarithmic equations or inequalities symbolically or graphically.	9-12.A.3.1 Model real-world phenomena using linear and quadratic equations and linear inequalities (e.g., apply algebraic techniques to solve rate problems, work problems, and percent mixture problems; solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest; apply quadratic equations to model throwing a baseball in the air)	2	MC	
12A.4(d) Solve (symbolically or graphically) a system of equations or inequalities and recognize the relationship between the analytical solution and graphical solution.	9-12.A.3.4c Solve systems of linear equations in two variables and graph the solutions 9-12.A.3.4d Use the graph of a system of equations in two variables to help determine the solution 9-12.A.3.8 Determine the solution to a system of equations in two variables from a given graph	2	MC	These New Mexico assessment standards do not specify systems of inequalities
12A.4(e) Solve problems involving special formulas such as: $A = P(1 + r)t$ , $A = Pert$ ].		1		
12A.4(f) Solve an equation or formula involving several variables for one variable in terms of the others.		1		

(CONTINUED)

TABLE C1 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics assessment standards and current New Mexico Standards Based Assessment (NMSBA) assessment standards, April 2008**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>12A.4 Equations and inequalities</b>				
12A.4(g) Solve quadratic equations with complex roots.	9-12.A.2.12 Use the quadratic formula and factoring techniques to determine whether the graph of a quadratic function will intersect the x-axis in zero, one, or two points	3		
<b>12A.5 Mathematical reasoning in algebra</b>				
12A.5(a) Use algebraic properties to develop a valid mathematical argument.		1		
12A.5(b) Determine the role of hypotheses, logical implications, and conclusions in algebraic argument.	9-12.G.1.5a Identify the hypothesis and conclusion in logical deduction 9-12.G.1.5b Use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient 9-12.G.1.5a Identify the hypothesis and conclusion in logical deduction	2	IC	These New Mexico assessment standards are geometry standards
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 other assessment standards.

a. Rating is based on a scale of 1 to 3, where 1 indicates that the NMSBA assessment standard or standards do not address the NAEP assessment standard, 2 that the NMSBA assessment standard or standards partially address the NAEP assessment standard, and 3 that the NMSBA 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 NMSBA assessment standard or standards if all of the content in the NAEP assessment standard is contained in one or more NMSBA assessment standards at the same or lower grade level. A NAEP standard is considered to be *partially addressed* by the NMSBA assessment standard or standards if the NMSBA assessment standard or standards address only one part of the NAEP standard; the NAEP standard contains more content or more detailed content than the NMSBA assessment standard or standards or the NMSBA assessment standard or standard imply but do not explicitly state the content found in the NAEP assessment standard; or there is a matching NMSBA assessment standard or standards at a lower grade level than the NAEP assessment standard, but it does not address all the content addressed by the 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 New Mexico State Board of Education (2002).

TABLE C2

**Number of current New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards not covered by the National Assessment of Educational Progress (NAEP) assessment standards by strand, April 2008**

NMSBA strand	Number of standards not covered
Geometry	3
Data analysis and probability	6
Algebra	21
Total	30

Source: New Mexico State Board of Education (2002).

TABLE C3

**Current New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards not covered by the National Assessment of Educational Progress (NAEP) grade 12 assessment standards, April 2008**

NMSBA strand	NMSBA grade 12 assessment standard not covered in NAEP
Geometry	9-12.G.2.1 Demonstrate understanding of the construction of the coordinate plane, know the names of the origin, coordinate axes and four quadrants, draw and label them correctly, find the coordinates of an indicated point, and plot a point with given coordinates
	9-12.G.2.4 Use basic geometric ideas (e.g., the Pythagorean theorem, area, and perimeter of objects) in the context of the Euclidean Plane, calculate the perimeter of a rectangle with integer coordinates and sides parallel to the coordinate axes and with sides not parallel
	9-12.G.3.2 Deduce properties of figures using transformations that include translations, rotations, reflections, and dilations in a coordinate system
Data analysis and probability	9-12.D.1.1 Understand the differences between the various methods of data collection
	9-12.D.1.2a Differentiate between sampling and census
	9-12.D.2.1 Understand the meaning of measurement data and categorical data, and of the term “variable”
	9-12.D.2.2 Understand the meaning of “univariate” (i.e., one variable) and “bivariate” (i.e., two variable) data
	9-12.D.4.1 Explain the concept of a random variable
	9-12.D.4.2 Understand the concept of probability as relative frequency

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TABLE C3 (CONTINUED)

**Current New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards not covered by the National Assessment of Educational Progress (NAEP) grade 12 assessment standards, April 2008**

NMSBA strand	NMSBA grade 12 assessment standard not covered in NAEP
Algebra	9-12.A.1.5 Compare and order polynomial expressions by degree.
	9-12.A.1.6c Given data in a table, construct a function that represents these data (linear only)
	9-12.A.1.6d Given a graph, construct a function that represents the graph (linear only)
	9-12.A.1.11 Simplify square roots and cube roots with monomial radicands that are perfect squares or perfect cubes ( e.g., $9a^2x^4$ ).
	9-12.A.1.13b Solve: radical equations involving one radical
	9-12.A.1.14 Factor polynomials, difference of squares and perfect square trinomials, and the sum and difference of cubes.
	9-12.A.1.15 Simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms.
	9-12.A.1.16 Manipulate simple expressions with + and – exponents.
	9-12.A.2.1 Distinguish between the concept of a relation and a function.
	9-12.A.2.3 Describe the concept of a graph of a function.
	9-12.A.2.7 Identify the independent and dependent variables from an application problem (e.g., height of a child).
	9-12.A.2.8 Describe the concept of a graph of an equation.
	9-12.A.2.10 Analyze and describe middle and end (asymptotic) behavior of linear, quadratic, and exponential functions, and sketch the graphs of functions.
	9-12.A.2.13 Apply quadratic equations to physical phenomena (e.g., the motion of an object under the force of gravity).
	9-12.A.3.2 Use a variety of computational methods (e.g., mental arithmetic, paper and pencil, technological tools).
	9-12.A.3.3 Express the relationship between two variables using a table with a finite set of values and graph the relationship.
	9-12.A.3.4a Graph a linear equation and linear inequality in two variables
	9-12.A.3.5 Solve applications involving systems of equations.
	9-12.A.3.7 Create a linear equation from a table of values containing co-linear data.
	9-12.A.3.10 Write an equation of the line that passes through two given points.
9-12.A.3.12 Verify that a point lies on a line, given an equation of the line, and be able to derive linear equations by using the point-slope formula.	

Source: New Mexico State Board of Education (2002).



TABLE C4

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>12N.1 Number sense</b>				
12N.1(d) Represent, interpret or compare expressions for real numbers, including expressions utilizing exponents and logarithms.	9-12R.A.1.3 Determine the relative position on the number line and the relative magnitude of integers, decimals, rationals, irrationals, and numbers in scientific notation	2	MC	These New Mexico assessment standards do not include logarithms
12N.1(f) Represent or interpret expressions involving very large or very small numbers in scientific notation.	9-12R.A.1.3 Determine the relative position on the number line and the relative magnitude of integers, decimals, rationals, irrationals, and numbers in scientific notation	2	IC	
12N.1(g) Represent, interpret or compare expressions or problem situations involving absolute values.	9-12R.A.1.4 Explain that the distance between two numbers on the number line is the absolute value of their difference	2	IC	
12N.1(i) Order or compare real numbers, including very large and very small real numbers.	9-12R.A.1.3 Determine the relative position on the number line and the relative magnitude of integers, decimals, rationals, irrationals, and numbers in scientific notation	2	IC	
<b>12N.2 Estimation</b>				
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.	9-12R.A.1.5 Use a variety of computational methods, recognize when an estimate or approximation is more appropriate than an exact answer, and understand the limits on precision of approximations	2	IC	
12N.2(c) Verify solutions or determine the reasonableness of results in a variety of situations.	7.N.3.1 Use estimation to check reasonableness of results, and use this information to make predictions in situations involving rational numbers, pi, and simple algebraic equations	3	LG	
12N.2(d) Estimate square or cube roots of numbers less than 1,000 between two whole numbers.		1		
<b>12N.3 Number operations</b>				
12N.3(a) Find integral or simple fractional powers of real numbers.	9-12R.A.1.6 Simplify numerical expressions using the order of operations, including integer exponents 9-12R.A.1.11 Describe the properties of rational exponents and apply these properties to simplify algebraic expressions	3		
12N.3(b) Perform arithmetic operations with real numbers, including common irrational numbers.	8.N.2.2 Perform arithmetic operations and their inverses (e.g., addition/subtraction, multiplication/division, square roots of perfect squares, cube roots of perfect cubes) on real numbers	3	LG	

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TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>12N.3 Number operations</b>				
12N.3(c) Perform arithmetic operations with expressions involving absolute value.	9-12R.A.1.14 Evaluate polynomial, rational, radical, and absolute value expressions for one or more variables	2	IC	
12N.3(d) Describe the effect of multiplying and dividing by numbers including the effect of multiplying or dividing a real number by: <ul style="list-style-type: none"> <li>• Zero, or</li> <li>• A number less than zero, or</li> <li>• A number between zero and one, or</li> <li>• One, or</li> <li>• A number greater than one.</li> </ul>		1		
12N.3(f) Solve application problems involving numbers, including rational and common irrationals.	8.N.3.6 Select and use appropriate forms of rational numbers to solve real-world problems including those involving proportional relationships 8.N.3.7 Approximate, mentally and with calculators, the value of irrational numbers as they arise from problem situations	3	LG	
<b>12N.4 Ratios and proportional reasoning</b>				
12N.4(c) Use proportions to solve problems (including rates of change).	8.N.3.6 Select and use appropriate forms of rational numbers to solve real-world problems including those involving proportional relationships	3	LG	
12N.4(d) Solve multi-step problems involving percentages, including compound percentages.	8.A.2.6 Formulate and solve problems involving simple linear relationships, find percents of a given number, variable situations, and unknown quantities	2	LG MC	This New Mexico assessment standard does not include compound percentages
<b>12N.5 Properties of numbers and operations</b>				
12N.5(c) Solve problems using factors, multiples, or prime factorization.	6.N.2.2 Factor a whole number into a product of its primes 6.N.2.6 Determine the least common multiple and the greatest common divisor of whole numbers and use them to solve problems with fractions	3	LG	
12N.5(d) Use divisibility or remainders in problem settings.	6.N.2.5a Explain and perform: whole number division and express remainders as decimals or appropriately in the context of the problem	3	LG	
12N.5(e) Apply basic properties of operations, including conventions about the order of operations.	9-12R.A.1.6 Simplify numerical expressions using the order of operations, including integer exponents	2	IC	

(CONTINUED)

TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Number properties and operations</b>				
<b>12N.5 Properties of numbers and operations</b>				
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.	9-12R.A.1.2 Classify and use equivalent representations of natural, whole, integer, rational, irrational numbers and complex numbers, and choose which type of number is appropriate in a given context	3		
<b>12N.6 Mathematical reasoning using numbers</b>				
12N.6(a) Give a mathematical argument to establish the validity of a simple numerical property or relationship.		1		
12N.6(b) * Analyze or interpret a proof by mathematical induction of a simple numerical relationship.		1		
<b>Measurement</b>				
<b>12M.1 Measuring physical attributes</b>				
12M.1(b) Determine the effect of proportions and scaling on length, areas and volume.	9-12R.G.4.3 Know that the effect of a scale factor $k$ on length, area and volume is to multiply each by $k$ , $k^2$ and $k^3$ , respectively	3		
12M.1(c) Estimate, or compare perimeters or areas of two-dimensional geometric figures.	9-12R.G.1.2 Find the area and perimeter of a geometric figure composed of a combination of two or more rectangles, triangles, and/or semicircles with just edges in common	2	IC	This New Mexico assessment standard does not include estimating or comparing
12M.1(d) Solve problems of angle measure, including those involving triangles or other polygons or parallel lines cut by a transversal.	9-12R.G.4.2 Solve problems involving complementary, supplementary, and congruent angles	2	MC	
12M.1(f) Solve problems involving perimeter or area of plane figures such as polygons, circles, or composite figures.	9-12R.G.1.2 Find the area and perimeter of a geometric figure composed of a combination of two or more rectangles, triangles, and/or semicircles with just edges in common	3		
12M.1(h) Solve problems by determining, estimating, or comparing volumes or surface areas of three-dimensional figures.	9-12R.G.1.3 Draw three-dimensional objects and calculate the surface areas and volumes of these figures (e.g. prisms, cylinders, pyramids, cones, spheres) as well as figures constructed from unions of prisms with faces in common, given the formulas for these figures	2	MC	This New Mexico assessment standard does not specify estimating and comparing
12M.1(i) Solve problems involving rates such as speed, density, population density, or flow rates.	8.M.2.7 Solve simple problems involving rates and derived measurements for such properties as velocity and density	3	LG	

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TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Measurement</b>				
<b>12M.2 Systems of measurement</b>				
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.	9-12R.G.1.1 Understand that numerical values associated with measurements of physical quantities must be assigned units of measurement or dimensions; apply such units correctly in expressions, equations and problem solutions that involve measurements; and convert a measurement using one unit of measurement to another unit of measurement	3		
12M.2(b) Solve problems involving conversions within or between measurement systems, given the relationship between the units.	9-12R.G.1.1 Understand that numerical values associated with measurements of physical quantities must be assigned units of measurement or dimensions; apply such units correctly in expressions, equations and problem solutions that involve measurements; and convert a measurement using one unit of measurement to another unit of measurement	2	IC	It is not clear whether the New Mexico assessment standard includes solving problems involving conversions or just converting
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.	9-12R.G.1.1 Understand that numerical values associated with measurements of physical quantities must be assigned units of measurement or dimensions; apply such units correctly in expressions, equations and problem solutions that involve measurements; and convert a measurement using one unit of measurement to another unit of measurement	2	IC	
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.	6.M.2.1 Apply various measurement techniques and tools, units of measure, and degrees of accuracy to find accurate rational number representations for length, liquid, weight, perimeter, temperature, and time	3	LG	
12M.2(f) Construct or solve problems involving scale drawings.	9-12R.G.4.1 Solve contextual problems using congruence and similarity relationships of triangles (e.g., find the height of a pole given the length of its shadow)	2	IC	
<b>12M.3 Measurement in triangles</b>				
12M.3(a) Solve problems involving indirect measurement.	9-12R.G.4.1 Solve contextual problems using congruence and similarity relationships of triangles (e.g., find the height of a pole given the length of its shadow)	3		

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TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Measurement</b>				
12M.3 Measurement in triangles				
12M.3(b) Solve problems using the fact that trigonometric ratios (sine, cosine, and tangent) stay constant in similar triangles.	9-12R.G.4.5 Understand how similarity of right triangles allows the trigonometric functions sine, cosine and tangent to be defined as ratios of sides and be able to use these functions to solve problems	3		
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.	9-12R.G.4.6 Apply basic trigonometric functions to solve right-triangle problems	3		
12M.3(d) Interpret and use the identity $\sin^2 q + \cos^2 q = 1$ for angles $q$ between $0^\circ$ and $90^\circ$ ; 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		
<b>Geometry</b>				
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.		1		
12G.1(d) Draw or sketch from a written description plane figures and planar images of three-dimensional figures.	9-12R.G.1.3 Draw three-dimensional objects and calculate the surface areas and volumes of these figures (e.g. prisms, cylinders, pyramids, cones, spheres) as well as figures constructed from unions of prisms with faces in common, given the formulas for these figures	2	IC	
12G.1(e) Use two-dimensional representations of three-dimensional objects to visualize and solve problems.	8.G.4.5 Construct two-dimensional patterns for three-dimensional models (e.g., cylinders, prisms, cones) 6.G.1.1c Visualize and draw two-dimensional views of three-dimensional objects made from rectangular solids	3	LG	

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TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.1 Dimension and shape</b>				
12G.1(f) Analyze properties of three-dimensional figures including spheres and hemispheres.	9-12R.G.1.3 Draw three-dimensional objects and calculate the surface areas and volumes of these figures (e.g. prisms, cylinders, pyramids, cones, spheres) as well as figures constructed from unions of prisms with faces in common, given the formulas for these figures	2	IC	These New Mexico assessment standards do not specify analyzing properties
<b>12G.2 Transformation of shapes and preservation of properties</b>				
12G.2(a) Recognize or identify types of symmetries (e.g., point, line, rotational, self-congruence) of two- and three-dimensional figures.	6.G.3.1 Identify line of symmetry with rotation and scaling 8.G.3.1 Describe the symmetry of three-dimensional figures	2	LG MC	
12G.2(b) Give or recognize the precise mathematical relationship (e.g., congruence, similarity, orientation) between a figure and its image under a transformation.	9-12R.G.3.2 Sketch a planar figure that is the result of given transformations (i.e., translation, reflection, rotation, and/or dilation) 9-12R.G.3.3 Identify similarity in terms of transformations 9-12R.G.3.1 Use rigid motions (compositions of reflections, translations and rotations) to determine whether two geometric figures are congruent in a coordinate plane	3		
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).	9-12R.G.3.2 Sketch a planar figure that is the result of given transformations (i.e., translation, reflection, rotation, and/or dilation)	2	MC	This New Mexico assessment standard does not include three dimensional shapes
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.	9-12R.G.3.4 Determine the effects of transformations on linear and area measurements of the original planar figure. 9-12R.G.1.2 Find the area and perimeter of a geometric figure composed of a combination of two or more rectangles, triangles, and/or semicircles with just edges in common	2	MC	This New Mexico assessment standard does not include three dimensional figures

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TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.2 Transformation of shapes and preservation of properties</b>				
12G.2(e) Justify relationships of congruence and similarity, and apply these relationships using scaling and proportional reasoning.	9-12R.G.1.9 Write geometric proofs, including proofs by contradiction, and perform and explain basic geometric constructions related to: theorems involving the properties of parallel and perpendicular lines, circles, and polygons; theorems involving complementary, supplementary, and congruent angles; theorems involving congruence and similarity; and the Pythagorean theorem 9-12R.G.3.1 Use rigid motions (compositions of reflections, translations and rotations) to determine whether two geometric figures are congruent in a coordinate plane 9-12R.G.3.3 Identify similarity in terms of transformations	2	IC	
12G.2(g) Perform or describe the effects of successive transformations.	9-12R.G.3.2 Sketch a planar figure that is the result of given transformations (i.e., translation, reflection, rotation, and/or dilation)	2	IC	This New Mexico assessment standard does not specify the effects of successive transformations
<b>12G.3 Relationships between geometric figures</b>				
12G.3(b) Apply geometric properties and relationships to solve problems in two and three dimensions.	9-12R.G.4.1 Solve contextual problems using congruence and similarity relationships of triangles (e.g., find the height of a pole given the length of its shadow) 9-12R.G.4.2 Solve problems involving complementary, supplementary, and congruent angles 9-12R.G.4.4 Solve problems using the Pythagorean theorem	2	MC	These New Mexico assessment standards do not include three dimensions
12G.3(c) Represent problem situations with geometric models to solve mathematical or real world problems.	9-12R.G.4.1 Solve contextual problems using congruence and similarity relationships of triangles (e.g., find the height of a pole given the length of its shadow) 9-12R.G.4.4 Solve problems using the Pythagorean theorem 9-12R.G.4.6 Apply basic trigonometric functions to solve right-triangle problems	2	IC	These New Mexico assessment standards do not specify geometric models; however, the benchmark title of G.4 does
12G.3(d) Use the Pythagorean theorem to solve problems in two- or three-dimensional situations.	9-12R.G.4.4 Solve problems using the Pythagorean theorem	2	MC	This New Mexico assessment standard does not specify three-dimensional situations

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TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.3 Relationships between geometric figures</b>				
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.	9-12R.G.4.1 Solve contextual problems using congruence and similarity relationships of triangles (e.g., find the height of a pole given the length of its shadow) 9-12R.G.1.9 Write geometric proofs, including proofs by contradiction, and perform and explain basic geometric constructions related to: theorems involving the properties of parallel and perpendicular lines, circles, and polygons; theorems involving complementary, supplementary, and congruent angles; theorems involving congruence and similarity; and the Pythagorean theorem	2	IC	
12G.3(f) Analyze properties or relationships of triangles, quadrilaterals, and other polygonal plane figures.	9-12R.G.1.9 Write geometric proofs, including proofs by contradiction, and perform and explain basic geometric constructions related to: theorems involving the properties of parallel and perpendicular lines, circles, and polygons; theorems involving complementary, supplementary, and congruent angles; theorems involving congruence and similarity; and the Pythagorean theorem	2	IC	
12G.3(g) Analyze properties and relationships of parallel, perpendicular, or intersecting lines, including the angle relationships that arise in these cases.	9-12R.G.1.9 Write geometric proofs, including proofs by contradiction, and perform and explain basic geometric constructions related to: theorems involving the properties of parallel and perpendicular lines, circles, and polygons; theorems involving complementary, supplementary, and congruent angles; theorems involving congruence and similarity; and the Pythagorean theorem 9-12R.G.4.2 Solve problems involving complementary, supplementary, and congruent angles	2	IC	

(CONTINUED)



TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.3 Relationships between geometric figures</b>				
12G.3(h) Analyze properties of circles and the intersections of lines and circles (inscribed angles, central angles, tangents, secants, chords).	9-12R.G.1.9 Write geometric proofs, including proofs by contradiction, and perform and explain basic geometric constructions related to: theorems involving the properties of parallel and perpendicular lines, circles, and polygons; theorems involving complementary, supplementary, and congruent angles; theorems involving congruence and similarity; and the Pythagorean theorem	2	MC	This New Mexico assessment standard does not specify the intersections of lines and circles
<b>12G.4 Position, direction, and coordinate geometry</b>				
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.	9-12R.G.2.2 Determine the midpoint and distance between two points within a coordinate system and relate these ideas to geometric figures in the plane (e.g., find the center of a circle given the two points of a diameter of the circle)	2	MC	This New Mexico assessment standard does not specify slopes of perpendicular or parallel lines
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.	9-12R.G.4.8 Describe the intersections of a line and a plane, intersections of lines in the plane and in space, or of two planes in space	3		
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.		1		
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		
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		

(CONTINUED)

TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.4 Position, direction, and coordinate geometry</b>				
12G.4(h) * Represent situations and solve problems involving polar coordinates.		1		
<b>12G.5 Mathematical reasoning in geometry</b>				
12G.5(a) Make, test, and validate geometric conjectures using a variety of methods including deductive reasoning and counterexamples.	9-12R.G.1.4 Identify the hypothesis and conclusion in examples of conditional statements 9-12R.G.1.6 Use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient to refute a universal statement 9-12R.G.1.8 Explain why, for inductive reasoning, showing a statement is true for a finite number of examples does not show it is true for all cases unless the cases verified are all possible cases	3		
12G.5(b) Determine the role of hypotheses, logical implications, and conclusion, in proofs of geometric theorems.	9-12R.G.1.4 Identify the hypothesis and conclusion in examples of conditional statements 9-12R.G.1.8 Explain why, for inductive reasoning, showing a statement is true for a finite number of examples does not show it is true for all cases unless the cases verified are all possible cases	3		
12G.5(c) Analyze or explain a geometric argument by contradiction	9-12R.G.1.9 Write geometric proofs, including proofs by contradiction, and perform and explain basic geometric constructions related to: theorems involving the properties of parallel and perpendicular lines, circles, and polygons; theorems involving complementary, supplementary, and congruent angles; theorems involving congruence and similarity; and the Pythagorean theorem	3		
12G.5(d) Analyze or explain a geometric proof of the Pythagorean theorem.	9-12R.G.1.9 Write geometric proofs, including proofs by contradiction, and perform and explain basic geometric constructions related to: theorems involving the properties of parallel and perpendicular lines, circles, and polygons; theorems involving complementary, supplementary, and congruent angles; theorems involving congruence and similarity; and the Pythagorean theorem	3		

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TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Geometry</b>				
<b>12G.5 Mathematical reasoning in geometry</b>				
12G.5(e) Prove basic theorems about congruent and similar triangles and circles.	9-12R.G.1.9 Write geometric proofs, including proofs by contradiction, and perform and explain basic geometric constructions related to: theorems involving the properties of parallel and perpendicular lines, circles, and polygons; theorems involving complementary, supplementary, and congruent angles; theorems involving congruence and similarity; and the Pythagorean theorem	3		
<b>Data analysis, statistics, and probability</b>				
<b>12P.1 Data representation</b>				
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, bar graphs, 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.	8.D.1.3 Organize, analyze, and display appropriate quantitative and qualitative data to address specific questions including: a. frequency distributions b. plots c. histograms d. bar, line, and pie graphs e. diagram and pictorial displays f. charts and tables	3	LG	
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)	8.D.2.4 Interpret and analyze data from graphical representations and draw simple conclusions (e.g., line of best fit)	3	LG	
12P.1(c) Solve problems involving univariate or bivariate data.	9-12R.D.2.7 Compare and draw conclusions between two or more sets of univariate data using basic data analysis techniques and summary statistics	2	MC	
12P.1(d) Given a graphical or tabular representation of a set of data, determine whether information is represented effectively and appropriately.	7.D.1.2 Select and use appropriate representation for presenting collected data and justify the selection	3	LG	
12P.1(e) Compare and contrast different graphical representations of univariate and bivariate data.	9-12R.D.2.5 Compare distributions of univariate data using back-to-back stem and leaf plots and parallel box and whisker plots 9-12R.D.2.7 Compare and draw conclusions between two or more sets of univariate data using basic data analysis techniques and summary statistics	2	IC	

(CONTINUED)

TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
Data analysis, statistics and probability				
12P.1 Data representation				
12P.1(f) Organize and display data in a spreadsheet in order to recognize patterns and solve problems.	9-12R.D.2.11 Describe the relationship between two variables and determine its strength with and without technological tools	2	IC	
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).	9-12R.D.2.7 Compare and draw conclusions between two or more sets of univariate data using basic data analysis techniques and summary statistics 9-12R.D.2.3 Display the distribution of univariate data, describe its shape using appropriate summary statistics, and understand the distinction between a statistic and a parameter 9-12R.D.2.4 Calculate and apply measures of variability (e.g., standard deviation)	3		
12P.2(b) Recognize how linear transformations of one-variable data affect mean, median, mode, range, interquartile range, and standard deviation.	6.D.2.3a Understand how additional data added to data sets may affect the computations of central tendency	2	LG MC	This New Mexico assessment standard does not include range, interquartile range, and standard deviation
12P.2(c) Determine the effect of outliers on mean, median, mode, range, interquartile range, or standard deviation.	6.D.2.3b Understand how the inclusion or exclusion of outliers affects measures of central tendency	2	LG MC	This New Mexico assessment standard does not include range, interquartile range, and standard deviation
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.	9-12R.D.2.7 Compare and draw conclusions between two or more sets of univariate data using basic data analysis techniques and summary statistics	3		
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.	9-12R.D.2.10 Use technological tools to find the line of best fit	2	MC	

(CONTINUED)

TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>12P.2 Characteristics of data sets</b>				
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).	9-12R.D.2.6 Describe the characteristics of a normal distribution 9-12R.D.2.3 Display the distribution of univariate data, describe its shape using appropriate summary statistics, and understand the distinction between a statistic and a parameter 9-12R.D.2.4 Calculate and apply measures of variability (e.g., standard deviation)	3		
<b>12P.3 Experiments and samples</b>				
12P.3(a) Identify possible sources of bias in sample surveys, and describe how such bias can be controlled and reduced.	9-12R.D.1.2 Describe the characteristics of a well-designed and well-conducted survey by differentiating between sampling and census, and a biased and unbiased sample	2	IC	
12P.3(b) Recognize and describe a method to select a simple random sample.	9-12R.D.1.2 Describe the characteristics of a well-designed and well-conducted survey by differentiating between sampling and census, and a biased and unbiased sample	2	IC	
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".		1		
12P.3(d) Identify or evaluate the characteristics of a good survey or of a well-designed experiment.	9-12R.D.1.2 Describe the characteristics of a well-designed and well-conducted survey by differentiating between sampling and census, and a biased and unbiased sample 9-12R.D.1.3 Describe the characteristics of a well-designed and well-conducted experiment by differentiating between experiments and observational studies, and recognizing the sources of bias in poorly designed experiments 9-12R.D.1.4 Explain the role of randomization in well-designed surveys and experiments	3		

(CONTINUED)

TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>12P.3 Experiments and samples</b>				
12P.3(e) * Recognize the differences in design and in conclusions between randomized experiments and observational studies.	9-12R.D.1.3 Describe the characteristics of a well-designed and well-conducted experiment by differentiating between experiments and observational studies, and recognizing the sources of bias in poorly designed experiments	3		
<b>12P.4 Probability</b>				
12P.4(a) Recognize whether two events are independent or dependent.		1		
12P.4(b) Determine the theoretical probability of simple and compound events in familiar or unfamiliar contexts.	9-12R.D.3.3 Use the results of simulations to compute the expected value and probabilities of random variables in simple cases 9-12R.D.3.4 Compute the probability of an event using the complement rule, addition rule for disjoint and joint events, multiplication rule for independent events, and rules for conditional probability	3		
12P.4(c) Given the results of an experiment or simulation, estimate the probability of simple or compound events in familiar or unfamiliar contexts.	9-12R.D.3.3 Use the results of simulations to compute the expected value and probabilities of random variables in simple cases	2	MC	
12P.4(d) Use theoretical probability to evaluate or predict experimental outcomes.	8.D.4.4 Use theoretical or experimental probability to make predictions about real-world events	3	LG	
12P.4(e) Determine the number of ways an event can occur using tree diagrams, formulas for combinations and permutations, or other counting techniques.	6.D.4.4 Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome	3	LG	
12P.4(h) Determine the probability of independent and dependent events.	9-12R.D.3.4 Compute the probability of an event using the complement rule, addition rule for disjoint and joint events, multiplication rule for independent events, and rules for conditional probability	3		
12P.4(i) Determine conditional probability using two-way tables.	9-12R.D.3.4 Compute the probability of an event using the complement rule, addition rule for disjoint and joint events, multiplication rule for independent events, and rules for conditional probability	2	MD	This New Mexico assessment standard does not specify using two-way tables

(CONTINUED)

TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Data analysis, statistics, and probability</b>				
<b>12P.4 Probability</b>				
12P.4(j) Interpret and apply probability concepts to practical situations.	8.D.4.4 Use theoretical or experimental probability to make predictions about real-world events 8.D.4.5 Use probability to generate convincing arguments, draw conclusions, and make decisions in a variety of situations	3	LG	
12P.4(k) *Use the binomial theorem to solve problems.		1		
<b>12P.5 Mathematical reasoning with data</b>				
12P.5(a) Identify misleading uses of data in real-world settings and critique different ways of presenting and using information.	9-12R.D.2.15 Evaluate published reports that are based on data by examining the design of the study, the appropriateness of the data analysis, and the validity of conclusions	2	IC	
12P.5(b) Distinguish relevant from irrelevant information, identify missing information, and either find what is needed or make appropriate approximations.		1		
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.	9-12R.D.2.12 Explain why correlation does not imply a cause-and-effect relationship	3		
12P.5(e) * Recognize and explain the potential errors caused by extrapolating from data.		1		
<b>Algebra</b>				
<b>12A.1 Patterns, relations, and functions</b>				
12A.1(a) Recognize, describe, or extend numerical patterns, including arithmetic and geometric progressions.		1		
12A.1(b) Express linear and exponential functions in recursive and explicit form given a table, verbal description, or some terms of a sequence.	9-12R.A.3.3 Model real-world phenomena using exponential equations, interpret resulting solutions, and use estimation to detect errors	2	IC	

(CONTINUED)

TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>12A.1 Patterns, relations, and functions</b>				
12A.1(e) Identify or analyze distinguishing properties of linear, quadratic, rational, exponential, or *trigonometric functions from tables, graphs, or equations.	9-12R.A.2.13 Read information and draw conclusions from graphs, and identify properties of a graph that provide useful information about the original problem 9-12R.A.2.8 Graph a quadratic function and understand the relationship between its real zeros and the x-intercepts of its graph 9-12R.A.2.9 Graph exponential functions and identify their key characteristics as related to contextual situations 9-12R.A.2.14 Understand the relationship between the coefficients of a linear equation and the slope and x- and y- intercepts of its graphs	2	MC	This New Mexico assessment standard does not specify rational and trigonometric functions
12A.1(g) Determine whether a relation, given in verbal, symbolic, tabular, or graphical form, is a function.	9-12R.A.2.2 Determine whether a relation defined by a graph, a set of ordered pairs, a table of values, an equation, or a rule is a function	3		
12A.1(h) Recognize and analyze the general forms of linear, quadratic, rational, exponential, or *trigonometric functions.	9-12R.A.2.8 Graph a quadratic function and understand the relationship between its real zeros and the x-intercepts of its graph 9-12R.A.2.9 Graph exponential functions and identify their key characteristics as related to contextual situations 9-12R.A.2.14 Understand the relationship between the coefficients of a linear equation and the slope and x- and y- intercepts of its graphs	2	IC	This New Mexico assessment standard does not specify rational and trigonometric functions
12A.1(i) Determine the domain and range of functions given in various forms and contexts.		1		
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		
<b>12A.2 Algebraic representations</b>				
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.	9-12R.A.1.12 Explain and use equivalent representations for algebraic expressions (e.g., simplify using the distributive property) 9-12R.A.2.3 Translate among tabular, symbolic, and graphical representations of functions and relations	2	MC	

(CONTINUED)



TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>12A.2 Algebraic representations</b>				
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.	9-12R.A.2.13 Read information and draw conclusions from graphs, and identify properties of a graph that provide useful information about the original problem	2	MC	
12A.2(d) Perform or interpret transformations on the graphs of linear, quadratic, exponential, and *trigonometric functions.		1		
12A.2(e) Make inferences or predictions using an algebraic model of a situation.	8.A.4.1 Use graphs, tables, and algebraic representations to make predictions and solve problems that involve change	3	LG	
12A.2(f) Given a real-world situation, determine if a linear, quadratic, rational, exponential, logarithmic, or *trigonometric function fits the situation.	9-12R.A.3.1 Model real-world phenomena using linear equations and linear inequalities interpret resulting solutions, and use estimation to detect errors 9-12R.A.3.2 Model real-world phenomena using quadratic equations, interpret resulting solutions, and use estimation to detect errors 9-12R.A.2.9 Graph exponential functions and identify their key characteristics as related to contextual situations	2	MC	These New Mexico assessment standards do not specify logarithmic, rational, or trigonometric functions
12A.2(g) Solve problems involving exponential growth and decay.	9-12R.A.3.3 Model real-world phenomena using exponential equations, interpret resulting solutions, and use estimation to detect errors	2	IC	
12A.2(h) * Analyze properties of exponential, logarithmic, and rational functions.	9-12R.A.2.9 Graph exponential functions and identify their key characteristics as related to contextual situations 9-12R.A.2.10 Identify and describe symmetries of graphs	2	MC	These New Mexico assessment standards do not specify logarithmic and rational functions
<b>12A.3 Variables, expressions, and operations</b>				
12A.3(b) Write algebraic expressions, equations, or inequalities to represent a situation.	9-12R.A.1.7 Translate verbal statements into algebraic expressions or equations 9-12R.A.3.1 Model real-world phenomena using linear equations and linear inequalities interpret resulting solutions, and use estimation to detect errors	3		

(CONTINUED)

TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>12A.3 Variables, expressions, and operations</b>				
12A.3(c) Perform basic operations, using appropriate tools, on algebraic expressions including polynomial and rational expressions.	9-12R.A.1.18 Use the four basic operations (+, -, ×, ÷) with linear, polynomial, and rational expressions in contextual situations	3		
12A.3(d) Write equivalent forms of algebraic expressions, equations, or inequalities to represent and explain mathematical relationships.	9-12R.A.1.12 Explain and use equivalent representations for algebraic expressions (e.g., simplify using the distributive property)	2	MC	This New Mexico assessment standard only includes expressions not equations or inequalities
12A.3(e) Evaluate algebraic expressions, including polynomials and rational expressions.	9-12R.A.1.14 Evaluate polynomial, rational, radical, and absolute value expressions for one or more variables	3		
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.	9-12R.A.2.5 Explain and use function notation in both abstract and contextual situations and evaluate a function at a specific point in its domain	2	MD	This New Mexico assessment standard does not specify combining functions by addition, subtraction, multiplication, or division
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.	9-12R.A.3.3 Model real-world phenomena using exponential equations, interpret resulting solutions, and use estimation to detect errors	2	MC	This New Mexico assessment standard does not specify logarithms
<b>12A.4 Equations and inequalities</b>				
12A.4(a) Solve linear, rational or quadratic equations or inequalities, including those involving absolute value.	9-12R.A.1.17 Solve linear equations and inequalities in one variable including those involving the absolute value of a linear function 9-12R.A.1.9 Solve quadratic equations in one variable	2	MC	These New Mexico assessment standards do not specify rational equations and quadratic inequalities

(CONTINUED)

TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
<b>12A.4 Equations and inequalities</b>				
12A.4(c) Analyze situations, develop mathematical models, or solve problems using linear, quadratic, exponential, or logarithmic equations or inequalities symbolically or graphically.	9-12R.A.3.1 Model real-world phenomena using linear equations and linear inequalities interpret resulting solutions, and use estimation to detect errors 9-12R.A.3.2 Model real-world phenomena using quadratic equations, interpret resulting solutions, and use estimation to detect errors 9-12R.A.3.3 Model real-world phenomena using exponential equations, interpret resulting solutions, and use estimation to detect errors	2	MC	These New Mexico assessment standards do not specify rational equations and quadratic 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.	9-12R.A.3.4 Solve systems of linear equations in two variables algebraically and graphically	2	MC	These New Mexico assessment standards do not specify systems of inequalities
12A.4(e) Solve problems involving special formulas such as: $A = P(1 + r)t$ , $A = Pert$ ].		1		
12A.4(f) Solve an equation or formula involving several variables for one variable in terms of the others.	9-12R.A.1.8 Solve formulas for specified variables	3		
12A.4(g) Solve quadratic equations with complex roots.	9-12R.A.2.12 Explain the meaning of the real and complex roots of quadratic functions in contextual situations 9-12R.A.2.11 Use the quadratic formula and factoring techniques to determine whether the graph of a quadratic function will intersect the x-axis in zero, one, or two points (include quadratic functions that represent real phenomena)	3		
<b>12A.5 Mathematical reasoning in algebra</b>				
12A.5(a) Use algebraic properties to develop a valid mathematical argument.		1		
12A.5(b) Determine the role of hypotheses, logical implications, and conclusions in algebraic argument.	9-12R.G.1.4 Identify the hypothesis and conclusion in examples of conditional statements 9-12R.G.1.6 Use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient to refute a universal statement	2	IC	These New Mexico assessment standards are geometry standards

(CONTINUED)

TABLE C4 (CONTINUED)

**Alignment of National Assessment of Educational Progress (NAEP) grade 12 mathematics and proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards**

NAEP assessment standards	New Mexico assessment standards	Overall rating <sup>a</sup>	Code <sup>b</sup>	Notes
<b>Algebra</b>				
12A.5 Mathematical reasoning in algebra				
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 other assessment standards.

a. Rating is based on a scale of 1 to 3, where 1 indicates that the NMSBA assessment standard or standards do not address the NAEP assessment standard, 2 that the NMSBA assessment standard or standards partially address the NAEP assessment standard, and 3 that the NMSBA 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 NMSBA assessment standard or standards if all of the content in the NAEP assessment standard is contained in one or more NMSBA assessment standards at the same or lower grade level. A NAEP standard is considered to be *partially addressed* by the NMSBA assessment standard or standards if the NMSBA assessment standard or standards address only one part of the NAEP standard; the NAEP standard contains more content or more detailed content than the NMSBA assessment standard or standards or the NMSBA assessment standard or standard imply but do not explicitly state the content found in the NAEP assessment standard; or there is a matching NMSBA assessment standard or standards at a lower grade level than the NAEP assessment standard, but it does not address all the content addressed by the 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 New Mexico State Board of Education (2008).

TABLE C5

**Number of proposed New Mexico Standards Based Assessment (NMSBA) grade 12 assessment standards not covered by the National Assessment of Educational Progress (NAEP) grade 12 assessment standards, by strand, April 2008**

NMSBA strand	Number of standards not covered
Geometry	6
Data analysis and probability	9
Algebra	15
Total	30

*Source:* New Mexico State Board of Education (2008).

TABLE C6

**Proposed New Mexico Standards Based Assessment (NMSBA) grade 12 geometry assessment standards not covered by the National Assessment of Educational Progress (NAEP) grade 12 assessment standards, April 2008**

NMSBA strand	Proposed NMSBA grade 12 assessment standard not covered in NAEP
Geometry	9-12R.G.1.5 Use definitions in making logical arguments
	9-12R.G.1.7 Explain the difference between inductive and deductive reasoning and provide examples of each
	9-12R.G.1.10 Recognize that there are geometries, other than Euclidean geometry, in which the parallel postulate is not true
	9-12R.G.2.1 Identify the origin, coordinate axes, and four quadrants on the Cartesian coordinate plane, and draw and label them correctly
	9-12R.G.2.3 Use basic geometric ideas (e.g., the Pythagorean theorem, area and perimeter) in the context of the Cartesian coordinate plane (e.g., calculate the perimeter of a rectangle with integer coordinates and with sides parallel to the coordinate axes, and of a rectangle with sides not parallel)
	9-12R.G.4.7 Use angle and side relationships in problems with special right triangles (e.g., 30-, 60-, 90-, and 45-, 45-, 90- degree triangles)
Data analysis and probability	9-12R.D.1.1 Explain the differences between various methods of data collection
	9-12R.D.2.1 Distinguish measurement data from categorical data, and define the term variable
	9-12R.D.2.2 Explain the meaning of univariate and bivariate data
	9-12R.D.2.8 Describe the shape of a scatterplot
	9-12R.D.2.9 Use linear patterns in data to make predictions
	9-12R.D.2.13 Use the results of simulations to explore the variability of sample statistics from a known population and construct sampling distributions
	9-12R.D.2.14 Describe how sample statistics, including the law of large numbers, reflect the values of population parameters and use sampling distributions as the basis for informal inference
	9-12R.D.3.1 Explain the concept of a random variable
9-12R.D.3.2 Explain how the relative frequency of a specified outcome of an event can be used to estimate the probability of the outcome	
Algebra	9-12R.A.1.1 Use the special symbols of mathematics correctly and precisely
	9-12R.A.1.10 Solve radical equations involving one radical
	9-12R.A.1.13 Simplify rational expressions by factoring and reducing to lowest terms
	9-12R.A.1.15 Compare and order polynomial expressions by degree
	9-12R.A.1.16 Factor polynomials of various types (e.g., difference of squares, perfect square trinomials, sum and difference of cubes)
	9-12R.A.1.19 Use the four basic operations (+, -, ×, ÷) in contextual situations with numbers in scientific notation, and express the results with the appropriate number of significant figures
	9-12R.A.2.1 Distinguish between the concept of a relation and a function
	9-12R.A.2.4 Construct a linear function that represents a given graph
	9-12R.A.2.6 Graph a linear equation and demonstrate that it has a constant rate of change
	9-12R.A.2.7 Graph a linear inequality in two variables
	9-12R.A.2.15 Evaluate estimated rate of change in a contextual situations.
	9-12R.A.3.5 Solve applications involving systems of two equations in two variables
	9-12R.A.3.6 Write an equation of the line that passes through two given points
	9-12R.A.3.7 Verify that a point lies on a line, given an equation of the line, and be able to derive linear equations given a point and a slope
	9-12R.A.3.8 Determine whether the graphs of two given linear equations are parallel, perpendicular, coincide or none of these

Source: New Mexico State Board of Education (2008).

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