

# Math Performance Standards (Grade Level Expectations) For Grades 3-10

Each PSGLE includes a bolded statement called the “stem.” Each stem is the same or similar across the grades for a given PSGLE and is meant to communicate the main curriculum and instructional focus of the PSGLE across the grades.

The first row of each table includes a heading that refers to the content standard, and the second row includes a heading that refers to the performance standard. (The content standard is a broad statement of what students should know; the performance standards state what students should know and be able to do at ages 5-7, 8-10, 11-14, and 15-18.) The second box includes the complete performance standards.

The coding indicates the content strand and the PSGLE number, so PSGLE [6] N-1 is content strand Numeration, and the first PSGLE for that content strand for grade 6.

<b>Content Standard A: Mathematical facts, concepts, principles, and theories</b>			
<b>Numeration: Understand and use numeration</b>			
<p><b>Numeration Performance Standards that apply to grade 3:</b> <b>M1.1.1</b> Read, write, order, count, and model one-to-one correspondence with whole numbers to 100. <b>M1.1.2</b> Use, model, and identify place value positions of 1’s, 10’s, and 100’s. <b>M1.1.3</b> Model and explain the processes of addition and subtraction, describing the relationship between the operations. <b>M1.1.4</b> Select and use various representations of ordinal and cardinal numbers. <b>M1.1.5</b> Identify, model, and label simple fractions, describing and defining them as equal parts of a whole, a region, or a set. <b>M1.1.6</b> Identify, describe, and extend patterns inherent in the number system. Skip count by 2’s 5’s and 10’s. Add and subtract by 10. Identify even and odd numbers. <b>M1.1.7</b> Demonstrate the commutative and identify properties of addition.</p> <p><b>Numeration Performance Standards that apply to grades 4-6:</b> <b>M1.2.1</b> Read, write, model, order, and count with positive whole numbers to 1,000,000 and negative whole numbers, <b>M1.2.2</b> Use, model, and identify place value positions from 0.001 to 1,000,000. <b>M1.2.3</b> Model and explain the processes of multiplication and division. Describe the relationships among the four basic operations. <b>M1.2.4</b> Identify and describe different uses for the same numerical representation. <b>M1.2.5</b> Model and explain the process of adding and subtracting fractions with common denominators and decimals that represent money. <b>M1.2.6</b> Identify and describe factors and multiples including those factors and multiples common to a pair or set of numbers. <b>M1.2.7</b> Demonstrate the commutative and identify properties of multiplication.</p>			
<b>Understanding Numbers</b>			
<b>Grade 3</b>	<b>Grade 4</b>	<b>Grade 5</b>	<b>Grade 6</b>
<p><b>The student demonstrates conceptual understanding</b></p> <ul style="list-style-type: none"> <li>• of whole numbers to one thousand by</li> </ul> <p>[3] N-1 reading, writing, ordering, or [counting L] (M1.1.1)</p> <p>[3] N-2 modeling (base ten blocks) or identifying place value positions to thousands (M1.1.2)</p>	<p><b>The student demonstrates conceptual understanding</b></p> <ul style="list-style-type: none"> <li>• of whole numbers to <u>ten thousands</u> by</li> </ul> <p>[4] N-1 reading, writing, ordering, or [counting L] (M1.2.1)</p> <p>[4] N-2 modeling (base ten blocks) or identifying place value positions to <u>ten thousands</u> (M1.2.2)</p>	<p><b>The student demonstrates conceptual understanding</b></p> <ul style="list-style-type: none"> <li>• of whole numbers to <u>millions</u> by</li> </ul> <p>[5] N-1 reading, writing, ordering, or [counting L] (M1.2.1)</p> <p>[5] N-2 identifying place value positions from <u>tenths to millions</u> (M1.2.2)</p>	<p><b>The student demonstrates conceptual understanding</b></p> <ul style="list-style-type: none"> <li>• of <u>fractions (proper or mixed numbers), decimals, percents (whole number), or integers</u> by</li> </ul> <p>[6] N-1 reading, writing, ordering, or [counting L] (M1.2.1)</p> <p>[6] N-2 [identifying place value positions from <u>thousandths to millions</u> L] (M1.2.2)</p>

The number in brackets indicates the grade level.

Differences between grade levels are underlined.

The coding at the end of each PSGLE indicates the performance standard the

Some PSGLEs have been identified as Local. They are for local assessment and will not be on a state assessment.

Grade Level Expectations are written for assessment purposes. The PSGLEs should be written in a way so that it is clear what is expected of classroom instruction and/or state assessment.

#### Criteria for PSGLEs

1. The set of PSGLEs for each grade level should be reasonable to learn within a school year and still allow for learning additional state and local expectations.
2. PSGLEs should promote coherent, focused, developmentally appropriate instructions, as opposed to isolated instruction just on topics, facts, or individual skills.
3. Concepts, skills, and knowledge should be differentiated between adjacent grade levels.
4. PSGLEs should be of similar levels of specificity.
5. PSGLEs should show a continuum of learning. Success in one grade should be a good predictor of success the next year.

Note: Items differentiated with an "i.e." indicate that statewide assessment items may only be written to the content contained within the statement in the parentheses. Items differentiated with an "e.g." do not limit assessment items to that content, but indicate examples of content that may be used in statewide assessment items.

Math Performance Standards are organized into 10 content strands and are coded as follows:

N=Numeration

MEA=Measurement

E&C=Estimation and Computation

F&R=Functions and Relationships

G=Geometry

S&P=Statistics and Probability

PS=Process Skills (The Process Skills include Problem-Solving, Communication, Reasoning, and Connections.)

NOTE: All the PSGLEs for Process Skills are for local assessment. Process Skills that would be assessed on a state assessment have been embedded in PSGLEs for other content strands. For instance, a grade level expectation for the Statistics and Probability content strand for eighth grade is, “[Designing, collecting **L**], organizing, displaying, or explaining the classification of data in real-world problems.” That Grade Level Expectation for Statistics and Probability incorporates one of the Grade Level Expectations for Process Skills, “representing mathematical problems numerically, graphically, and/or symbolically.”

Math Performance Standards  
(Grade Level Expectations)

**Content Standard A: Mathematical facts, concepts, principles, and theories**  
**Numeration: Understand and use numeration**

**Numeration Performance Standards that apply to grade 3:** **M1.1.1** Read, write, order, count, and model one-to-one correspondence with whole numbers to 100. **M1.1.2** Use, model, and identify place value positions of 1's, 10's, and 100's. **M1.1.3** Model and explain the processes of addition and subtraction, describing the relationship between the operations. **M1.1.4** Select and use various representations of ordinal and cardinal numbers. **M1.1.5** Identify, model, and label simple fractions, describing and defining them as equal parts of a whole, a region, or a set. **M1.1.6** Identify, describe, and extend patterns inherent in the number system. Skip count by 2's 5's and 10's. Add and subtract by 10. Identify even and odd numbers. **M1.1.7** Demonstrate the commutative and identity properties of addition.

**Numeration Performance Standards that apply to grades 4-6:** **M1.2.1** Read, write, model, order, and count with positive whole numbers to 1,000,000 and negative whole numbers. **M1.2.2** Use, model, and identify place value positions from 0.001 to 1,000,000. **M1.2.3** Model and explain the processes of multiplication and division. Describe the relationships among the four basic operations. **M1.2.4** Identify and describe different uses for the same numerical representation. **M1.2.5** Model and explain the process of adding and subtracting fractions with common denominators and decimals that represent money. **M1.2.6** Identify and describe factors and multiples including those factors and multiples common to a pair or set of numbers. **M1.2.7** Demonstrate the commutative and identity properties of multiplication.

**Understanding Numbers**

Grade 3	Grade 4	Grade 5	Grade 6
<p><b>The student demonstrates conceptual understanding</b></p> <ul style="list-style-type: none"> <li>• of whole numbers to one thousand by</li> </ul> <p>[3] N-1 reading, writing, ordering, or [counting L] (M1.1.1)</p> <p>[3] N-2 modeling (base ten blocks) or identifying place value positions to thousands (M1.1.2)</p> <p>[3] N-3 using appropriate representations of ordinal or cardinal numbers (M1.1.4)</p> <p>of simple fractions with denominators 2, 3, 4 or 10 by</p> <p>[3] N-4 identifying, describing with explanations, or illustrating equal parts of a whole, a region, or a set (using models) (M1.1.5)</p> <p>[3] N-5 identifying, describing with explanations, or illustrating equivalent representation of fractions (using models) (M1.1.5)</p>	<p><b>The student demonstrates conceptual understanding</b></p> <ul style="list-style-type: none"> <li>• of whole numbers to <u>ten thousands</u> by</li> </ul> <p>[4] N-1 reading, writing, ordering, or [counting L] (M1.2.1)</p> <p>[4] N-2 modeling (base ten blocks) or identifying place value positions to <u>ten thousands</u> (M1.2.2)</p> <p>[4] N-3 converting between whole numbers expressed in expanded notation and standard form (M1.2.4)</p> <ul style="list-style-type: none"> <li>• of fractions with denominators <u>2 through 12</u> by</li> </ul> <p>[4] N-4 identifying, describing with explanations, or illustrating equal parts of a whole, a region, or a set (using models) (M1.2.4)</p> <p>[4] N-5 identifying, describing with explanations, or illustrating equivalent fractions or <u>mixed numbers</u> (M1.2.4 &amp; M3.2.5)</p>	<p><b>The student demonstrates conceptual understanding</b></p> <ul style="list-style-type: none"> <li>• of whole numbers to <u>millions</u> by</li> </ul> <p>[5] N-1 reading, writing, ordering, or [counting L] (M1.2.1)</p> <p>[5] N-2 identifying place value positions from <u>tenths to millions</u> (M1.2.2)</p> <p>[5] N-3 converting between whole numbers written in expanded notation and standard form (M1.2.4)</p> <ul style="list-style-type: none"> <li>• of positive fractions with denominators <u>1 through 12 and 100 with proper and mixed numbers and benchmark percents (10%, 25%, 50%, 75%, 100%) by modeling, identifying, describing with explanations, or illustrating</u></li> </ul> <p>[5] N-4 equal parts of a whole, a region, or a set (M1.2.4)</p> <p>[5] N-5 equivalent fractions or mixed numbers (M1.2.4 &amp; M3.2.5)</p>	<p><b>The student demonstrates conceptual understanding</b></p> <ul style="list-style-type: none"> <li>• of fractions (<u>proper or mixed numbers</u>), <u>decimals</u>, <u>percents (whole number)</u>, or <u>integers</u> by</li> </ul> <p>[6] N-1 reading, writing, ordering, or [counting L] (M1.2.1)</p> <p>[6] N-2 [identifying place value positions from <u>thousandths to millions</u> L] (M1.2.2)</p> <p>[6] N-3 converting between whole numbers written in expanded notation and standard form (M1.2.4)</p> <ul style="list-style-type: none"> <li>• of fractions, mixed numbers, or percents by [modeling L], identifying, describing, or illustrating</li> </ul> <p>[6] N-4 equal parts of a whole, a region, or a set (M1.2.4)</p> <p>[6] N-5 equivalent fractions or mixed numbers (M1.2.4 &amp; M3.2.5)</p>

Math Performance Standards  
(Grade Level Expectations)

<b>Understanding Meaning of Operations</b>			
<b>Grade 3</b>	<b>Grade 4</b>	<b>Grade 5</b>	<b>Grade 6</b>
<p><b>The student demonstrates conceptual understanding of mathematical operations by</b></p> <p>[3] N-6 [using models, explanations, number lines, or real-life situations L] describing or illustrating the processes of addition and subtraction of whole numbers and their relationships (M1.1.3)</p>	<p><b>The student demonstrates conceptual understanding of mathematical operations by</b></p> <p>[4] N-6 [using models, explanations, number lines, or real-life situations L] describing or illustrating the processes of <u>multiplication</u> (M1.2.3)</p> <p>[4] N-7 [using models, explanations, number lines, or real-life situations L] describing or illustrating the relationship between <u>multiplication and addition</u> (M1.2.3)</p> <p>[4] N-8 [using models, explanations, number lines, or real-life situations L] describing or illustrating the relationship between <u>multiplication and division</u> (M1.2.3)</p> <p>[4] N-9 [using models, explanations, number lines, or real-life situations L] describing or illustrating the process of adding or subtracting fractions with like denominators (2 to 12) (M1.2.5)</p>	<p><b>The student demonstrates conceptual understanding of mathematical operations by</b></p> <p>[5] N-6 [using models, explanations, number lines, or real-life situations L] describing or illustrating the process of <u>division</u> and its relationship to <u>subtraction or to multiplication</u> (M1.2.3)</p> <p>[5] N-7 [using models, explanations, number lines, or real-life situations L] describing or illustrating the process of adding and subtracting <u>proper</u> fractions or <u>mixed numbers</u> (like denominators) (M1.2.5)</p> <p>[5] N-8 [using models, explanations, number lines, or real-life situations L] describing or illustrating the process of adding or subtracting decimals that represent money (M1.2.5)</p>	<p><b>The student demonstrates conceptual understanding of mathematical operations by</b></p> <p>[6] N-6 [using models, explanations, number lines, or real-life situations L] describing or illustrating the relationships among the four basic operations (M1.2.3)</p> <p>[6] N-7 [using models, explanations, number lines, or real-life situations L] describing or illustrating the process of adding and subtracting fractions with <u>different</u> denominators (M1.2.5)</p>
<b>Number Theory</b>			
<p><b>The student demonstrates conceptual understanding of number theory by</b></p> <p>[3] N-7 [describing or illustrating identity property of addition L] (M1.1.7)</p> <p>[3] N-8 [modeling (with manipulatives) and explaining commutative property of addition L] (M1.1.7)</p> <p>[3] N-9 identifying or using patterns in the number system (skip count by 2's, 5's, or 10's; add or subtract by 10; even or odd numbers) (M1.1.6)</p>	<p><b>The student demonstrates conceptual understanding of number theory by</b></p> <p>[4] N-10 [describing or illustrating identity property of <u>multiplication</u> L] (M1.2.7)</p> <p>[4] N-11 [modeling (with manipulatives) and explaining commutative property of <u>multiplication</u> L] (M1.2.7)</p> <p>[4] N-12 identifying or listing factors and multiples of a number (M1.2.6)</p>	<p><b>The student demonstrates conceptual understanding of number theory by</b></p> <p>[5] N-9 describing or illustrating <u>commutative</u> or identity properties of addition or multiplication <u>using models or explanations</u> (M1.2.7)</p> <p>[5] N-10 identifying or listing factors and multiples <u>common to a pair or set of numbers</u> (M1.2.6)</p>	<p><b>The student demonstrates conceptual understanding of number theory by</b></p> <p>[6] N-8 describing or illustrating commutative, [<u>associative, inverse</u> L] or identity properties of addition or multiplication using models or explanations (M1.2.7)</p> <p>[6] N-9 identifying or describing factors and multiples common to a pair or set of numbers (e.g., Least Common Multiple, L.C.M., or Greatest Common Factor, G.C.F.) (M1.2.6)</p> <p>[6] N-10 [modeling (base 10 blocks) distributive property L] (M1.3.6)</p>

Math Performance Standards  
(Grade Level Expectations)

**Content Standard A: Mathematical facts, concepts, principles, and theories**  
**Numeration: Understand and use numeration**

**Numeration Performance Standards that apply to grades 7-8:** **M1.3.1** Read, write, model, and order real numbers, explaining scientific notation, exponents, and percents. **M1.3.2** Model counting in a different base system. **M1.3.3** Translate between equivalent representations of the same number. Select a representation that is appropriate for the situation. **M1.3.4** Describe and model the relationship of fractions to decimals, percents, ratios, and proportions. **M1.3.5** Use, explain, and define the rules of divisibility, prime and composite numbers, multiples, and order of operations. **M1.3.6** Use commutative, identity, associative, and distributive properties with variables.

**Numeration Performance Standards that apply to grades 9-10:** **M1.4.1** Read, write, model, order, and define real numbers and subsets. **M1.4.2** Add in a different base system. **M1.4.3** Compare and contrast the relationship between various applications of the same operation. **M1.4.4** Translate between equivalent representations of the same exponential expression. **M1.4.5** Recognize, describe, and use properties of the real number system.

**Understanding Numbers**

Grade 7	Grade 8	Grade 9	Grade 10
<p><b>The student demonstrates understanding</b></p> <ul style="list-style-type: none"> <li>• of rational numbers (fractions, decimals, percents, or integers) by</li> </ul> <p>[7] N-1 ordering <u>rational</u> numbers (M1.3.1)</p> <p>[7] N-2 [<u>modeling</u> (place value blocks) or identifying place value positions of <u>whole numbers and decimals</u> L] (M1.3.2)</p> <p>[7] N-3 converting between expanded notation (<u>multiples of ten</u>) and standard form for <u>decimal numbers</u> (M1.3.3)</p> <ul style="list-style-type: none"> <li>• of positive fractions, decimals, or percents by</li> </ul> <p>[7] N-4 identifying or <u>representing</u> equivalents of numbers (M1.3.4 &amp; M3.3.5)</p>	<p><b>The student demonstrates understanding</b></p> <ul style="list-style-type: none"> <li>• of real numbers by</li> </ul> <p>[8] N-1 ordering <u>real</u> numbers (M1.3.1)</p> <p>[8] N-2 distinguishing between a whole number in scientific notation and real numbers in standard form (M1.3.1)</p> <p>[8] N-3 converting between expanded notation (multiples of ten <u>with exponents</u>) and standard form (M1.3.3)</p> <ul style="list-style-type: none"> <li>• of <u>rational numbers</u> (fractions, decimals, or percents including <u>integers</u>) by</li> </ul> <p>[8] N-4 identifying, describing, or illustrating equivalent <u>representations</u> (M1.3.4 &amp; M3.3.5)</p> <p>[8] N-5 expressing products of numbers using exponents (M1.3.1 &amp; M1.3.3)</p>	<p><b>The student demonstrates understanding</b></p> <ul style="list-style-type: none"> <li>• of real numbers by</li> </ul> <p>[9] N-1 converting between a <u>rational</u> number in scientific notation and standard form (M1.4.4 &amp; M 3.4.4)</p> <p>[9] N-2 equating different equivalent representations of the same exponential expression (e.g., <math>2^3 \bullet 2^5 = 2^8</math>) (M1.4.4 &amp; M3.4.4)</p>	<p><b>The student demonstrates understanding</b></p> <ul style="list-style-type: none"> <li>• of real numbers by</li> </ul> <p>[10] N-1 identifying their subsets (natural, whole, integers, rational, irrational) (M1.4.1)</p> <p>[10] N-2 simplifying expressions with positive and negative exponents (M1.4.4 &amp; M3.4.4)</p> <p>[10] N-3 expressing square roots in simplest radical form (M1.4.4 &amp; M3.4.4)</p>

Math Performance Standards  
(Grade Level Expectations)

<b>Understanding Meaning of Operations</b>			
Grade 7	Grade 8	Grade 9	Grade 10
<p><b>The student demonstrates conceptual understanding of mathematical operations by</b></p> <p>[7] N-5 using models, explanations, number lines, real-life situations, describing or illustrating the effects of arithmetic operations on rational numbers (fractions, decimals) (M1.2.3)</p>	<p><b>The student demonstrates conceptual understanding of mathematical operations by</b></p> <p>[8] N-6 using models, explanations, number lines, real-life situations, describing or illustrating the effects of arithmetic operations on rational numbers (percents) (M1.2.3)</p> <p>[8] N-7 using models, explanations, number lines, real-life situations, describing or illustrating the use of inverse operations (addition/subtraction or multiplication/division) (M1.2.3)</p>	<p><b>The student demonstrates conceptual understanding of mathematical operations by</b></p> <p>[9] N-3 using models, explanations, number lines, real-life situations, describing or illustrating the effects of arithmetic operations on <u>real</u> numbers (M1.4.3)</p> <p>[9] N-4 using models, explanations, number lines, real-life situations, describing or illustrating the use of inverse operations (<u>squaring/square root</u>) (M1.4.3 &amp; 1.4.5)</p>	<p><b>The student demonstrates conceptual understanding of mathematical operations by</b></p> <p>[10] N-4 describing or illustrating the effects of arithmetic operations on real numbers (M1.4.3)</p> <p>[10] N-5 describing or illustrating the use of inverse operations (<u>cubing/cube root</u>) (M1.4.3 &amp; 1.4.5)</p> <p>[10] N-6 describing or illustrating [counting and adding in different bases L] (M1.4.2)</p>
<b>Number Theory</b>			
<p><b>The student demonstrates conceptual understanding of number theory by</b></p> <p>[7] N-6 using commutative, [associative L], inverse, or identity properties with <u>rational numbers</u> (M1.3.6)</p> <p>[7] N-7 <u>applying rules of divisibility to whole numbers</u> (M1.3.5)</p> <p>[7] N-8 <u>identifying prime and composite numbers</u> (M1.3.5)</p> <p>[7] N-9 [using <u>distributive</u> property with rational numbers L] (M1.3.6)</p>	<p><b>The student demonstrates conceptual understanding of number theory by</b></p> <p>[8] N-8 applying the rules for order of operations to rational numbers (M1.3.5)</p> <p>[8] N-9 identifying or writing the prime factorization of a number using exponents (M1.3.5)</p> <p>[8] N-10 [using distributive property <u>with real numbers L</u>] (M1.3.6)</p>	<p><b>The student demonstrates conceptual understanding of number theory by</b></p> <p>[9] N-5 applying the rules for order of operations to <u>real numbers</u> and <u>variables</u> (M1.3.5)</p> <p>[9] N-6 [using distributive property with <u>variables L</u>] (M1.4.5)</p>	<p><b>The student demonstrates conceptual understanding of number theory by</b></p> <p>[10] N-7 identifying or applying commutative, identity, associative, inverse, or distributive properties to real numbers and variables (M1.4.5)</p> <p>[10] N-8 identifying or writing the prime factorization of a <u>variable expression</u> using exponents (M1.4.4)</p>

Math Performance Standards  
(Grade Level Expectations)

**Content Standard A: Mathematical facts, concepts, principles, and theories**  
**Measurement: Select and use systems, units, and tools of measurement**

**Measurement Performance Standards that apply to grade 3:** **M2.1.1** Compare and order objects by various measurable attributes including calendar, temperature, length, weight, capacity, area, and volume. **M2.1.2** Compare objects to standard and non-standard units to identify objects that are greater than, less than, and equal to, a given unit. **M2.1.3** Choose a unit of measure, estimate the length or weight of objects and then measure to check for reasonableness. **M2.1.4** Tell time to the nearest half hour, distinguishing between morning, afternoon, and evening. **M2.1.5** Identify coins, their value, and the value of given sets of coins.

**Measurement Performance Standards that apply to grades 4-6:** **M2.2.1** Estimate and measure weights, lengths, and temperatures to the nearest unit using the metric and standard systems. **M2.2.2** Identify and use equivalent measurements (e.g., 60 minutes = 1 hour, 7 days = 1 week). **M2.2.3** Use a variety of measuring tools; describe the attribute(s) they measure. **M2.2.4** Estimate and measure the dimensions of geometric figures. **M2.2.5** Tell time using analog and digital clocks identifying AM and PM; find elapsed time. **M2.2.6** Read, write, and use money notation, determining possible combinations of coins and bills to equal given amounts; count back change for any given situation.

**Measurable Attributes**

Grade 3	Grade 4	Grade 5	Grade 6
<p><b>The student demonstrates understanding of measurable attributes by</b></p> <p><b>[3] MEA-1</b> [estimating length to the nearest inch or foot L] (M2.1.3)</p> <p><b>[3] MEA-2</b> comparing and ordering objects according to measurable attribute (calendar, length, [temperature, weight, area, or volume L]) (M2.1.1)</p> <p><b>[3] MEA-3</b> identifying or describing objects that are greater than, less than, or equal to a unit of measure (standard or non-standard) (M2.1.2)</p> <p><b>[3] MEA-4</b> selecting an appropriate unit of English, metric, or non-standard measurement to estimate the length, time, weight, or temperature (M2.1.3)</p> <p><b>[3] MEA-5</b> identifying coins, their value, or the value of a set of coins (M2.1.5)</p>	<p><b>The student demonstrates understanding of measurable attributes by</b></p> <p><b>[4] MEA-1</b> [estimating length to the nearest <u>half-inch</u> or <u>centimeter</u> L] (M2.2.1)</p> <p><b>[4] MEA-2</b> [estimating temperature (degree Celsius or Fahrenheit) or weight (pounds or kilograms) to the nearest unit L] (M2.2.1)</p> <p><b>[4] MEA-3</b> identifying or using equivalent measures for length (inch, foot, yard: 12 inches = 1 foot, 3 feet = 1 yard, 36 inches = 1 yard; centimeter, meter: 100 centimeters = 1 meter) (M2.2.2)</p> <p><b>[4] MEA-4</b> selecting an appropriate unit of metric measurement to estimate length, weight or temperature (M2.2.1)</p>	<p><b>The student demonstrates understanding of measurable attributes by</b></p> <p><b>[5] MEA-1</b> [estimating length to the nearest <u>one-fourth inch</u> or <u>centimeter</u> L] (M2.2.1)</p> <p><b>[5] MEA-2</b> [estimating temperature (degree Celsius or Fahrenheit, <u>plus or minus 5 degrees</u>) or weight (<u>half-pounds</u> or kilograms) to the nearest unit L] (M2.2.1)</p> <p><b>[5] MEA-3</b> identifying or using equivalent measures for <u>weight/mass</u> (16 oz. = 1 <u>pound</u> or 1000 <u>grams</u> = 1 <u>kilogram</u>) and length (1000 millimeters = 1 meter) or <u>time</u> (M2.2.2)</p>	<p><b>The student demonstrates understanding of measurable attributes by</b></p> <p><b>[6] MEA-1</b> [estimating length to the nearest <u>eighth-inch</u> or <u>millimeter</u> L] (M2.2.1)</p> <p><b>[6] MEA-2</b> identifying equivalent measures <u>within systems</u></p> <p>English</p> <ul style="list-style-type: none"> <li>• length (inches, feet, yards, <u>miles</u>)</li> <li>• weight (ounces, pounds, [<u>tons</u> L])</li> <li>• <u>volume</u> (<u>fluid ounces</u>, <u>cups</u>, <u>pints</u>, <u>quarts</u>, <u>gallons</u>)</li> </ul> <p>Metric</p> <ul style="list-style-type: none"> <li>• length (millimeters, centimeters, meters, <u>kilometers</u>)</li> <li>• <u>volume</u> (milliliters, liters) (M2.2.2)</li> </ul>

Math Performance Standards  
(Grade Level Expectations)

<b>Measurement Techniques</b>			
<b>Grade 3</b>	<b>Grade 4</b>	<b>Grade 5</b>	<b>Grade 6</b>
<p><b>The student demonstrates ability to use measurement techniques using pictorial representations [or manipulatives L] in real-world contexts by</b></p> <p>[3] <b>MEA-6</b> measuring length to the nearest half-inch (M2.1.3)</p> <p>[3] <b>MEA-7</b> telling time to the nearest <math>\frac{1}{4}</math> hour using an analog clock or [distinguishing morning, afternoon, or evening L] (M2.1.4)</p> <p>[3] <b>MEA-8</b> determining elapsed time using a calendar (M2.2.5)</p> <p>[3] <b>MEA-9</b> [counting back change from \$1.00 L] (M2.2.6)</p>	<p><b>The student demonstrates ability to use measurement techniques using pictorial representations [or manipulatives L] in real-world contexts by</b></p> <p>[4] <b>MEA-5</b> measuring length to the nearest half-inch or [centimeter L] (M2.2.1, M2.2.3, &amp; M2.2.4)</p> <p>[4] <b>MEA-6</b> telling time in 5 minute increments using analog clocks (M2.2.5)</p> <p>[4] <b>MEA-7</b> [counting back change from \$5.00 L] (M2.2.6)</p> <p>[4] <b>MEA-8</b> determining possible combinations of coins and bills to given amounts (M2.2.6)</p> <p>[4] <b>MEA-9</b> [simulating multiple purchases and calculating the amount of change from a given bill(s) up to \$50.00 L] (M2.2.6)</p>	<p><b>The student demonstrates ability to use measurement techniques by</b></p> <p>[5] <b>MEA-4</b> [measuring temperature or weight using appropriate tools L] (M2.2.1 &amp; M2.2.3)</p> <p>[5] <b>MEA-5</b> telling time using analog clocks to the nearest <u>minute and using A.M. or P.M.</u> (M2.2.5)</p> <p>[5] <b>MEA-6</b> determining possible combinations of coins and bills to given amounts (M2.2.6)</p> <p>[5] <b>MEA-7</b> [simulating multiple purchases and calculating the amount of change from given bills up to <u>\$100.00</u> L] (M2.2.6)</p> <p>[5] <b>MEA-8</b> measuring length to the nearest <math>\frac{1}{4}</math> inch or centimeter (M2.2.1)</p>	<p><b>The student uses measurement techniques by</b></p> <p>[6] <b>MEA-3</b> using a scaled ruler to an eighth of an inch or millimeter on a map or drawing (M2.2.1 &amp; M2.2.3)</p> <p>[6] <b>MEA-4</b> calculating elapsed time (minutes, hours) (M2.2.5)</p> <p>[6] <b>MEA-5</b> solving real-world problems involving elapsed time between U.S. time zones (including Alaska Standard time) (M2.2.5)</p> <p>[6] <b>MEA-6</b> converting and using equivalent measurements within the same system (M2.2.2)</p> <p>[6] <b>MEA-7</b> measuring length to the nearest <u><math>\frac{1}{8}</math> of an inch</u> or nearest <u>millimeter</u> (M2.2.1)</p>

Math Performance Standards  
(Grade Level Expectations)

**Content Standard A: Mathematical facts, concepts, principles, and theories**  
**Measurement: Select and use systems, units, and tools of measurement**

**Measurement Performance Standards that apply to grades 7-8:** **M2.3.1** Estimate and measure various dimensions to a specified degree of accuracy. **M2.3.2** Estimate and convert measurements within the same system. **M2.3.3** Use a variety of methods and tools to construct and compare plane figures. **M2.3.4** Describe and apply the relationships between dimensions of geometric figures to solve problems using indirect measurement; describe and apply the concepts of rate and scale. **M2.3.5** Apply information about time zones and elapsed time to solve problems.

**Measurement Performance Standards that apply to grades 9-10:** **M2.4.1** Evaluate measurements for accuracy, precision, and error with respect to the measuring tools, methods, and the computational process. **M2.4.2** Estimate and convert measurements between different systems. **M2.4.3** Apply various measurement systems to describe situations and solve problems. **M2.4.4** Use indirect methods, including the Pythagorean Theorem and right PSGLT trigonometry, to find missing dimensions.

**Measurable Attributes**

Grade 7	Grade 8	Grade 9	Grade 10
<p><b>The student demonstrates understanding of measurable attributes by</b></p> <p>[7] <b>MEA-1</b> [estimating length to the nearest sixteenth of an inch or millimeter, volume to the nearest cubic centimeter or milliliter or angle to the nearest 30 degrees L] (M2.3.1)</p> <p>[7] <b>MEA-2</b> identifying or using equivalent English (square inches, square feet, square yards) or metric systems (square centimeters, square meters) (M2.3.2)</p>	<p><b>The student demonstrates understanding of measurable attributes by</b></p> <p>[8] <b>MEA-1</b> <u>converting</u> measurements within the same system (English or metric) (M2.3.2)</p>	<p><b>The student demonstrates understanding of measurable attributes by</b></p> <p>[9] <b>MEA-1</b> <u>estimating or converting</u> measurements between the English and metric systems in real-world applications, given a conversion factor (e.g., miles/kilometers) (M2.4.2)</p>	<p><b>The student demonstrates understanding of measurable attributes by</b></p> <p>[10] <b>MEA-1</b> <u>converting square and cubic units</u> within the same system, English or metric, in real-world applications (M2.4.2)</p>

**Measurement Techniques**

<p><b>The student uses measurement techniques by</b></p> <p>[7] <b>MEA-3</b> applying a given scale factor to find missing dimensions of similar figures (M2.3.4)</p> <p>[7] <b>MEA-4</b> measuring various dimensions to one-sixteenth of an inch or millimeter (M2.3.1)</p> <p>[7] <b>MEA-5</b> accurately measuring a given angle using a protractor to the nearest plus or minus 2 degrees (M2.3.1)</p> <p>[7] <b>MEA-6</b> solving real-world problems involving elapsed time between <u>world time zones</u> (M2.3.5)</p>	<p><b>The student uses measurement techniques by</b></p> <p>[8] <b>MEA-2</b> <u>using scale drawings involving indirect measurement (determining the scale factor and applying it to find missing dimension)</u> (M2.3.4)</p> <p>[8] <b>MEA-3</b> [modeling the conversion within the same system L] (M2.3.2)</p>	<p><b>The student uses measurement techniques by</b></p> <p>[9] <b>MEA-2</b> <u>applying indirect methods, such as the Pythagorean theorem to find missing dimensions, in real-world applications</u> (M2.4.4)</p>	<p><b>The student uses measurement techniques by</b></p> <p>[10] <b>MEA-2</b> [Applying <u>right triangle trigonometry (sine, cosine, and tangent)</u> to find missing dimensions in real-world applications L] (M2.4.4)</p>
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Math Performance Standards  
(Grade Level Expectations)

<b>Content Standard A: Mathematical facts, concepts, principles, and theories.</b>			
<b>Estimation and Computation: Perform basic arithmetic functions, make reasoned estimates, and select and use appropriate methods or tools</b>			
<p><b>Estimation and Computation Performance Standards that apply to grade 3:</b> <b>M3.1.1</b> Make reasonable estimates of “how many” and “how much”; estimate the results of simple addition and subtraction problems. <b>M3.1.2</b> Recall and use basic addition and subtraction facts orally and with paper and pencil without a calculator. <b>M3.1.3</b> Add and subtract whole numbers to 100 using a variety of models and algorithms. <b>M3.1.4</b> Model multiplication as repeated addition and grouping objects; model division as “sharing equally” and grouping objects.</p> <p><b>Estimation and Computation Performance Standards that apply to grades 4-6:</b> <b>M3.2.1</b> Describe and use a variety of estimation strategies including rounding to the appropriate place value, multiplying by powers of 10, and using front-end estimation to check the reasonableness of solutions. <b>M3.2.2</b> Recall and use basic multiplication and division facts orally, with paper and pencil without a calculator. <b>M3.2.3</b> Add and subtract whole numbers and fractions with common denominators to 12 and decimals, including money amounts, using models and algorithms. <b>M3.2.4</b> Multiply and divide multi-digit whole numbers by 2-digit numbers, limiting the 2-digit divisors to those that end in 0; multiply and divide decimals that represent money by whole numbers. <b>M3.2.5</b> Find equivalent fractions. Convert between fractions and mixed numbers. <b>M3.2.6</b> Develop and interpret scales and scale models.</p>			
<b>Estimation</b>			
Grade 3	Grade 4	Grade 5	Grade 6
<p><b>The student determines reasonable answers to real-life situations, paper/pencil computations, or calculator results by</b></p> <p>[3] <b>E&amp;C-1</b> finding “how many” or “how much” to 50 (M3.1.1)</p> <p>[3] <b>E&amp;C-2</b> estimating the results of simple addition and subtraction problems up to <u>1,000</u> (M3.1.1)</p>	<p><b>The student determines reasonable answers to real-life situations, paper/pencil computations, or calculator results by</b></p> <p>[4] <b>E&amp;C-1</b> <u>identifying or using [a variety of L] strategies (e.g., rounding to appropriate place value, multiplying by powers of ten, using front-end estimation) to estimate the results of whole number addition or subtraction computations to <b>10,000</b>, or <b>simple multiplication or division</b></u> (M3.2.1)</p>	<p><b>The student determines reasonable answers to real-life situations, paper/pencil computations, or calculator results by</b></p> <p>[5] <b>E&amp;C-1</b> <u>identifying or using [a variety of L] strategies (e.g., rounding to appropriate place value, multiplying by powers of ten, using front-end estimation to estimate the results of addition or subtraction computations from <b>tenths to 100,000</b>, <b>including money</b>, or simple multiplication or division</u> (M3.2.1)</p>	<p><b>The student determines reasonable answers to real-life situations, paper/pencil computations, or calculator results by</b></p> <p>[6] <b>E&amp;C-1</b> identifying or using [a variety of L] strategies (e.g., truncating, rounding to compatible numbers) to estimate the results of addition, subtraction or multiplication from <u>thousandths to millions</u> or simple division (M3.2.1)</p>
<b>Computation</b>			
<p><b>The student accurately solves problems (including real-world situations) involving</b></p> <p>[3] <b>E&amp;C-3</b> [recalling basic addition and subtraction facts, sums to 20, and corresponding subtraction facts efficiently L] (M3.1.2)</p> <p>[3] <b>E&amp;C-4</b> adding or subtracting two-digit whole numbers (M3.1.3)</p> <p>[3] <b>E&amp;C-5</b> using repeated addition to model multiplication with whole numbers with products to 25 (M3.1.4)</p> <p>[3] <b>E&amp;C-6</b> using grouping or “sharing equally” to model division with whole numbers to 25 (M3.1.4)</p>	<p><b>The student accurately solves problems (including real-world situations) involving</b></p> <p>[4] <b>E&amp;C-2</b> [recalling basic multiplication facts, products to 100, and corresponding division facts efficiently L] (M3.2.2)</p> <p>[4] <b>E&amp;C-3</b> adding or subtracting <u>three-digit</u> whole numbers (M3.2.3)</p> <p>[4] <b>E&amp;C-4</b> multiplying two-digit numbers by single-digit numbers (M3.2.4)</p> <p>[4] <b>E&amp;C-5</b> adding fractions with like denominators to 12 (M3.2.3)</p>	<p><b>The student accurately solves problems (including real-world situations) involving</b></p> <p>[5] <b>E&amp;C-2</b> [recalling basic multiplication facts, products to <u>144</u>, and corresponding division facts efficiently L] (M3.2.2)</p> <p>[5] <b>E&amp;C-3</b> adding or subtracting <u>four-digit</u> whole numbers, fractions with like denominators to 12, or <u>decimals involving money</u> (M3.2.3)</p> <p>[5] <b>E&amp;C-4</b> multiplying <u>two-digit whole numbers</u> by two-digit numbers or <u>dividing three-digit whole numbers by single-digit numbers</u> (M3.2.4)</p>	<p><b>The student accurately solves problems (including real-world situations) involving</b></p> <p>[6] <b>E&amp;C-2</b> [recalling basic addition, subtraction, multiplication, and division facts efficiently L] (M3.2.2)</p> <p>[6] <b>E&amp;C-3</b> adding or subtracting whole numbers, fractions with unlike denominators to 12, or decimals to the <u>hundredths place</u> (M3.2.3)</p> <p>[6] <b>E&amp;C-4</b> multiplying whole numbers by two- or three-digit numbers, dividing three-digit numbers by one or two-digit numbers, or <u>multiplying or dividing decimals that represent money by whole numbers, or multiplying or dividing proper fractions</u> (M3.2.4)</p> <p>[6] <b>E &amp; C-5</b> [developing or interpreting scale models (scale factors such as 1 in. = 1 ft.) L] (M3.2.6)</p>

Math Performance Standards  
(Grade Level Expectations)

<b>Content Standard A: Mathematical facts, concepts, principles, and theories</b>			
<b>Estimation and Computation: Perform basic arithmetic functions, make reasoned estimates, and select and use appropriate methods or tools</b>			
<p><b>Estimation and Computation Performance Standards that apply to grades 7-8:</b> <b>M3.3.1</b> Apply, explain, and assess the appropriateness of a variety of estimation strategies including truncating and rounding to compatible numbers. <b>M3.3.2</b> Apply basic operations efficiently and accurately, using estimation to check the reasonableness of results. <b>M3.3.3</b> Add and subtract fractions, decimals, and percents. <b>M3.3.4</b> Multiply and divide rational numbers in various forms including fractions, decimals, and percents. <b>M3.3.5</b> Convert between equivalent fractions, decimals, percents, and proportions. Convert from exact to decimal representations of irrational numbers. <b>M3.3.6</b> Solve problems using ratios and proportions.</p> <p><b>Estimation and Computation Performance Standards that apply to grades 9-10:</b> <b>M3.4.1</b> Use estimation to solve problems and to check the accuracy of solutions; state whether the estimation is greater or less than the exact answer. <b>M3.4.2</b> Add and subtract real numbers using scientific notation, powers, and roots. <b>M3.4.3</b> Multiply and divide real numbers in various forms including scientific notation, powers, and roots. <b>M3.4.4</b> Select, convert, and apply an equivalent representation of a number for a specified situation. <b>M3.4.5</b> Use ratios and proportions to model and solve fraction and percent problems with variables.</p>			
<b>Estimation</b>			
Grade 7	Grade 8	Grade 9	Grade 10
<p><b>The student solves problems (including real-world situations) using estimation by</b></p> <p>[7] <b>E&amp;C-1</b> identifying or using [a variety of L] strategies, <u>including truncating, rounding, front-end estimation, compatible numbers, to check for reasonableness of solutions</u> (M3.3.1)</p> <p>[7] <b>E &amp; C 2</b> [comparing results of different strategies L] (M3.3.1)</p>	<p><b>The student solves problems (including real-world situations) using estimation by</b></p> <p>[8] <b>E&amp;C-1</b> [applying and assessing the appropriateness of a variety of estimation strategies L] (M3.3.1)</p>	<p><b>The student solves problems (including real-world situations) using estimation by</b></p> <p>[9] <b>E&amp;C-1</b> judging whether the strategy will result in an answer greater or less than the exact answer (M3.4.1)</p>	<p><b>The student solves problems (including real-world situations) using estimation by</b></p> <p>[10] <b>E&amp;C-1</b> [<u>explaining why one strategy is more appropriate than another and determining why the estimation result is greater or less than the exact answer L</u>] (M3.4.1)</p>
<b>Computation</b>			
<p><b>The student accurately solves problems (including real-world situations) involving</b></p> <p>[7] <b>E&amp;C-3</b> adding or subtracting <u>fractions or mixed numbers with unlike denominators</u>, or decimals to the <u>thousandths place</u> (M3.3.3)</p> <p>[7] <b>E &amp; C-4</b> multiplying or dividing decimals to <u>hundredths</u>, or <u>multiplying or dividing by powers of ten</u>, or multiplying or dividing fractions or <u>mixed numbers</u> (M3.3.4)</p> <p>[7] <b>E&amp;C-5</b> converting between equivalent fractions, terminating decimals, or percents (10% = 1/10 = 0.1) (M3.3.5)</p> <p>[7] <b>E&amp;C-6</b> solving proportions using a <u>given scale</u> (M3.3.6)</p>	<p><b>The student accurately solves problems (including real-world situations) involving</b></p> <p>[8] <b>E&amp;C-2</b> adding, subtracting, multiplying or dividing integers or positive <u>rational numbers</u> (M3.3.3 &amp; M3.3.4)</p> <p>[8] <b>E&amp;C-3</b> percents and percentages (e.g., tax, discount) (M3.3.3 &amp; M3.3.4)</p> <p>[8] <b>E&amp;C-4</b> converting between equivalent fractions, decimals, or percents (M3.3.5)</p> <p>[8] <b>E&amp;C-5</b> <u>ratio</u> and proportion (M3.3.6)</p>	<p><b>The student accurately solves problems (including real-world situations) involving</b></p> <p>[9] <b>E&amp;C-2</b> adding or subtracting rational numbers including integers <u>with whole number exponents</u> (M3.4.2)</p> <p>[9] <b>E&amp;C-3</b> multiplying or dividing rational numbers including integers <u>with whole number exponents</u> (M3.4.3)</p> <p>[9] <b>E&amp;C-4</b> <u>determining rate by using ratio and proportion</u> (M3.4.5)</p> <p>[9] <b>E&amp;C-5</b> [multiplying or dividing numbers in scientific notation L] (M3.4.3)</p>	<p><b>The student accurately solves problems (including real-world situations) involving</b></p> <p>[10] <b>E&amp;C-2</b> applying basic operations with real numbers using powers [and scientific notation L] (M3.4.2 &amp; M3.4.3)</p> <p>[10] <b>E&amp;C-3</b> solving problems involving percent increase or decrease (M3.4.5)</p>

Math Performance Standards  
(Grade Level Expectations)

**Content Standard A: Mathematical facts, concepts, principles, and theories**  
**Functions and Relationships: Represent, analyze, and use patterns, relations, and functions**

**Functions and Relationships Performance Standards that apply to grade 3:** **M4.1.1** Recognize, describe, create, and extend repeating and increasing patterns with a variety of materials including symbols, objects, and manipulatives. **M4.1.2** Generate and solve simple functions by identifying and applying addition and subtraction patterns. **M4.1.3** Use a calculator to find and extend patterns in the number system. **M4.1.4** Complete open space sentences with missing numbers; use appropriate vocabulary including greater than, less than, and equal to; and use the correct symbols.

**Functions and Relationships Performance Standards that apply to grades 4-6:** **M4.2.1** Use patterns and their extensions to make predictions and solve problems; describe patterns found in the number system including those formed by multiples, factors, perfect squares, and powers of 10. **M4.2.2** Generate and solve simple functions by identifying and applying multiplication and division patterns. **M4.2.3** Use a calculator to find a missing item in a number sequence. **M4.2.4** Use words, lists, and tables to represent and analyze patterns. **M4.2.5** Explain the purpose of variables and use them in open sentences to express relationships and describe simple functions.

**Describing Patterns and Functions**

Grade 3	Grade 4	Grade 5	Grade 6
<p><b>The student demonstrates conceptual understanding of functions by</b></p> <p>[3] <b>F&amp;R-1</b> identifying a missing element in a pattern up to the next three terms (identifying a number using addition or subtraction or objects); or explaining how missing elements could be found (M4.1.1)</p> <p><b>F&amp;R-2</b> [expressing a generalization of a pattern using words L] (M4.1.1 &amp; M4.1.2)</p> <p>[3] <b>F&amp;R-3</b> [using manipulatives, including a calculator, as tools when describing, extending, or representing patterns L] (M4.1.1 &amp; M4.1.3)</p>	<p><b>The student demonstrates conceptual understanding of functions, <u>patterns</u>, or <u>sequences</u> by</b></p> <p>[4] <b>F&amp;R-1</b> <u>extending patterns that use addition, subtraction, multiplication, or symbols, up to 10 terms, represented by models (function machine), tables, sequences, or in problem situations</u> (M4.2.1)</p> <p>[4] <b>F&amp;R-2</b> [using rules to express the generalization of a pattern using words, lists, or tables L] (M4.2.4)</p> <p>[4] <b>F&amp;R-3</b> [using manipulatives, including a calculator, as tools when describing, extending, or representing a <u>number sequence</u> L] (M4.2.1 &amp; M4.2.3)</p>	<p><b>The student demonstrates conceptual understanding of functions, <u>patterns</u>, or <u>sequences</u> by</b></p> <p>[5] <b>F&amp;R-1</b> extending patterns that use addition, subtraction, multiplication, <u>division</u> or symbols, up to 10 terms, represented by models (function machines), tables, sequences, or in problem situations (M4.2.1)</p> <p>[5] <b>F&amp;R-2</b> using rules to express the generalization of a pattern using words, lists, or tables (M4.2.4)</p> <p>[5] <b>F&amp;R-3</b> identifying or applying addition or subtraction patterns to find missing values in a function (M4.1.2)</p> <p>[5] <b>F&amp;R-4</b> [using manipulatives, including a calculator, as tools when describing, extending, or representing a number sequence L] (M4.2.1 &amp; M4.2.3)</p>	<p><b>The student demonstrates conceptual understanding of functions, <u>patterns</u>, or <u>sequences</u> by</b></p> <p>[6] <b>F&amp;R-1</b> extending patterns (<u>found in the number system, formed by multiples, factors, perfect squares up to 100, powers of ten</u>), up to 10 terms, represented in tables, sequences, or in problem situations (M4.2.1)</p> <p>[6] <b>F&amp;R-2</b> using rules to express the generalization of a pattern using words, lists, or tables, <u>with or without variables</u> (M4.2.4)</p> <p>[6] <b>F&amp;R-3</b> identifying or <u>applying multiplication or division</u> patterns to find missing values in a function (M4.2.2)</p> <p>[6] <b>F&amp;R-4</b> [using manipulatives, including a calculator, as tools when describing, extending, or representing a number sequence L] (M4.2.1 &amp; M4.2.3)</p>

**Modeling and Solving Equations and Inequalities**

<p><b>The student demonstrates algebraic thinking by</b></p> <p>[3] <b>F&amp;R-4</b> using an open number sentence (addition or subtraction) to solve for an unknown represented by a box or circle (e.g., <math>5+?=16</math>, <math>-7=4</math>, <math>5+2=?</math>) (M4.1.4)</p> <p>[3] <b>F&amp;R-5</b> using appropriate vocabulary or symbols for greater than, less than, or equal to (M4.1.4)</p>	<p><b>The student demonstrates algebraic thinking by</b></p> <p>[4] <b>F&amp;R-4</b> using an open number sentence (addition, subtraction or <u>multiplication</u>) to solve for an unknown represented by a box or circle (e.g., <math>9 \cdot ? = 36</math>, <math>\cdot 8=56</math>, <math>3 \cdot 6=?</math>) (M4.2.5)</p>	<p><b>The student demonstrate algebraic thinking by</b></p> <p>[5] <b>F&amp;R-5</b> using an open number sentence (addition, subtraction, multiplication, or <u>division</u>) to solve for an unknown represented by a box or circle (e.g., <math>256 \div ?=8</math>, <math>\div 8=56</math>, <math>36 \div 3=?</math>) (M4.2.5)</p>	<p><b>The student demonstrates algebraic thinking by</b></p> <p>[6] <b>F&amp;R-5</b> solving for an unknown <u>represented by a letter</u>, (addition, subtraction, multiplication, or division) (e.g., <math>3 \cdot n = 15</math>, <math>n - 5 = 12</math>) (M4.2.5)</p>
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Math Performance Standards  
(Grade Level Expectations)

**Content Standard A: Mathematical facts, concepts, principles, and theories**  
**Functions and Relationships: Represent, analyze, and use patterns, relations, and function**

**Functions and Relationships Performance Standards that apply to grades 7-8:** **M4.3.1** Identify numeric and geometric patterns to find the next term and predict the nth term. **M4.3.2** Identify and describe how a change in one variable in a function affects the remaining variables (e.g., how changing the length affects the area and volume of a rectangular prism). **M4.3.3** Use a calculator to find a missing item in arithmetic and a geometric sequence; predict the graph of each function. **M4.3.4** Translate among and use tables of ordered pairs, graphs on coordinate planes, and linear equations as tools to represent and analyze patterns. **M4.3.5** Find the value of a variable by evaluating formulas and algebraic expressions for given values.

**Functions and Relationships Performance Standards that apply to grades 9-10:** **M4.4.1** Identify, graph, and describe the graphs of basic families of functions including linear, absolute value, quadratic, and exponential using a graphing calculator. **M4.4.2** Create and solve linear and quadratic equations and inequalities. **M4.4.3** Create and solve simple systems of equations, algebraically and graphically, using a graphing calculator. **M4.4.4** Use discrete structures, such as networks, matrices, sequences, and iterations as tools to analyze patterns, expressions, and equations. **M4.4.5** Add, subtract, multiply, divide, and simplify rational expressions; add, subtract, and multiply polynomials.

**Describing Patterns and Functions**

Grade 7	Grade 8	Grade 9	Grade 10
<p><b>The student demonstrates conceptual understanding of functions, patterns, or sequences including those represented in real-world situations by</b></p> <p>[7] <b>F&amp;R-1</b> describing or extending patterns (<u>linear</u>), up to ten terms, represented in tables, sequences, or in problem situations (M4.3.1)</p> <p>[7] <b>F&amp;R-2</b> generalizing relationships (linear) using a table of <u>ordered pairs</u>, a <u>function</u>, or an <u>equation</u> (M4.3.4)</p> <p>[7] <b>F&amp;R-3</b> describing in words how a change in one variable in a formula affects the remaining variables (how changing the length affects the area of a quadrilateral) (M4.3.2)</p> <p>[7] <b>F&amp;R-4</b> [using a calculator as a tool when describing, extending, or representing <u>patterns</u> L] (M4.3.3)</p>	<p><b>The student demonstrates conceptual understanding of functions, patterns, or sequences including those represented in real-world situations by</b></p> <p>[8] <b>F&amp;R-1</b> describing or extending patterns (linear), up to the <u>nth term</u>, represented in, tables, sequences, <u>graphs</u>, or in problem situations (M4.3.1)</p> <p>[8] <b>F&amp;R-2</b> generalizing relationships (linear) using a table of ordered pairs, a <u>graph</u>, or an equation (M4.3.4)</p> <p>[8] <b>F&amp;R-3</b> describing in words how a change in one variable in a formula affects the remaining variables (how changing the length affects the area of quadrilaterals <u>or</u> volume of a rectangular prism) (M4.3.2)</p> <p>[8] <b>F&amp;R-4</b> [using a calculator as a tool when describing, extending, or representing patterns L] (M4.3.3)</p>	<p><b>The student demonstrates conceptual understanding of functions, patterns, or sequences including those represented in real-world situations by</b></p> <p>[9] <b>F&amp;R-1</b> describing or extending patterns (<u>families of functions</u>: linear <u>quadratic</u>, <u>absolute value</u>), up to the nth term, represented in tables, sequences, graphs, or in problem situations (M4.4.1)</p> <p>[9] <b>F&amp;R-2</b> generalizing relationships (linear, <u>quadratic</u>, <u>absolute value</u>), using a table of ordered pairs, a graph, or an equation (M4.4.4)</p> <p>[9] <b>F&amp;R-3</b> describing in words how a change in one variable in a formula affects the remaining variables (e.g., how changing the <u>radius</u> affects the volume of a cylinder) (M4.3.2)</p> <p>[9] <b>F&amp;R-4</b> [using a calculator as a tool when describing, extending, representing, or <u>graphing patterns</u> or <u>linear equations</u> L] (M4.4.2)</p>	<p><b>The student demonstrates conceptual understanding of functions, patterns, or sequences including those represented in real-world situations by</b></p> <p>[10] <b>F&amp;R-1</b> describing or extending patterns (families of functions: linear, quadratic, absolute value), up to the nth term, represented in tables, sequences, graphs, or in problem situations (M4.4.1)</p> <p>[10] <b>F&amp;R-2</b> <u>generalizing equations and inequalities</u> (linear, quadratic, absolute value) using a table of ordered pairs or a graph (M4.4.4)</p> <p>[10] <b>F&amp;R-3</b> describing in words how a change in one variable <u>or constant in an equation</u> affects the outcome of the <u>equation</u> (M4.3.2)</p> <p>[10] <b>F&amp;R-4</b> [using a calculator as a tool when describing, extending, representing, or graphing patterns, linear or <u>quadratic</u> equations L] (M4.4.2)</p>

Math Performance Standards  
(Grade Level Expectations)

Modeling and Solving Equations and Inequalities			
Grade 7	Grade 8	Grade 9	Grade 10
<p><b>The student demonstrates algebraic thinking by</b></p> <p>[7] <b>F&amp;R-5</b> evaluating algebraic expressions (M4.3.5)</p> <p>[7] <b>F&amp;R-6</b> solving or identifying solutions to one-step linear equations of the form <math>x \pm a=b</math> or <math>ax=b</math>, where <math>a</math> and <math>b</math> are whole numbers, translating a story problem into an equation of similar form, or translating a story problem into an equation of similar form and solving it (M4.3.5)</p>	<p><b>The student demonstrates algebraic thinking by</b></p> <p>[8] <b>F&amp;R-5</b> translating a written phrase to an algebraic expression (M4.3.5)</p> <p>[8] <b>F&amp;R-6</b> solving or identifying solutions to two-step linear equations of the form <math>ax \pm b =c</math>, where <math>a</math>, <math>b</math> and <math>c</math> are rational numbers, and <math>a \neq 0</math>, translating a story problem into an equation of similar form, or translating a story problem into an equation of similar form and solving it (M4.3.5)</p>	<p><b>The student demonstrates algebraic thinking by</b></p> <p>[9] <b>F&amp;R-5</b> modeling (graphically or algebraically) or solving situations (<u>including real-world applications</u>) using systems of linear equations (M4.4.3)</p> <p>[9] <b>F&amp;R-6</b> solving or identifying solutions to multi-step linear equations of the form <math>ax \pm b = cx \pm d</math>, where <math>a</math>, <math>b</math>, <math>c</math> and <math>d</math> are rational numbers and <math>a \neq 0</math>, <math>c \neq 0</math> (M4.4.2)</p> <p>[9] <b>F&amp;R-7</b> solving literal equations or formulas for a variable involving one step (e.g. solve for <math>t</math> when <math>d = rt</math>) (M4.4.2)</p>	<p><b>The student demonstrates algebraic thinking by</b></p> <p>[10] <b>F&amp;R-5</b> modeling (graphically or algebraically) or solving situations using systems of linear equations or <u>inequalities</u> (including real-world applications) (M4.4.3)</p> <p>[10] <b>F&amp;R-6</b> selecting and using the quadratic formula to solve problems (M4.4.2)</p> <p>[10] <b>F&amp;R-7</b> solving or identifying solutions to literal equations or formulas for a variable involving <u>multi-steps</u> (e.g., solve for <math>h</math> when <math>A = \frac{1}{2}h(b_1 + b_2)</math>) (M4.4.2)</p>

Math Performance Standards  
(Grade Level Expectations)

**Content Standard A: Mathematical facts, concepts, principles, and theories.**

**Geometry: Construct, transform, and analyze geometric figures.**

**Geometry Performance Standards that apply to grade 3:** **M5.1.1** Identify, sort, describe, model, and compare circles, triangles, and rectangles including squares regardless of orientation. **M5.1.2** Identify, sort, describe, model, and compare solid figures including cubes, cylinders, and spheres. **M5.1.3** Identify and create examples of line symmetry; compare and describe given circles, triangles, and rectangles as larger, smaller, or congruent. **M5.1.4** Demonstrate conservation of area using drawings or manipulatives. **M5.1.5** Describe and identify geometric transformations including slides, flips, and turns. **M5.1.6** Use comparative directional and positional words: above, below, inside, outside, on, in, right and left, horizontal, vertical, and middle. **M5.1.7** Draw and build familiar shapes.

**Geometry Performance Standards that apply to grades 4-6:** **M5.2.1** Identify and compare various triangles and quadrilaterals according to their sides and/or angles. **M5.2.2** Compare and contrast plane and solid figures (e.g., circle/sphere, square/cube, triangle/pyramid) using relevant attributes, including the number of vertices, edges, and the number and shape of faces. **M5.2.3** Identify and model geometric figures that are congruent, similar, and/or symmetrical. **M5.2.4** Distinguish between area and perimeter; find both using a variety of methods including rulers, grid paper, and tiles. **M5.2.5** Identify and model transformations of geometric figures, describing the motions as slides, flips, or rotations. **M5.2.6** Locate and describe objects in terms of their position with and without compass directions; identify coordinates for a given point or locate points of given coordinates on a grid. **M5.2.7** Sketch and identify line segments, midpoints, intersections, parallel, and perpendicular lines.

**Geometric Relationships**

Grade 3	Grade 4	Grade 5	Grade 6
<p><b>The student demonstrates an understanding of geometric relationships by</b></p> <p>[3] <b>G-1</b> using the number or length of sides to identify, describe, [model L], or compare triangles or rectangles (including squares) (M5.1.1)</p> <p>[3] <b>G-2</b> using the attributes and properties of plane figures to [model L], identify, compare, or describe plane figures (circles, rectangles, squares, and triangles)[and solid figures (cubes, cylinders, or spheres) L] (M5.1.1 &amp; M5.1.2)</p>	<p><b>The student demonstrates an understanding of geometric relationships by</b></p> <p>[4] <b>G-1</b> using the attributes and properties of <u>angles</u> to identify and compare triangles (<u>acute, right, or obtuse</u>) and regular polygons (M5.2.1)</p> <p>[4] <b>G-2</b> using the attributes and properties of <u>solid figures</u> (<u>edges, vertices, or the number or shape of faces</u>) to [model L], identify, compare, or describe solid figures (cubes, cylinders, rectangular prisms, or spheres) (e.g., cans, dice, boxes, balls) (M5.2.2)</p>	<p><b>The student demonstrates an understanding of geometric relationships by</b></p> <p>[5] <b>G-1</b> using the attributes and properties of angles and the <u>number, length, and orientation of sides</u> to identify or compare triangles (<u>scalene, isosceles, or equilateral</u>) or <u>quadrilaterals</u> (<u>parallelograms, trapezoids, rhombi</u>) (M5.2.1)</p> <p>[5] <b>G-2</b> using the attributes and properties of solid figures (edges, vertices, <u>number of faces</u>) to [model L], identify, compare, or describe (cubes, cylinders, <u>cones</u>, spheres, <u>pyramids</u>, or <u>rectangular prisms</u>) (e.g., boxes, buildings, packages) (M5.2.2)</p>	<p><b>The student demonstrates an understanding of geometric relationships by</b></p> <p>[6] <b>G-1</b> using the attributes and properties (sides and angles) of <u>regular polygons to identify, classify, or compare regular or irregular polygons</u> (M5.2.1)</p> <p>[6] <b>G-2</b> identifying, comparing or describing attributes and properties of circles (radius, and diameter) (M5.2.2)</p> <p>[6] <b>G-3</b> using the attributes and properties of prisms (vertices, <u>length and alignment of edges, shape and number of bases, shape of faces</u>) to [model L], identify, compare, or describe <u>triangular</u> or rectangular prisms (M5.2.2)</p> <p>[6] <b>G-4</b> identifying a 3-dimensional shape from the 2-dimensional drawing of the shape (M5.2.2)</p>

Math Performance Standards  
(Grade Level Expectations)

Similarity, Congruence, Symmetry, and Transformation of Shapes			
Grade 3	Grade 4	Grade 5	Grade 6
<p><b>The student demonstrates conceptual understanding of similarity, congruence, symmetry, or transformations of shapes by</b></p> <p>[3] <b>G-3</b> identifying, creating, or drawing lines of symmetry for real-world objects (e.g., block letters, flags, insects) (M5.1.3)</p> <p>[3] <b>G-4</b> comparing or describing shapes (circles, triangles, or rectangles) as “larger than,” “smaller than,” or “congruent to,” a given shape (M5.1.3)</p> <p>[3] <b>G-5</b> illustrating or identifying the results of transformations (slides) of polygons (M5.1.5)</p>	<p><b>The student demonstrates conceptual understanding of similarity, congruence, symmetry, or transformations of shapes by</b></p> <p>[4] <b>G-3</b> identifying or drawing all lines of symmetry to identify figures that are symmetrical (M5.2.3)</p> <p>[4] <b>G-4</b> identifying shapes that are congruent (M5.2.3)</p> <p>[4] <b>G-5</b> illustrating or identifying the results of transformations (<u>turns</u>) of polygons by <u>continuing a given pattern</u> (M5.2.5)</p>	<p><b>The student demonstrates conceptual understanding of similarity, congruence, symmetry, or transformations of shapes by</b></p> <p>[5] <b>G-3</b> illustrating or identifying the results of transformation (<u>slides, turns, or flips of polygons</u>) (e.g., pictures of cultural art, fabric designs, architecture, logos) (M5.2.5)</p> <p>[5] <b>G-4</b> identifying, creating, or drawing geometric figures that are congruent, <u>similar</u>, or symmetrical (M5.2.3)</p> <p>[5] <b>G-5</b> [modeling designs (e.g., tessellations) that contain a series of slides, flips, <u>and/or turns</u> L] (M5.2.5)</p>	<p><b>The student demonstrates conceptual understanding of similarity, congruence, symmetry, or transformations of shapes by</b></p> <p>[6] <b>G-5</b> identifying, creating, or drawing geometric figures that are congruent, similar, or symmetrical (M5.2.3)</p> <p>[6] <b>G-6</b> [<u>drawing or describing</u> the results of transformations of polygons such as slides, turns, or flips L] (M5.2.5)</p>
Perimeter, Area, Volume, and Surface Area			
<p><b>The student solves problems using perimeter or area by</b></p> <p>[3] <b>G-6</b> estimating or determining area or perimeter of rectangular or square shapes on grids (M5.1.4)</p>	<p><b>The student solves problems using perimeter or area by</b></p> <p>[4] <b>G-6</b> estimating or determining area or perimeter of rectangles, squares and irregular shapes on grids <u>with a key or ruler</u> (M5.2.4)</p>	<p><b>The student solves problems (including real-world situations) using perimeter or area by</b></p> <p>[5] <b>G-6</b> estimating or determining area or perimeter of rectangles using a key, ruler, <u>or given measures</u> (M5.2.4)</p> <p>[5] <b>G-7</b> [estimating or determining the area and circumference of a circle using a grid or manipulatives L] (M5.2.4 &amp; M5.3.4)</p>	<p><b>The student solves problems (including real-world situations) by using perimeter, area, or volume by</b></p> <p>[6] <b>G-7</b> estimating or determining area or perimeter of <u>polygons (parallelograms, trapezoids, triangles)</u> using a key, ruler, or given measures (M5.2.4)</p> <p>[6] <b>G-8</b> [estimating the area and circumference of a circle using a grid or manipulatives and comparing the relationship of the diameter to the circumference (<math>\pi</math>) L] (M5.2.4 &amp; M5.3.4)</p> <p>[6] <b>G-9</b> [estimating or determining the volume of a right rectangular prism using manipulatives and formulas (e.g., cereal box, sand box, planter) L] (M5.3.4)</p>

Math Performance Standards  
(Grade Level Expectations)

<b>Position and Direction</b>			
Grade 3	Grade 4	Grade 5	Grade 6
<p><b>The student demonstrates understanding of position and direction by</b></p> <p>[3] <b>G-7</b> [using directional terms (inside, outside, right, left, horizontal, vertical) to describe relative location of objects in a picture L] (M5.1.6)</p>	<p><b>The student demonstrates understanding of position and direction by</b></p> <p>[4] <b>G-7</b> [describing the relative location of places or objects on a map using compass directions of north, south, east or west L] (M5.2.6)</p>	<p><b>The student demonstrates understanding of position and direction by</b></p> <p>[5] <b>G-8</b> [locating points of given coordinates on a grid or identifying coordinates for a given point (e.g., items on a treasure map) L] (M5.2.6)</p>	<p><b>The student demonstrates understanding of position and direction by</b></p> <p>[6] <b>G-10</b> graphing a vertical or horizontal line segment (given whole number coordinates for its end points) on a coordinate grid or identifying its length or midpoint (e.g., using a map to trace a route and calculate distance) (M5.2.6 &amp; M5.2.7)</p>
<b>Construction</b>			
<p><b>The student demonstrates a conceptual understanding of geometric drawings or constructions by</b></p> <p>[3] <b>G-8</b> [drawing real-world objects that consist of geometric shapes (squares, rectangles, triangles, or circles) L] (M5.1.7)</p>	<p><b>The student demonstrates a conceptual understanding of geometric drawings or constructions by</b></p> <p>[4] <b>G-8</b> [identifying or drawing parallel or intersecting line segments L] (M5.2.7)</p>	<p><b>The student demonstrates a conceptual understanding of geometric drawings or constructions by</b></p> <p>[5] <b>G-9</b> [identifying or drawing <u>perpendicular line segments or midpoints</u> L] (M5.2.7)</p>	<p><b>The student demonstrates a conceptual understanding of geometric drawings or constructions by</b></p> <p>[6] <b>G-11</b> [drawing or measuring quadrilaterals with given dimensions or angles L] (M5.3.7)</p>

Math Performance Standards  
(Grade Level Expectations)

**Content Standard A: Mathematical facts, concepts, principles, and theories**  
**Geometry: Construct, transform, and analyze geometric figures**

**Geometry Performance Standards that apply to grades 7-8:** **M5.3.1** Identify, classify, compare, and sketch regular and irregular polygons. **M5.3.2** Model, identify, draw, and describe 3-dimensional figures including tetrahedrons, dodecahedrons, triangular prisms, and rectangular prisms. **M5.3.3** Apply the properties of equality and proportionality to solve problems involving congruent or similar shapes. **M5.3.4** Estimate and determine volume and surface areas of solid figures using manipulatives and formulas; estimate and find circumferences and areas of circles. **M5.3.5** Draw and describe the results of transformations including translations (slides), rotations (turns), reflections (flips), and dilations (shrinking or enlarging). **M5.3.6** Use coordinate geometry to represent and interpret relationships defined by equations and formulas including distance and midpoint. **M5.3.7** Draw, measure, and construct geometric figures including perpendicular bisectors, polygons with given dimensions and angles, circles with given dimensions, perpendicular and parallel lines.

**Geometry Performance Standards that apply to grades 9-10:** **M5.4.1** Identify and use the properties of polygons, including interior and exterior angles, and circles (including angles, arcs, chord, secants, and tangents) to solve problems. **M5.4.2** Create 2-dimensional representations of 3-dimensional objects. **M5.4.3** Identify congruent and similar figures using Euclidean and coordinate geometries; apply this information to solve problems. **M5.4.4** Use transformations to demonstrate geometric properties. **M5.4.5** Use coordinate geometry to graph linear equations, determine slopes of lines, identify parallel and perpendicular lines, and to find possible solutions to sets of equations. **M5.4.6** Construct geometric models, transformations, and scale drawings using a variety of methods including paper folding, compass, straight edge, protractor, and technology.

**Geometric Relationships**

Grade 7	Grade 8	Grade 9	Grade 10
<p><b>The student demonstrates an understanding of geometric relationships by</b></p> <p>[7] <b>G-1</b> using the attributes and properties of polygons (<u>diagonals</u>, number of sides and angles) to identify and classify regular or irregular polygons (M5.3.1)</p> <p>[7] <b>G-2</b> using the attributes and properties of prisms (vertices, length and alignment of edges, shape and number of bases, shape of faces) to identify and describe triangular or rectangular <u>pyramids</u> (M5.3.2)</p>	<p><b>The student demonstrates an understanding of geometric relationships by</b></p> <p>[8] <b>G-1</b> [using the attributes and properties of regular polygons to <u>sketch regular or irregular polygons</u> L] (M5.3.1)</p> <p>[8] <b>G-2</b> using the attributes and properties of solid figures (vertices, length and alignment of edges, shape and number of bases) to identify and describe <u>cylinders and cones</u> (M5.3.2)</p> <p>[8] <b>G-3</b> using two-dimensional nets to create three-dimensional objects (prisms and cylinders) (M5.3.2)</p>	<p><b>The student demonstrates an understanding of geometric relationships by</b></p> <p>[9] <b>G-1</b> identifying, analyzing, comparing, or using properties of angles (including supplementary or complementary) or circles (degrees in a circle) (M5.4.1)</p>	<p><b>The student demonstrates an understanding of geometric relationships by</b></p> <p>[10] <b>G-1</b> identifying, analyzing, comparing, or using properties of plane figures:</p> <ul style="list-style-type: none"> <li>• supplementary, complementary or <u>vertical angles</u></li> <li>• angles created by <u>parallel lines with a transversal</u></li> <li>• <u>sum of interior or exterior angles of a polygon</u></li> <li>• <u>central angles, chords, inscribed angles or arcs of a circle</u> (M5.4.1)</li> </ul> <p>[10] <b>G-2</b> [using <u>isometric drawings</u> to create two-dimensional drawings of three-dimensional objects (<u>shapes that are composites of rectangular right prisms</u>) L] (M5.4.2)</p>

**Transformation of Shapes**

<p><b>The student demonstrates conceptual understanding of similarity, congruence, symmetry, or transformations of shapes by</b></p> <p>[7] <b>G-3</b> using a scale factor to solve problems involving similar shapes (e.g., scale drawings, maps) (M5.3.3)</p> <p>[7] <b>G-4</b> [drawing or describing the results of applying transformations such as translations, rotations, reflections, or <u>dilations</u> to figures L] (M5.3.5)</p>	<p><b>The student demonstrates conceptual understanding of similarity, congruence, symmetry, or transformations of shapes by</b></p> <p>[8] <b>G-4</b> using <u>proportionality</u> to solve real-world problems involving similar shapes (e.g., <u>two real-world objects casting shadows</u>) (M5.3.3)</p> <p>[8] <b>G-5</b> identifying the results of applying transformations (translations, rotations, reflections, dilations) to figures on a <u>coordinate plane</u> (M5.3.5)</p>	<p><b>The student demonstrates conceptual understanding of similarity, congruence, symmetry, or transformations of shapes by</b></p> <p>[9] <b>G-2</b> using a <u>coordinate plane</u> to solve problems involving congruent or similar shapes (M5.4.3)</p> <p>[9] <b>G-3</b> [drawing or describing the results of applying transformations (translations, rotations, reflections, or dilations) to figures on a coordinate plane L] (M5.4.4)</p>	<p><b>The student demonstrates conceptual understanding of similarity, congruence, symmetry, or transformations of shapes by</b></p> <p>[10] <b>G-3</b> identifying congruent and similar figures using Euclidean geometry (e.g., [constructions L], coordinate geometry) (M5.4.3)</p> <p>[10] <b>G-4</b> using transformations to <u>show congruence or similarity</u> of figures on a coordinate plane (M5.4.4)</p>
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Math Performance Standards  
(Grade Level Expectations)

<b>Perimeter, Area, and Volume</b>			
<b>Grade 7</b>	<b>Grade 8</b>	<b>Grade 9</b>	<b>Grade 10</b>
<p><b>The student solves problems (including real-world situations) by</b></p> <p>[7] <b>G-5</b> determining the volume of cubes and rectangular prisms (M5.3.4)</p> <p>[7] <b>G-6</b> determining the surface area of rectangular prisms (M5.3.4)</p> <p>[7] <b>G-7</b> determining the circumference of a circle (M5.3.4)</p>	<p><b>The student solves problems (including real-world situations) by</b></p> <p>[8] <b>G-6</b> determining the volume of <u>right triangular prisms</u> or cylinders (M5.3.4)</p> <p>[8] <b>G-7</b> determining the surface area of <u>cylinders or triangular prisms</u> (M5.3.4)</p> <p>[8] <b>G-8</b> determining the circumference <u>and area</u> of a circle (M5.3.4)</p>	<p><b>The student solves problems (including real-world situations) by</b></p> <p>[9] <b>G-4</b> determining the volume or surface area of prisms, <u>cylinders, cones or pyramids</u> (M5.3.4)</p>	<p><b>The student solves problems (including real-world situations) by</b></p> <p>[10] <b>G-5</b> determining the volume or surface area of <u>spheres or compound solids</u> (M5.3.4)</p>
<b>Position and Direction</b>			
<p><b>The student demonstrates understanding of position and direction by</b></p> <p>[7] <b>G-8</b> graphing or identifying values of variables on a coordinate grid (M5.3.6)</p>	<p><b>The student demonstrates understanding of position and direction by</b></p> <p>[8] <b>G-9</b> graphing or identifying <u>relationships of variables</u> on a coordinate plane (e.g., <u>length/width, area/diameter, cost/pound</u>) (M5.3.6)</p>	<p><b>The student demonstrates understanding of position and direction when solving problems (including real-world situations) by</b></p> <p>[9] <b>G-5</b> graphing or identifying (<u>using equations or formulas to determine the slope of line segments</u> on a coordinate plane) (M5.4.5)</p>	<p><b>The student demonstrates understanding of position and direction when solving problems (including real-world situations) by</b></p> <p>[10] <b>G-6</b> graphing a line segment on a coordinate grid and/or identifying its length or midpoint by using formulas (M5.4.5)</p> <p>[10] <b>G-7</b> graphing a system of equations on a coordinate grid, identifying a solution, or determining their relationship (intersecting, parallel, perpendicular) (M5.4.5)</p>
<b>Construction</b>			
<p><b>The student demonstrates a conceptual understanding of geometric drawings or constructions by</b></p> <p>[7] <b>G-9</b> [drawing or measuring <u>polygons with given dimensions and angles or circles with given dimensions</u> L] (M5.3.7)</p>	<p><b>The student demonstrates a conceptual understanding of geometric drawings or constructions by</b></p> <p>[8] <b>G-10</b> [drawing, measuring, or <u>constructing geometric figures</u> (polygons, perpendicular bisectors, or perpendicular or parallel lines) L] (M5.3.7)</p>	<p><b>The student demonstrates a conceptual understanding of geometric drawings or constructions by</b></p> <p>[9] <b>G-6</b> [drawing, measuring, or constructing geometric models of plane figures (containing parallel and/or perpendicular lines) L] (M5.4.6)</p>	<p><b>The student demonstrates a conceptual understanding of geometric drawings or constructions by</b></p> <p>[10] <b>G-8</b> [drawing, measuring, or constructing geometric models of plane figures (containing parallel and/or perpendicular lines, angles, perpendicular bisectors, congruent angles, regular polygons) L] (M5.4.6)</p>

Math Performance Standards  
(Grade Level Expectations)

<b>Content Standard A: Mathematical facts, concepts, principles, and theories</b>			
<b>Statistics and Probability: Formulate questions, gather and interpret data, and make predictions</b>			
<p><b>Statistics and Probability Performance Standards that apply to grade 3:</b> <b>M6.1.1</b> Collect, record, organize, display, and explain the classification of data. <b>M6.1.2</b> Describe data from a variety of visual displays including tallies, tables, pictographs, bar graphs, and Venn diagrams. <b>M6.1.3</b> Use the terms “maximum” and “minimum” when working with a data set. <b>M6.1.4</b> Find and record the possibilities of simple probability experiments; explain differences between chance and certainty, giving examples. <b>M6.1.5</b> Conduct a survey and tally the results.</p> <p><b>Statistics and Probability Performance Standards that apply to grades 4-6:</b> <b>M6.2.1</b> Collect, organize, and display data creating a variety of visual displays including tables, charts, and line graphs. <b>M6.2.2</b> Present the data using a variety of appropriate representations and explain the meaning of the data. <b>M6.2.3</b> Describe and interpret a data set using mean, median, mode, and range. <b>M6.2.4</b> Estimate whether a game is mathematically fair or unfair; analyze and present probability data using simple fractions. <b>M6.2.5</b> Conduct simple probability experiments using concrete materials and represent the results using fractions and probability.</p>			
<b>Data Display</b>			
Grade 3	Grade 4	Grade 5	Grade 6
<p><b>The student demonstrates an ability to classify and organize data by</b></p> <p>[3] <b>S&amp;P-1</b> [designing an investigation and collecting, recording L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., literature, self, or family), using bar graphs, and [Venn diagrams L] (M6.1.1, M6.1.2, &amp; M6.1.5)</p>	<p><b>The student demonstrates an ability to classify and organize data by</b></p> <p>[4] <b>S&amp;P-1</b> [designing an investigation and collecting L], organizing or displaying, <u>using appropriate scale</u>, data in real-world problems (e.g., social studies, friends, or school), using bar graphs, <u>tables, charts, or diagrams with whole numbers up to 25</u> (M6.2.1 &amp; M6.2.2)</p>	<p><b>The student demonstrates an ability to classify and organize data by</b></p> <p>[5] <b>S&amp;P-1</b> [designing an investigation and collecting L], organizing, or displaying, using appropriate scale, data in real-world problems (e.g., social studies, friends, or school), using bar graphs, tables, charts, diagrams, or <u>line graphs with whole numbers up to 50</u> (M6.2.1 &amp; M6.2.2)</p>	<p><b>The student demonstrates an ability to classify and organize data by</b></p> <p>[6] <b>S&amp;P-1</b> [designing an investigation and collecting L], organizing, or displaying, using appropriate scale for <u>data displays</u> (tables, bar graphs, <u>line graphs, or circle graphs</u>), data in real-world problems (e.g., social studies, friends, or school), <u>with whole numbers up to 100</u> (M6.2.1 &amp; M6.2.2)</p>
<b>Analysis and Central Tendency</b>			
<p><b>The student demonstrates an ability to analyze data (comparing, explaining, interpreting, or justifying conclusions) by</b></p> <p>[3] <b>S&amp;P-2</b> using information from a variety of displays (tallies, tables, pictographs, bar graphs, or [Venn diagrams L] (M6.1.2)</p> <p>[3] <b>S&amp;P-3</b> using the terms “maximum” or “minimum” (M6.1.3)</p>	<p><b>The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating or drawing or justifying conclusions) by</b></p> <p>[4] <b>S&amp;P-2</b> using information from a variety of displays (tables, bar graphs, or Venn diagrams) (M6.2.2)</p> <p>[4] <b>S&amp;P-3</b> using mode or range with up to 5 pieces of data with a value of 10 or less each (M6.2.3)</p>	<p><b>The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating; or drawing or justifying conclusions) by</b></p> <p>[5] <b>S&amp;P-2</b> using information from a variety of displays (tables, bar graphs, <u>line graphs</u>, or Venn diagrams) (M6.2.2)</p> <p>[5] <b>S&amp;P-3</b> using mode, <u>median</u>, or range with up to <u>10</u> pieces of data with a value of 10 or less each (M6.2.3)</p>	<p><b>The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating; or drawing or justifying conclusions) by</b></p> <p>[6] <b>S&amp;P-2</b> using information from a variety of displays (tables, bar graphs, line graphs, <u>circle graphs</u>, or Venn diagrams) (M6.2.2)</p> <p>[6] <b>S&amp;P-3</b> using <u>mean</u>, median, mode, or range (M6.2.3)</p>

Math Performance Standards  
(Grade Level Expectations)

<b>Probability</b>			
<b>Grade 3</b>	<b>Grade 4</b>	<b>Grade 5</b>	<b>Grade 6</b>
<p><b>The student demonstrates a conceptual understanding of probability by</b></p> <p>[3] <b>S&amp;P-4</b> [explaining the differences between chance and certainty or recognizing events that may be certain or chance events L] (M6.1.4)</p> <p>[3] <b>S&amp;P-5</b> [Finding and recording L] and making predictions about the likelihood of outcomes of a simple probability experiment (e.g., spinner, tossing a coin) (M6.1.4)</p>	<p><b>The student demonstrates a conceptual understanding of probability and counting techniques by</b></p> <p>[4] <b>S&amp;P-4</b> predicting <u>or explaining the probability of all possible</u> outcomes in a simple experiment (e.g., spinners, dice, coins) (M6.2.4)</p> <p>[4] <b>S&amp;P-5</b> determining possible combinations in a given situation involving up to 3 items (e.g., how many ways can you choose two fruits out of a basket containing oranges and bananas? – three ways: two bananas; one orange and one banana; and two oranges) (M6.2.5)</p>	<p><b>The student demonstrates a conceptual understanding of probability and counting techniques by</b></p> <p>[5] <b>S&amp;P-4</b> predicting or explaining the probability of all possible outcomes in an experiment <u>using ratios or fractions to describe the probability</u> (M6.2.4)</p> <p>[5] <b>S&amp;P-5</b> <u>solving or identifying solutions to problems involving money</u> combinations (e.g., how many ways can you make 25 cents using nickels, dimes, or quarters?) (M6.2.5)</p>	<p><b>The student demonstrates a conceptual understanding of probability and counting techniques by</b></p> <p>[6] <b>S&amp;P-4</b> <u>analyzing whether a game is mathematically fair or unfair</u> by explaining the probability of all possible outcomes L] (M6.2.4)</p> <p>[6] <b>S&amp;P-5</b> solving or identifying solutions to problems involving <u>possible</u> combinations (e.g., if ice cream sundaes come in 3 flavors with 2 possible toppings, how many different sundaes can be made using only one flavor of ice cream with one topping?) (M6.2.5)</p>

Math Performance Standards  
(Grade Level Expectations)

**Content Standard A: Mathematical facts, concepts, principles, and theories**  
**Statistics and Probability: Formulate questions, gather and interpret data, and make predictions**

**Statistics and Probability Performance Standards that apply to grades 7-8: M6.3.1** Collect, analyze, and display data in a variety of visual displays including frequency distributions, circle graphs, box and whisker plots, stem and leaf plots, histograms, and scatter plots with and without technology. **M6.3.2** Interpret and analyze information found in newspapers, magazines, and graphical displays. **M6.3.3** Determine and justify a choice of mean, median, or mode as the best representation of data for a practical situation. **M6.3.4** Make projections based on available data and evaluate whether or not inferences can be made given the parameters of the data. **M6.3.5** Use tree diagrams and sample spaces to make predictions about independent events. **M6.3.6** Design and conduct a simulation to study a problem and communicate the results.

**Statistics and Probability Performance Standards that apply to grades 9-10: M6.4.1** Analyze and draw inferences from a wide variety of data sources that summarize data; constructing graphical displays with and without technology. **M6.4.2** Determine the line of best fit and use it to predict unknown data values. **M6.4.3** Describe data, selecting measures of central tendencies and distribution, to convey information in the data. **M6.4.4** Analyze the validity of statistical conclusions and the use, misuse, and abuse of data caused by a wide variety of factors including choices of scale, inappropriate choices of measures of center, incorrect curve fitting, and inappropriate uses of controls or sample groups. **M6.4.5** Analyze data from multiple events and predict theoretical probability; find and compare experimental and theoretical probability for a simple situation, discussing possible differences between two results. **M6.4.6** Design, conduct, analyze, and communicate the results of multi-stage probability experiments.

**Data Display**

Grade 7	Grade 8	Grade 9	Grade 10
<p><b>The student demonstrates an ability to classify and organize data by</b></p> <p>[7] <b>S&amp;P-1</b> [collecting, L] displaying, organizing, or explaining the classification of data in real-world problems (e.g., science or humanities, peers or community), using <u>circle graphs, frequency distributions, stem and leaf, [or scatter plots L]</u> with appropriate scale (M6.3.1)</p>	<p><b>The student demonstrates an ability to classify and organize data by</b></p> <p>[8] <b>S&amp;P-1</b> [designing, collecting L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., science or humanities, peers or community), using <u>histograms, scatter plots, or box and whisker plots</u> with appropriate scale [or with technology L] (M6.3.1)</p>	<p><b>The student demonstrates an ability to classify and organize data by</b></p> <p>[9] <b>S&amp;P-1</b> [designing, collecting L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., science or humanities, peers, community, or careers) using <u>information from tables or graphs that display two sets of data</u> [or with technology L] (M6.4.1)</p>	<p><b>The student demonstrates an ability to classify and organize data by</b></p> <p>[10] <b>S&amp;P-1</b> [designing, collecting L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., science or humanities, peers, community, or careers), using information from tables or graphs that display two or more sets of data [or with technology L] (M6.4.1)</p>

**Analysis and Central Tendency**

<p><b>The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating or making predictions; or drawing or justifying conclusions) by</b></p> <p>[7] <b>S&amp;P-2</b> using information from a variety of displays (e.g., as found in graphical displays in newspapers and magazines) (M6.3.2)</p> <p>[7] <b>S&amp;P-3</b> <u>determining</u> range, mean, median, or mode (M6.3.3)</p>	<p><b>The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating, making predictions, or describing trends; or drawing, formulating, or justifying conclusions) by</b></p> <p>[8] <b>S&amp;P-2</b> using information from a variety of displays or <u>analyzing the validity of statistical conclusions found in the media</u> (M6.3.2)</p> <p>[8] <b>S&amp;P-3</b> <u>determining or justifying</u> a choice of range, mean, median, or mode as the best representation of data for a practical situation (M6.3.3)</p>	<p><b>The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating, making predictions, or, describing trends; or drawing, formulating, or justifying conclusions) by</b></p> <p>[9] <b>S&amp;P-2</b> using information from a variety of displays or analyzing the validity of statistical conclusions found in the media (M6.4.1)</p> <p>[9] <b>S&amp;P-3</b> using range and measures of central tendency to determine the best representation of the data for a practical situation (M6.4.3)</p> <p>[9] <b>S&amp;P-4</b> identifying and/or showing the meaning of a best fit line (M6.4.2)</p>	<p><b>The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating, making predictions, or describing trends; or drawing, formulating, or justifying conclusions) by</b></p> <p>[10] <b>S&amp;P-2</b> using information from a display <u>to solve a problem</u> or analyzing the validity of statistical conclusions (M6.4.1 &amp; M6.4.4)</p> <p>[10] <b>S&amp;P-3</b> using <u>and justifying</u> range and measures of central tendency to determine the best representation of the data for a practical situation (M6.4.3)</p> <p>[10] <b>S&amp;P-4</b> <u>using</u> a best fit line <u>to describe trends and make predictions about data</u> (M6.4.2)</p>
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Math Performance Standards  
(Grade Level Expectations)

<b>Probability</b>			
<b>Grade 7</b>	<b>Grade 8</b>	<b>Grade 9</b>	<b>Grade 10</b>
<p><b>The student demonstrates a conceptual understanding of probability and counting techniques by</b></p> <p>[7] <b>S&amp;P-4</b> determining the [experimental L] and theoretical probability of a simple event (M6.3.5)</p> <p>[7] <b>S&amp;P-5</b> using a systematic approach to finding sample spaces or to making predictions about the probability of independent events (M6.3.5)</p> <p>[7] <b>S&amp;P-6</b> [designing and conducting a simulation to study a problem and communicate the results L] (M6.3.6)</p>	<p><b>The student demonstrates a conceptual understanding of probability and counting techniques by</b></p> <p>[8] <b>S&amp;P-4</b> determining or <u>comparing</u> the experimental and/or theoretical probability of simple events (M6.3.5)</p> <p>[8] <b>S&amp;P-5</b> using a systematic approach to finding sample spaces or to making predictions about the probability of independent events <u>and using the information to solve real-world problems</u> (M6.3.5)</p> <p>[8] <b>S&amp;P-6</b> [designing and conducting a simulation to study a problem and communicate the results L] (M6.3.6)</p>	<p><b>The student demonstrates a conceptual understanding of probability and counting techniques by</b></p> <p>[9] <b>S&amp;P-5</b> determining or comparing the experimental and/or theoretical probability of independent or <u>dependent</u> events (M6.4.5)</p> <p>[9] <b>S&amp;P-6</b> making predictions about the probability of independent or <u>dependent</u> events and using the information to solve problems (M6.4.5)</p> <p>[9] <b>S&amp;P 7</b> [designing, conducting, analyzing, and communicating the results of a probability experiment L] (M6.4.6)</p>	<p><b>The student demonstrates a conceptual understanding of probability and counting techniques by</b></p> <p>[10] <b>S&amp;P-5</b> <u>explaining in words or identifying the difference</u> between experimental and theoretical probability of independent or dependent events (M6.4.5)</p> <p>[10] <b>S&amp;P-6</b> analyzing data to make predictions about the probability of independent or dependent events <u>as a basis for solving real-world problems</u> (M6.4.5)</p> <p>[10] <b>S&amp;P-7</b> [designing, conducting, analyzing, and communicating the results of a <u>multi-stage</u> probability experiment L] (M6.4.6)</p>

Math Performance Standards  
(Grade Level Expectations)

**Content Standards B, C, D, and E: Process skills and abilities**

**Applying conceptual knowledge and skills as designated in all strands of Content Standard A by problem solving, communicating, reasoning, and making connections**

**Problem-Solving Performance Standards that apply to grade 3:** **M7.1.1** Formulate problems from practical and mathematical activities. **M7.1.2** Develop and apply strategies including guess and check, modeling and acting out, drawings, and extending patterns to solve a variety of problems. **M7.1.3** Predict an answer before solving a problem and compare results to check for reasonableness.

**Problem-Solving Performance Standards that apply to grades 4-6:** **M7.2.1** Read and summarize a problem, using mathematical terms and symbols. **M7.2.2** Select and apply a variety of strategies including making a table, chart or list, drawing pictures, making a model, and comparing with previous experience to solve problems. **M7.2.3** Explain and verify results of the original problem and apply what was learned to new situations.

**Problem Solving:** Understand and be able to select and use a variety of problem-solving strategies

Grade 3	Grade 4	Grade 5	Grade 6
<p><b>The student demonstrates an ability to problem solve by</b></p> <p>[3] <b>PS-1</b> selecting and applying an appropriate strategy (e.g., guess and check; draw a picture; make a model, extend a pattern) to solve a variety of problems (M7.1.2)</p>	<p><b>The student demonstrates an ability to problem solve by</b></p> <p>[4] <b>PS-1</b> selecting and applying appropriate strategy (e.g., lists, guess and check; extended patterns) to solve a variety of problems (M7.2.2)</p> <p>[4] <b>PS-2</b> explaining and verifying results of an original problem and applying what was learned to new situations (M7.2.3)</p>	<p><b>The student demonstrates an ability to problem solve by</b></p> <p>[5] <b>PS-1</b> selecting and applying an appropriate strategy (e.g., tables, charts, lists, or graphs; guess and check; extended patterns; make a model) to solve a variety of problems <u>and verify the results</u> (M7.2.2)</p> <p>[5] <b>PS-2</b> explaining and verifying results of an original problem and applying what was learned to new situations (M7.2.3)</p>	<p><b>The student demonstrates an ability to problem solve by</b></p> <p>[6] <b>PS-1</b> selecting, <u>modifying</u>, and applying appropriate problem solving strategies (e.g., graphing, <u>Venn diagrams</u>, tables, lists, <u>working backwards</u>, guess and check, or extend a pattern) and verifying results (M7.3.2)</p> <p>[6] <b>PS-2</b> evaluating and interpreting solutions to problems (M7.3.3)</p>

**Communication Performance Standards that apply to grade 3:** **M8.1.1** Translate problems from everyday language into math language and symbols. **M8.1.2** Use manipulatives, models, pictures, and language to represent and communicate mathematical ideas. **M8.1.3** Use everyday language to explain thinking about problem solving strategies and solutions to problems.

**Communication Performance Standards that apply to grades 4-6:** **M8.2.1** Use the mathematical vocabulary appropriate to the problem. **M8.2.2** Represent mathematical and practical situations using concrete, pictorial, and symbolic representation. **M8.2.3** Organize and communicate mathematical problem solving strategies and solutions to problems.

**Communication:** Form and use appropriate methods to define and explain mathematical relationships

<p><b>The student communicates his or her mathematical thinking by</b></p> <p>[3] <b>PS-2</b> representing mathematical problems using manipulatives, models, pictures, and/or everyday language; or using everyday language to explain thinking about the problem-solving strategies and solutions to problems (M8.1.1, M8.1.2, &amp; M8.1.3)</p>	<p><b>The student communicates his or her mathematical thinking by</b></p> <p>[4] <b>PS-3</b> representing problems using mathematical <u>language including concrete, pictorial, and/or symbolic representation; or by organizing and communicating mathematical</u> problem-solving strategies and solutions to problems (M8.2.1, M8.2.2, &amp; M8.2.3)</p>	<p><b>The student communicates his or her mathematical thinking by</b></p> <p>[5] <b>PS-3</b> representing problems using mathematical language including concrete, pictorial, and/or symbolic representation; or organizing and communicating mathematical problem-solving strategies and solutions <u>using mathematical language</u> (M8.2.1, M8.2.2, &amp; M8.2.3)</p>	<p><b>The student communicates his or her mathematical thinking by</b></p> <p>[6] <b>PS-3</b> representing problems using mathematical language including concrete, pictorial, and/or symbolic representation; or using appropriate vocabulary, symbols, and technology to explain mathematical solutions (M8.2.1, M8.2.2, &amp; M8.2.3)</p>
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Math Performance Standards  
(Grade Level Expectations)

<p><b>Reasoning Performance Standards that apply to grade 3:</b> <b>M9.1.1</b> Draw conclusions about mathematical problems. <b>M9.1.2</b> Find examples that support or refute mathematical statements. <b>M9.1.3</b> Explain why a prediction, estimation, or solution is reasonable.</p>			
<p><b>Reasoning Performance Standards that apply to grades 4-6:</b> <b>M9.2.1</b> Draw logical conclusions about mathematical situations. <b>M9.2.2</b> Given a rule or generalization, determine whether the example fits. <b>M9.2.3</b> Justify answers and mathematical strategies as reasonable.</p>			
<p><b>Reasoning:</b> Use logic and reason to solve mathematical problems</p>			
<b>Grade 3</b>	<b>Grade 4</b>	<b>Grade 5</b>	<b>Grade 6</b>
<p><b>The student demonstrates an ability to use logic and reason by</b></p> <p>[3] <b>PS-3</b> drawing conclusions about mathematical problems; or finding examples that support or refute mathematical statements (M9.1.1 &amp; M9.1.2)</p> <p>[3] <b>PS-4</b> explaining whether or not a prediction, estimation, or solution is reasonable (M9.1.3)</p>	<p><b>The student demonstrates an ability to use logic and reason by</b></p> <p>[4] <b>PS-4</b> drawing conclusions about mathematical problems (given a rule or generalization, determine whether the example fits) or <u>justifying</u> answers and mathematical strategies (M9.2.1, M9.2.2, &amp; M9.2.3)</p>	<p><b>The student demonstrates an ability to use logic and reason by</b></p> <p>[5] <b>PS-4</b> drawing <u>logical</u> conclusions about mathematical <u>situations</u> (given a rule or generalization, determine whether the example fits); or <u>justifying</u> answers and mathematical strategies as <u>reasonable</u> (M9.2.1, M9.2.2, &amp; M9.2.3)</p>	<p><b>The student demonstrates an ability to use logic and reason by</b></p> <p>[6] <b>PS-4</b> using <u>informal deductive reasoning</u> in concrete contexts; or <u>justifying</u> answers and mathematical strategies using examples (M9.3.1 &amp; M9.3.3)</p>
<p><b>Connections Performance Standards that apply to grade 3:</b> <b>M10.1.1</b> Apply mathematical skills and processes to literature. <b>M10.1.2</b> Apply mathematical skills and processes to situations with self and family.</p>			
<p><b>Connections Performance Standards that apply to grades 4-6:</b> <b>M10.2.1</b> Apply mathematical processes to social studies. <b>M10.2.2</b> Apply mathematical skills and processes to situations with friends and school.</p>			
<p><b>Connections:</b> Apply mathematical concepts and processes to situations within and outside of school.</p>			
<p><b>The student understands and applies mathematical skills and processes across the content strands by</b></p> <p>[3] <b>PS-5</b> using real-world contexts such as literature, self, and family (M10.1.1. &amp; M10.1.2)</p>	<p><b>The student understands and applies mathematical skills and processes across the content strands by</b></p> <p>[4] <b>PS-5</b> using real-world contexts such as social studies, friends, and school (M10.2.1 &amp; M10.2.2)</p>	<p><b>The student understands and applies mathematical skills and processes across the content strands by</b></p> <p>[5] <b>PS-5</b> using real-world contexts such as social studies, friends, and school (M10.2.1 &amp; M10.2.2)</p>	<p><b>The student understands and applies mathematical skills and processes across the content strands by</b></p> <p>[6] <b>PS-5</b> using real-world contexts such as social studies, friends, school and community (M10.2.1, M10.2.2, &amp;M10.3.2)</p>

Math Performance Standards  
(Grade Level Expectations)

**Content Standards B, C, D, and E: Process skills and abilities**

**Applying conceptual knowledge and skills designated in all strands of Content Standard A by problem solving, communicating, reasoning, and making connections**

**Problem-Solving Performance Standards that apply to grades 7-8:** **M7.3.1** Analyze and summarize a problem using the relationships between the known facts and unknown information. **M7.3.2** Select, modify, and apply a variety of problem-solving strategies including graphing, inductive and deductive reasoning, Venn diagrams, and spreadsheets. **M7.3.3** Evaluate, interpret, and justify solutions to problems.

**Problem-Solving Performance Standards that apply to grades 9-10:** **M7.4.1** Recognize and formulate mathematical problems from within and outside the field of mathematics. **M7.4.2** Apply multi-step, integrated, mathematical problem-solving strategies, persisting until a solution is found or it is clear no solution exists. **M7.4.3** Verify the answer by using an alternative strategy.

**Problem solving:** Understand and be able to select and use a variety of problem-solving strategies

Grade 7	Grade 8	Grade 9	Grade 10
<p><b>The student demonstrates an ability to problem solve by</b></p> <p>[7] <b>PS-1</b> selecting, modifying, and applying a variety of problem-solving strategies (e.g., working backwards, drawing a picture, Venn diagrams and verifying the results) (M7.3.2)</p> <p>[7] <b>PS-2</b> evaluating, interpreting, and justifying solutions to problems (M7.3.3)</p>	<p><b>The student demonstrates an ability to problem solve by</b></p> <p>[8] <b>PS-1</b> selecting, modifying, and applying a variety of problem-solving strategies (e.g., <u>inductive and deductive reasoning</u>, Venn diagrams, <u>making a simpler problem</u>) and verifying the results (M7.3.2)</p> <p>[8] <b>PS-2</b> evaluating, interpreting, and justifying solutions to problems (M7.3.3)</p>	<p><b>The student demonstrates an ability to problem solve by</b></p> <p>[9] <b>PS-1</b> selecting, modifying, and applying a variety of problem-solving strategies (e.g., <u>charts, graphing</u>, inductive and deductive reasoning, Venn diagrams) and verifying the results (M7.4.2)</p> <p>[9] <b>PS-2</b> evaluating, interpreting, and justifying solutions to problems by using an alternative strategy (M7.4.3)</p>	<p><b>The student demonstrates an ability to problem solve by</b></p> <p>[10] <b>PS-1</b> applying multi-step, integrated, mathematical problem-solving strategies (M7.4.2)</p> <p>[10] <b>PS-2</b> verifying the answer by using an alternative strategy (M7.4.3)</p>

**Communication Performance Standards that apply to grades 7-8:** **M8.3.1** Use math vocabulary, symbols, and notation to represent information in the problem. **M8.3.2** Represent a problem numerically, graphically, and symbolically; translate among these alternative representations. **M8.3.3** Use appropriate vocabulary, symbols, and technology to explain, justify, and defend mathematical solutions.

**Communication Performance Standards that apply to grades 9-10:** **M8.4.1** Use appropriate technology to represent the information and ideas in a problem. **M8.4.2** Use numerical, graphic, and symbolic representations to support oral and written communication about math ideas. **M8.4.3** Explain, justify, and defend mathematical ideas, solutions, and methods to various audiences.

**Communication:** Form and use appropriate methods to define and explain mathematical relationships

<p><b>The student communicates his or her mathematical thinking by</b></p> <p>[7] <b>PS-3</b> representing <u>mathematical problems numerically, graphically, and/or symbolically</u>; or using appropriate vocabulary, symbols, or technology to explain, justify, and defend strategies and solutions (M8.3.1, M8.3.2, &amp; M8.3.3)</p>	<p><b>The student communicates his or her mathematical thinking by</b></p> <p>[8] <b>PS-3</b> representing mathematical problems numerically, graphically, and/or symbolically, <u>translating among</u> these alternative representations; or using appropriate vocabulary, symbols, or technology to explain, justify, and defend strategies and solutions (M8.3.1, M8.3.2, &amp; M8.3.3)</p>	<p><b>The student communicates his or her mathematical thinking by</b></p> <p>[9] <b>PS-3</b> representing mathematical problems numerically, graphically, and/or symbolically, <u>translating among</u> these alternative representations; or using appropriate vocabulary, symbols, or technology to explain, justify, and defend strategies and solutions (M8.4.1, M8.4.2, &amp; M8.4.3)</p>	<p><b>The student communicates his or her mathematical thinking by</b></p> <p>[10] <b>PS-3</b> representing mathematical problems numerically, graphically, and/or symbolically communicating math ideas in writing; or using appropriate vocabulary, symbols, or technology to explain, justify, and defend strategies and solutions (M8.4.1, M8.4.2, &amp; M8.4.3)</p>
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Math Performance Standards  
(Grade Level Expectations)

<p><b>Reasoning Performance Standards that apply to grades 7-8:</b> <b>M9.3.1</b> Use informal deductive and inductive reasoning in both concrete and abstract contexts. <b>M9.3.2</b> State counterexamples to disprove statements. <b>M9.3.3</b> Justify and defend the validity of mathematical strategies and solutions using examples and counterexamples.</p>			
<p><b>Reasoning Performance Standards that apply to grades 9-10:</b> <b>M9.4.1</b> Follow and evaluate an argument, judging its validity using inductive or deductive reasoning and logic. <b>M9.4.2</b> Make and test conjectures. <b>M9.4.3</b> Use methods of proofs including direct, indirect, and counterexamples, to validate conjectures.</p>			
<p><b>Reasoning:</b> Use logic and reason to solve mathematical problems</p>			
<b>Grade 7</b>	<b>Grade 8</b>	<b>Grade 9</b>	<b>Grade 10</b>
<p><b>The student demonstrates an ability to use logic and reason by</b></p> <p>[7] <b>PS-4</b> using informal deductive and <u>inductive</u> reasoning in concrete contexts or <u>stating counterexamples to disprove statements</u>; or justifying <u>and defending the validity of mathematical strategies and solutions</u> using examples (M9.3.1, M9.3.2, &amp; M9.3.3)</p>	<p><b>The student demonstrates an ability to use logic and reason by</b></p> <p>[8] <b>PS-4</b> generalizing from patterns of observations (inductive reasoning) about mathematical problems and testing using a logical verification (deductive reasoning); or justifying and defending the validity of mathematical strategies and solutions using examples and counterexamples (M9.3.1, M9.3.2, &amp; M9.3.3)</p>	<p><b>The student demonstrates an ability to use logic and reason by</b></p> <p>[9] <b>PS-4</b> following and evaluating an argument, judging its validity using inductive, or deductive reasoning and logic; or making and testing conjectures (M9.4.1 &amp; M9.4.2)</p>	<p><b>The student demonstrates an ability to use logic and reason by</b></p> <p>[10] <b>PS-4</b> using methods of proof including direct, indirect, and counter examples to validate conjectures (M9.4.3)</p>
<p><b>Connections Performance Standards that apply to grades 7-8:</b> <b>M10.3.1</b> Apply mathematical skills and processes to science and humanities. <b>M10.3.2</b> Apply mathematical skills and processes to situations with peers and community.</p>			
<p><b>Connections Performance Standards that apply to grades 9-10:</b> <b>M10.4.1</b> Apply mathematical skills and processes to global issues. <b>M10.4.2</b> Describe how mathematics can be used in knowing how to prepare for careers.</p>			
<p><b>Connections:</b> Apply mathematical concepts and processes to situations within and outside of school</p>			
<p><b>The student understands and applies mathematical skills and processes across the content strands by</b></p> <p>[7] <b>PS-5</b> using real-world contexts such as science, humanities, peers, and community (M10.3.1 &amp; M10.3.2)</p>	<p><b>The student understands and applies mathematical skills and processes across the content strands by</b></p> <p>[8] <b>PS-5</b> using real-world contexts such as science, humanities, peers, community, and <u>careers</u> (M10.3.1 &amp; M10.4.2)</p>	<p><b>The student understands and applies mathematical skills and processes across the content strands by</b></p> <p>[9] <b>PS-5</b> using real-world contexts such as science, humanities, peers, community, careers, and <u>national issues</u> (M10.4.1 &amp; M10.4.2)</p>	<p><b>The student understands and applies mathematical skills and processes across the content strands by</b></p> <p>[10] <b>PS-5</b> using real-world contexts such as <u>global issues</u> and careers (M10.4.1 &amp; M10.4.2)</p>