

# 2014 WYOMING MATHEMATICS STANDARDS EXTENSIONS AND ACHIEVEMENT DESCRIPTORS FOR KINDERGARTEN

## Kindergarten Mathematics Standards

2012 WY Mathematics Content Standards	2014 Wyoming Content Standards Extensions	Instructional Achievement Level Descriptor
<b>Counting and Cardinality</b>		
<p><b>Know number names and the count sequence.</b></p> <p><b>K.CC.1.</b> Count to 100 by ones and by tens.</p>	<p><b>EEK.CC.1.</b> Starting with one, count to 10 by ones.</p>	<p><b>Level IV AA Students will:</b>  <b>EEK.CC.1.</b> Starting with any number greater than one, count to 10 by ones.  <i>Ex.</i> Count numbers to 10 starting with one and any number greater than one and less than 10.  <i>Ex.</i> Count sequentially to 10 starting with one, independent of objects or pictures.  <i>Ex.</i> Count with or without one-to-one correspondence, numbers beyond 10.</p> <p><b>Level III AA Students will:</b>  <b>EEK.CC.1.</b> Starting with one, count to 10 by ones.  <i>Ex.</i> Count numbers to 10 by ones, starting with one.  <i>Ex.</i> Sequentially sing numbers to 10 starting with one.</p> <p><b>Level II AA Students will:</b>  <b>EEK.CC.1.</b> Starting with one, count by ones to five.  <i>Ex.</i> Count on their fingers to five.  <i>Ex.</i> Count without one-to-one correspondence to five.  <i>Ex.</i> Sing along to a counting song.</p> <p><b>Level I AA Students will:</b>  <b>EEK.CC.1.</b> Count from one to two.</p>
<p><b>K.CC.2.</b> Count forward beginning from a given number within the known sequence (instead of having to begin at 1).</p>	<p><b>EEK.CC.2.</b> Count forward from a given number in a known sequence.</p>	<p><b>Level IV AA Students will:</b>  <b>EEK.CC.2.</b> Count forward beginning from a given number between 1 and 30.</p> <p><b>Level III AA Students will:</b>  <b>EEK.CC.2.</b> Count forward beginning from a given number between 1 and 20.</p> <p><b>Level II AA Students will:</b>  <b>EEK.CC.2.</b> Identify the next number when given a starting number between 1 and 10.</p> <p><b>Level I AA Students will:</b>  <b>EEK.CC.2.</b> Identify the next number when given a starting number between 1 and 5.</p>
<p><b>K.CC.3.</b> Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).</p>	<p><b>EEK.CC.3.</b> Represent a number of objects with a written numeral 1-10.</p>	<p><b>Level IV AA Students will:</b>  <b>EEK.CC.3.</b> Represent a number of objects with a numerical symbol 5-20.  <i>Ex.</i> The student correctly represents the number of objects by writing or indicating the appropriate numeral.</p>

		<p><b>Level III AA Students will:</b>  <b>EEK.CC.3.</b> Represent a number of objects with a numerical symbol 0-10.</p> <p><b>Level II AA Students will:</b>  <b>EEK.CC.3.</b> Match a given number to the quantity of objects up to 10.</p> <p><b>Level I AA Students will:</b>  <b>EEK.CC.3.</b> Match a given number to the quantity of objects up to 5.</p>
<p><b>Count to tell the number of objects.</b></p> <p><b>K.CC.4.</b> Understand the relationship between numbers and quantities; connect counting to cardinality.</p> <p>a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.</p>	<p><b>EEK.CC.4.</b> Demonstrate one-to-one correspondence, pairing each object with one and only one number.</p>	<p><b>Level IV AA Students will:</b>  <b>EEK.CC.4.</b> Demonstrate one-to-one correspondence with 10 objects.  <i>Ex.</i> When counting objects, say the number names in standard order, and pair each object with one and only one number name.  <i>Ex.</i> Use one-to-one correspondence when counting up to 10 common objects in the classroom (crayons, blocks, buttons).</p> <p><b>Level III AA Students will:</b>  <b>EEK.CC.4.</b> Demonstrate one-to-one correspondence with up to 5 objects.</p> <p><b>Level II AA Students will:</b>  <b>EEK.CC.4.</b> Demonstrate one-to-one correspondence with up to 3 objects.</p> <p><b>Level I AA Students will:</b>  <b>EEK.CC.4.</b> Count one object.</p>
<p><b>K.CC5.</b> Count to answer “how many?” questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.</p>	<p><b>EEK.CC.5.</b> Count out objects, up to three, from a larger set to tell how many.</p>	<p><b>Level IV AA Students will:</b>  <b>EEK.CC.5.</b> Count out 5 objects from a group of more than 5 objects; count a given set of 5 objects, and when asked “how many” say 5 without recounting.  <i>Ex.</i> Given a box of crayons, select 5 crayons as requested by the teacher.</p> <p><b>Level III AA Students will:</b>  <b>EEK.CC.5.</b> Count out up to 3 objects from a larger set, and when asked “how many” say 3 without recounting.  <i>Ex.</i> Given an array of objects, count out 3 of the objects, counting each object only once and tell how many.</p> <p><b>Level II AA Students will:</b>  <b>EEK.CC.5.</b> Count out either 1 or 2 objects from a group of 5 objects.  <i>Ex.</i> Count out two counting bears from a group of 5.</p> <p><b>Level I AA Students will:</b>  <b>EEK.CC.5.</b> Count out 1 object from a group of less than 5 objects.  <i>Ex.</i> Go to the prize box and pick 1 object.</p>

<p><b>Compare numbers.</b></p> <p><b>K.CC.6.</b> Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.<sup>1</sup></p> <p><sup>1</sup> <i>Include groups with up to ten objects.</i></p>	<p><b>EEK.CC.6.</b> Compare the number of objects to determine more or less.</p>	<p><b>Level IV AA Students will:</b> <b>EEK.CC.6.</b> Identify whether the number of objects in one group is more than, less than, or equal to the number of objects in another group. <i>Ex. Given two groups of blocks, one group has eight blocks and the other has five, identify which group has less blocks.</i></p> <p><b>Level III AA Students will:</b> <b>EEK.CC.6.</b> Identify whether the number of objects in one group is more or less (when the quantities are clearly different) in another group.</p> <p><b>Level II AA Students will:</b> <b>EEK.CC.6.</b> Given two groups of different quantities of objects, identify which group has more.</p> <p><b>Level I AA Students will:</b> <b>EEK.CC.6.</b> Given a group of one and a group of ten objects, identify which group has more.</p>
<p><b>K.CC.7.</b> Compare two numbers between 1 and 10 presented as written numerals.</p>	<p><b>EEK.CC.7.</b> Compare numbers 1-10 to determine more, less or equal</p>	<p><b>Level IV AA Students will:</b> <b>EEK.CC.7.</b> Compare sets of two numbers (1-10) to determine more, less or equal.</p> <p><b>Level III AA Students will:</b> <b>EEK.CC.7.</b> Compare two numbers (1-10) to determine more, less or equal.</p> <p><b>Level II AA Students will:</b> <b>EEK.CC.7.</b> Given two numbers (1-10) the student determines which number is more or less.</p> <p><b>Level I AA Students will:</b> <b>EEK.CC.7.</b> Given two numbers, identify which number is more.</p>
<p><b>Operations and Algebraic Thinking</b></p>		
<p><b>Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.</b></p> <p><b>K.OA.1.</b> Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.</p>	<p><b>EEK.OA.1.</b> Represent addition as “putting together” or subtraction as “taking from” in everyday activities.</p>	<p><b>Level IV AA Students will:</b> <b>EEK.OA.1.</b> Represent addition as “putting together” and subtraction as “taking from” with quantities to 10.</p> <p><b>Level III AA Students will:</b> <b>EEK.OA.1.</b> Represent addition as “putting together” and subtraction as “taking from” with quantities to 5.</p> <p><b>Level II AA Students will:</b> <b>EEK.OA.1.</b> Follow directions to “put together” by adding one and “take from” by taking away one.</p> <p><b>Level I AA Students will:</b> <b>EEK.OA.1.</b> Follow directions to “put together” by adding one.</p>

<p><b>K.OA.2.</b> Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings<sup>2</sup> to represent the problem.</p> <p><sup>2</sup> Drawings need not show details, but should show the mathematics in the problem. (This applies wherever drawings are mentioned in the Standards.)</p>	<p><b>EEK.OA.2.</b> Using word problems, represent addition as “putting together” or subtraction as “taking from” in everyday activities.</p>	<p><b>Level IV AA Students will:</b>  <b>EEK.OA.2.</b> Using word problems, represent addition as “putting together” and subtraction as “taking from” with quantities to 10.  <i>Ex. Use objects or drawings to represent the problems.</i></p> <p><b>Level III AA Students will:</b>  <b>EEK.OA.2.</b> Using word problems, represent addition as “putting together” and subtraction as “taking from” with quantities to 5.</p> <p><b>Level II AA Students will:</b>  <b>EEK.OA.2.</b> Using word problems, follow directions to “put together” by adding one and “take from” by taking away 1.</p> <p><b>Level I AA Students will:</b>  <b>EEK.OA.2.</b> Follow directions to “put together” by adding one or “take from” by taking one.</p>
<p><b>K.OA.3.</b> Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., <math>5 = 2 + 3</math> and <math>5 = 4 + 1</math>).</p>	<p><b>EEK.OA.3.</b> Using sums for less than 5, identify sets of addends for the same sum.</p>	<p><b>Level IV AA Students will:</b>  <b>EEK.OA.3.</b> Using sums for less than 5, identify two sets of addends for the same sum.</p> <p><b>Level III AA Students will:</b>  <b>EEK.OA.3.</b> Using sums for less than 5, identify one set of addends.</p> <p><b>Level II AA Students will:</b>  <b>EEK.OA.3.</b> Identify one addend (of two addends), for a sum less than 5.</p> <p><b>Level I AA Students will:</b>  <b>EEK.OA.3.</b> Match addends for a sum less than 3.</p>
<p><b>K.OA.4.</b> For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.</p>	<p><b>EEK.OA.4.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEK.OA.1)</b></p>
<p><b>K.OA.5.</b> Fluently add and subtract within 5.</p>	<p><b>EEK.OA.5.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEK.OA.1)</b></p>
<p><b>Number and Operation Base Ten</b></p>		
<p><b>Work with numbers 11-19 to gain foundations for place value.</b></p> <p><b>K.NBT.1.</b> Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., <math>18 = 10 + 8</math>); understand that these numbers are composed of ten ones and one, two, three, four,</p>	<p><b>EEK.NBT.1.</b> Using numbers from 11-19, identify the tens place value and the ones place value.</p>	<p><b>Level IV AA Students will:</b>  <b>EEK.NBT.1.</b> Using numbers from 11 – 19, identify the tens place value and the ones place value, of more than one number.</p> <p><b>Level III AA Students will:</b>  <b>EEK.NBT.1.</b> Using numbers from 11 – 19, identify the tens place value and the ones place value of one number.</p>


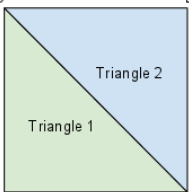
<p>five, six, seven, eight, or nine ones.</p>		<p><b>Level II AA Students will:</b>  <b>EEK.NBT.1.</b> Using numbers from 11 – 19, identify either the tens place value or the ones place value.</p> <p><b>Level I AA Students will:</b>  <b>EEK.NBT.1.</b> Using numbers from 11 – 19, match either the tens place value or the ones place value.</p>
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**Measurement and Data**

<p><b>Describe and compare measurable attributes.</b></p> <p><b>K.MD.1.</b> Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.</p> <p><b>K.MD.2.</b> Directly compare two objects with a measurable attribute in common, to see which object has “more of” / “less of” the attribute, and describe the difference. <i>For example, directly compare the heights of two children and describe one child as taller/shorter.</i></p> <p><b>Classify objects and count the number of objects in each category.</b></p> <p><b>K.MD.3.</b> Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.<sup>3</sup></p> <p><sup>3</sup> <i>Limit category counts to be less than or equal to 10.</i></p>	<p><b>EEK.MD.1-3.</b>  Classify objects according to attributes (big/small, heavy/light).</p>	<p><b>Level IV AA Students will:</b>  <b>EEK.MD.1-3.</b> Order objects according to their attributes (big/smaller/smallest, heavy/lighter/lightest).</p> <p><b>Level III AA Students will:</b>  <b>EEK.MD.1-3.</b> Classify objects according to their attributes (big/small, heavy/light).</p> <p><b>Level II AA Students will:</b>  <b>EEK.MD.1-3.</b> Using a model or a template, sort objects by one attribute (big/small or heavy/light).</p> <p><b>Level I AA Students will:</b>  <b>EEK.MD.1-3.</b> Match objects by one attribute, big and small.</p>
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**Geometry**

<p><b>Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).</b></p> <p><b>K.G.1.</b> Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as <i>above, below, beside, in front of, behind, and next to.</i></p>	<p><b>EEK.G.1.</b> Identify shapes and describe positions.</p>	<p><b>Level IV AA Students will:</b>  <b>EEK.G.1.</b> Describe objects in the environment using names of shapes and the relative position of objects using the terms in, on, out, under, and off.</p> <p><b>Level III AA Students will:</b>  <b>EEK.G.1.</b> Describe objects in the environment using names of shapes and identifying the relative position of objects using the terms in, on, out, under, and off.</p> <p><b>Level II AA Students will:</b>  <b>EEK.G.1.</b> Imitate a teacher model of two shapes and their relative position.</p> <p><b>Level I AA Students will:</b>  <b>EEK.G.1.</b> Match / copy a teacher model of two shapes and their relative position.</p>
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<p><b>K.G.2.</b> Correctly name shapes regardless of their orientations or overall size.</p> <p><b>K.G.3.</b> Identify shapes as two-dimensional (lying in a plane, “flat”) or three- dimensional (“solid”).</p> <p><b>Analyze, compare, create, and compose shapes.</b></p> <p><b>K.G.4.</b> Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices / “corners”) and other attributes (e.g., having sides of equal length).</p>	<p><b>EEK.G.2-4.</b> Correctly name shapes regardless of their orientations or overall size.</p>	<p><b>Level IV AA Students will:</b> <b>EEK.G.2-4.</b> Correctly name shapes regardless of their dimensions, orientations, or overall size.</p> <p><b>Level III AA Students will:</b> <b>EEK.G.2-4.</b> Correctly sort two-dimensional shapes regardless of their orientations, or overall size.</p> <p><b>Level II AA Students will:</b> <b>EEK.G.2-4.</b> Correctly match shapes regardless of their dimensions, orientations, or overall size.</p> <p><b>Level I AA Students will:</b> <b>EEK.G.2-4.</b> Match a shape regardless of its dimensions, orientation, or overall size.</p>
<p><b>K.G.5.</b> Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.</p>	<p><b>EEK.G.5.</b> Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.</p>	<p><b>Level IV AA Students will:</b> <b>EEK.G.5.</b> Model 4 shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.</p> <p><b>Level III AA Students will:</b> <b>EEK.G.5.</b> Model 2 shapes in the world by building shapes from components (e.g., sticks and clay balls) or drawing shapes.</p> <p><b>Level II AA Students will:</b> <b>EEK.G.5.</b> Model a shape in the world by building a shape from components (e.g., sticks and clay balls) or drawing the shape.</p> <p><b>Level I AA Students will:</b> <b>EEK.G.5</b> Match a shape in the world by building a shape from components (e.g., sticks and clay balls).</p>
<p><b>K.G.6.</b> Compose simple shapes to form larger shapes. <i>For example, “Can you join these two triangles with full sides touching to make a rectangle?”</i></p>	<p><b>EEK.G.6.</b> Compose simple shapes to form larger shapes. For example, “<i>Can you join these two triangles with full sides touching to make a rectangle?”</i>”</p>	<p><b>Level IV AA Students will:</b> <b>EEK.G.6.</b> Using 2, 3, and 4 equally-shaped parts, combine these simple shapes to form larger shapes.</p> <p><b>Level III AA Students will:</b> <b>EEK.G.6.</b> Using 2 and 4 equally-shaped parts, combine these simple shapes to form larger shapes.</p> <p><b>Level II AA Students will:</b> <b>EEK.G.6.</b> Match a model of 2 or 4 equally-shaped parts to form a larger shape.</p> <p><b>Level I AA Students will:</b> <b>EEK.G.6.</b> Match a model of 2 equally-shaped parts to form a larger shape.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>

# 2014 WYOMING MATHEMATICS STANDARDS EXTENSIONS AND ACHIEVEMENT DESCRIPTORS FOR FIRST GRADE

## First Grade Mathematics Standards

2012 WY Mathematics Content Standards	2014 Wyoming Content Standards Extensions	Instructional Achievement Level Descriptor
<b>Operations and Algebraic Thinking</b>		
<p><b>Represent and solve problems involving addition and subtraction.</b></p> <p><b>1.OA.1.</b> Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.<sup>1</sup></p> <p><sup>1</sup> See Glossary, Table 1.</p>	<p><b>EE1.OA.1.</b> When solving problems with sums up to 10, students will determine the math functions of putting together and taking apart.</p>	<p><b>Level IV AA Students will:</b>  <b>EE1.OA.1.</b> When solving word problems with sums up to 20, students will determine the math functions of putting together and taking apart.</p> <p><b>Level III AA Students will:</b>  <b>EE1.OA.1.</b> When solving problems with sums up to 10, students will determine the math functions of putting together and taking apart.  <i>Ex.</i> After the teacher shows 6 blocks and removes 2, label the action as “take away” or informal language with the same meaning.</p> <p><b>Level II AA Students will:</b>  <b>EE1.OA.1.</b> Demonstrate putting together or taking away.  <i>Ex.</i> Take away 1 crayon from the box.</p> <p><b>Level I AA Students will:</b>  <b>EE1.OA.1.</b> Follow directions to put together.</p>
<p><b>1.OA.2.</b> Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.</p>	<p><b>EE1.OA.2.</b> Use “putting together” to solve problems with two sets.</p>	<p><b>Level IV AA Students will:</b>  <b>EE1.OA.2.</b> Use “putting together” to solve problems using 3 sets.</p> <p><b>Level III AA Students will:</b>  <b>EE1.OA.2.</b> Use “putting together” to solve problems with 2 sets.</p> <p><b>Level II AA Students will:</b>  <b>EE1.OA.2.</b> Use “putting together” to solve a problem with one set and adding one more.</p> <p><b>Level I AA Students will:</b>  <b>EE1.OA.2.</b> Indicate 2 equal sets.</p>
<p><b>Understand and apply properties of operations and the relationship between addition and subtraction.</b></p> <p><b>1.OA.3.</b> Apply properties of operations as strategies to add and subtract.<sup>2</sup> Examples: <i>If <math>8 + 3</math></i></p>	<p><b>EE1.OA.3.</b> Add more to a group to show both groups have the same or equal quantity.</p>	<p><b>Level IV AA Students will:</b>  <b>EE1.OA.3.</b> Create 2 groups that have the same or equal quantity.  <i>Ex.</i> Fill 2 book bags with 5 books each.</p> <p><b>Level III AA Students will:</b>  <b>EE1.OA.3.</b> Add more to a group to show both groups have the same or equal quantity.</p>

<p><math>= 11</math> is known, then <math>3 + 8 = 11</math> is also known. (Commutative property of addition.) To add <math>2 + 6 + 4</math>, the second two numbers can be added to make a ten, so <math>2 + 6 + 4 = 2 + 10 = 12</math>. (Associative property of addition.)</p> <p><sup>2</sup> Students need not use formal terms for these properties.</p>		<p><b>Level II AA Students will:</b>  <b>EE1.OA.3.</b> Recognize 2 groups that have the same or equal quantity.  Ex. When presented with 2 groups of items, indicate if they have the same quantity. "Are they equal?"</p> <p><b>Level I AA Students will:</b>  <b>EE1.OA.3.</b> Match 2 groups of equal objects.  Ex. Given 2 blocks and shown a model of 2 blocks together, duplicate the model.</p>
<p><b>1.OA.4.</b> Understand subtraction as an unknown-addend problem. For example, subtract <math>10 - 8</math> by finding the number that makes 10 when added to 8.</p>	<p><b>EE1.OA.4.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EE1.OA.5.b)</p>
<p><b>Add and subtract within 20.</b></p> <p><b>1.OA.5.</b> Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).</p>	<p><b>EE1.OA.5.a.</b> Use manipulatives or visual representations to indicate the number that results when <b>adding</b> one more.</p> <p><b>EE1.OA.5.b.</b> Use manipulatives or visual representations to indicate the number that results when <b>subtracting</b> one less.</p>	<p><b>Level IV AA Students will:</b>  <b>EE1.OA.5.a.</b> Indicate the numeral that results when adding more to the known addend of sums, up to 20.  <b>EE1.OA.5.b.</b> Indicate the numeral that results when subtracting any number within 20.</p> <p><b>Level III AA Students will:</b>  <b>EE1.OA.5.a.</b> Use manipulatives or visual representations to indicate the numeral that results when adding more to the known addend of sums, up to 20.  <b>EE1.OA.5.b.</b> Use manipulatives or visual representations to indicate the numeral that results when subtracting any number within 20.</p> <p><b>Level II AA Students will:</b>  <b>EE1.OA.5.a.</b> With manipulatives or visual representation, indicate the number that results when adding one more to any number, from 5 to 20.  <b>EE1.OA.5.b.</b> With manipulatives or visual representation, indicate the numeral that results when subtracting one from any number, from 5 to 20.</p> <p><b>Level I AA Students will:</b>  <b>EE1.OA.5.a.</b> With manipulatives, indicate the number that results when adding one more to any number up to 5.  <b>EE1.OA.5.b.</b> With manipulatives, indicate the numeral that results when subtracting one from any number up to 5.</p>
<p><b>1.OA.6.</b> Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., <math>8+6=8+2+4=10+4=14</math>); decomposing a number leading to a ten (e.g., <math>13-4=13-3-1=10-1=9</math>); using the relationship between addition and subtraction (e.g., knowing that <math>8+4=12</math>, one knows <math>12-8=4</math>); and creating equivalent but easier or known sums (e.g., adding <math>6+7</math> by creating the known equivalent <math>6+6+1=12+1=13</math>).</p>	<p><b>EE1.OA.6.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EE1.OA.5.a-b.)</p>
<p><b>Work with addition and subtraction equations.</b></p>	<p><b>EE1.OA.7-8.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard</p>



<p><b>1.OA.7.</b> Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. <i>For example, which of the following equations are true and which are false? <math>6=6</math>, <math>7=8-1</math>, <math>5+2=2+5</math>, <math>4+1=5+2</math>.</i></p> <p><b>1.OA.8.</b> Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. <i>For example, determine the unknown number that makes the equation true in each of the equations <math>8+?=11</math>, <math>5=\square-3</math>, <math>6+6=\square</math>.</i></p>		<p>that are appropriate for this population and/or they have been covered in previous standards. (See EE1.OA.3.)</p>
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**Number and Operations Base Ten**

<p><b>Extend the counting sequence.</b></p> <p><b>1.NBT.1.</b> Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.</p>	<p><b>EE1.NBT.1.a.</b> Count by ones.</p> <p><b>EE1.NBT.1.b.</b> Count as many as 10 objects and represent the quantity with the corresponding numeral.</p>	<p><b>Level IV AA Students will:</b>  <b>EE1.NBT.1.a.</b> Count by ones from 1 – 30.  <i>Ex. Recite the count sequence 1 – 30.</i>  <i>Ex. Sing numbers to 30.</i>  <b>EE1.NBT.1.b.</b> Count up to 20 objects and represent the quantity with a numeral.</p> <p><b>Level III AA Students will:</b>  <b>EE1.NBT.1.a.</b> Count by ones 1 – 20.  <i>Ex. Recite the count sequence 1 – 20.</i>  <i>Ex. Sing numbers to 20.</i>  <b>EE1.NBT.1.b.</b> Count as many as 10 objects and represent the quantity with the corresponding numeral.  <i>Ex. The teacher will show the student numeral nine and ask them to give them that many blocks.</i>  <i>Ex. When shown the number 5, count 5 crayons.</i></p> <p><b>Level II AA Students will:</b>  <b>EE1.NBT.1.a.</b> Count by ones 1 – 10.  <i>Ex. Participate in a classroom chant 1 – 10.</i>  <i>Ex. Recite numbers 1 – 10.</i>  <i>Ex. Sing numbers 1 – 10.</i>  <b>EE1.NBT.1.b.</b> Count as many as 5 objects and/or represent the quantity with the appropriate numeral.  <i>Ex. Tap objects while counting.</i></p> <p><b>Level I AA Students will:</b>  <b>EE1.NBT.1.a.</b> Count by ones from 1 to 2.  <i>Ex. Sing numbers up to two with the teacher.</i>  <i>Ex. Count along using a voice output communicative device that will count in order (1-2) upon each activation.</i>  <b>EE1.NBT.1.b.</b> Count up to 2 objects.</p>
<p><b>Understand place value.</b></p> <p><b>1.NBT.2.</b> Understand that the two digits of a two-</p>	<p><b>EE1.NBT.2.</b> Create sets of 10.</p>	<p><b>Level IV AA Students will:</b>  <b>EE1.NBT.2.</b> Create multiple sets of ten with an odd number of objects (remainders).</p>

<p>digit number represent amounts of tens and ones. Understand the following as special cases:</p> <p><b>a.</b> 10 can be thought of as a bundle of ten ones – called a “ten.”</p> <p><b>b.</b> The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.</p> <p><b>c.</b> The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).</p>		<p><b>Level III AA Students will:</b>  <b>EE1.NBT.2.</b> Create sets of 10.</p> <p><b>Level II AA Students will:</b>  <b>EE1.NBT.2.</b> Create one set of 10.  <i>Ex.</i> The instructor creates one set of 10 using a jig, model, or template for the student to match another set of 10.</p> <p><b>Level I AA Students will:</b>  <b>EE1.NBT.2.</b> Match a given set of 10 to another set of 10.</p>
<p><b>1.NBT.3.</b> Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols <math>&gt;</math>, <math>=</math>, and <math>&lt;</math>.</p>	<p><b>EE1NBT.3.</b>  Compare two groups of items (10 or fewer) when the quantity of items in each group is similar.</p>	<p><b>Level IV AA Students will:</b>  <b>EE1.NBT.3.</b> Choose the set of items that are more than 10 and less than 10 when the sets differ by 3 or fewer.  <i>Ex.</i> Given two stacks of blocks, which has more than 10, which has less than 10?</p> <p><b>Level III AA Students will:</b>  <b>EE1.NBT.3.</b> Compare two groups of 10 or fewer items when the quantity of items in each group is similar.</p> <p><b>Level II AA Students will:</b>  <b>EE1.NBT.3.</b> Choose the matching set of items (4-8 items).  <i>Ex.</i> Given three pencil boxes, identify which two pencil boxes contain the same number of items.</p> <p><b>Level I AA Students will:</b>  <b>EE1.NBT.3.</b> Choose the matching set of items (1-3 items).</p>
<p><b>Use place value understanding and properties of operations to add and subtract.</b></p> <p><b>1.NBT.4.</b> Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.</p>	<p><b>EE1NBT.4.</b>  Create sets of ten.</p>	<p><b>Level IV AA Students will:</b>  <b>EE1.NBT.4.</b> Create sets of ten.  <i>Ex.</i> Given a bowl of pennies, make sets of 10 with different numbers of pennies.  <i>Ex.</i> Given lanyards or string and two colors of beads, create bracelets with varying combinations of 10 colored beads. (One bracelet with 10 blue beads, one bracelet with five blue beads, five red beads, etc.).</p> <p><b>Level III AA Students will:</b>  <b>EE1.NBT.4.</b> Create sets of ten.</p> <p><b>Level II AA Students will:</b>  <b>EE1.NBT.4.</b> Match sets of ten to teacher models.</p> <p><b>Level I AA Students will:</b>  <b>EE1.1NBT.4.</b> Match a set of five to a teacher model.</p>
<p><b>1.NBT.5.</b> Given a two-digit number, mentally find 10 more or 10 less than the number, without having a count; explain the reasoning used.</p>	<p><b>EE1.NBT.5.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard.</b></p>
<p><b>1.NBT.6.</b> Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or</p>	<p><b>EE1.NBT.6.</b>  Decompose numbers less than</p>	<p><b>Level IV AA Students will:</b>  <b>EE1.NBT.6.</b> Decompose numbers less than or equal to 10 in more than one way.  <i>Ex.</i> Given 10 or fewer bean bags and two baskets, toss bean bags into baskets, creating different sets each time</p>

<p>drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.</p>	<p>or equal to 10 in one way.</p>	<p>using a dry erase board to track quantities. Ex. Given 10 or fewer counting blocks, arrange them into two different group combinations.</p> <p><b>Level III AA Students will:</b> <b>EE1.NBT.6.</b> Decompose numbers less than or equal to 10 in one way.</p> <p><b>Level II AA Students will:</b> <b>EE1.NBT.6.</b> Decompose numbers less than or equal to 10 using a teacher model.</p> <p><b>Level I AA Students will:</b> <b>EE1.NBT.6.</b> Decompose numbers less than or equal to 5 using a teacher model.</p>
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**Measurement and Data**

<p><b>Measure lengths indirectly and by iterating length units.</b></p> <p><b>1.MD.1.</b> Order three objects by length; compare the lengths of two objects indirectly by using a third object.</p> <p><b>1.MD.2</b> Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. <i>Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.</i></p>	<p><b>EE1.MD.1-2.</b> Use appropriate vocabulary to describe the length of an object using the language of longer / shorter, taller / shorter.</p>	<p><b>Level IV AA Students will:</b> <b>EE1.MD.1-2.</b> Measure and compare two similar objects aligned at the same starting point, and describe which is longer / shorter, taller / shorter. <i>Ex. Indicate who is taller and who is shorter when two students stand side-by-side. Ex. Measure the height of their desks and the height of the teacher’s desk with interlocking cubes and then lay them down horizontally side-by-side on a table to compare.</i></p> <p><b>Level III AA Students will:</b> <b>EE1.MD.1-2.</b> Use appropriate vocabulary to describe the length of an object using the language of longer/shorter, taller/shorter. <i>Ex. Given two pieces of string placed side-by-side, use “longer” and “shorter” to describe their relative lengths (e.g., “Look at these two objects and tell me about their length.”).</i></p> <p><b>Level II AA Students will:</b> <b>EEK.MD.1-2.</b> Select from two everyday objects based on the stated attribute (long/short, tall/short). <i>Ex. Using a model, select the one that is shorter from two options (e.g., using two sets of pictures the teacher says “Here are two boys. This one is shorter.” “Here are two dogs. Show me the shorter one.”).</i></p> <p><b>Level I AA Students will:</b> <b>EE1.MD.1-2.</b> When presented with a manipulatives, demonstrate long and short. <i>Ex. When presented with a model, use clay to make a “long snake and a short snake” and compare them. Ex. First sit and then stand to explore short and tall (e.g., Stand up; Now you are tall. Sit down; Now you are short.)</i></p>
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<p><b>Tell and write time.</b></p> <p><b>1.MD.3.</b> Tell and write time in hours and half-hours using analog and digital clocks.</p>	<p><b>EE1.MD.3.a.</b> Demonstrate an understanding of the terms “tomorrow, yesterday, and today.”</p>	<p><b>Level IV AA Students will:</b> <b>EE1.MD.3.a.</b> Use the words “today, tomorrow, and yesterday” with a calendar to refer to personal activities and events. <i>Ex. Using the lunch menu, answer questions such as, “What did you have for lunch yesterday?”, “What did you eat today?”, and “What will you have tomorrow?” Ex. If today is Monday, what day is tomorrow?</i></p> <p><b>EE1.MD.3.b.</b> Demonstrate an understanding of telling time with a clock or watch related to real-life context.</p>
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	<p><b>EE1.MD.3.b.</b> Demonstrate an understanding that telling time is the same every day.</p>	<p><i>Ex.</i> Match noon on an analog clock to lunch. <i>Ex.</i> Match the current time on a clock with the appropriate activity from a picture schedule.</p> <p><b>Level III AA Students will:</b> <b>EE1.MD.3.a.</b> Demonstrate understanding of the terms “tomorrow, yesterday, and today.” <i>Ex.</i> Given a classroom calendar, find a picture of an activity that fits with “What happens tomorrow?” <i>Ex.</i> Given a calendar, find “Today” and place a sticker on it. <i>Ex.</i> Use a calendar to determine the day before and the day after today. <i>Ex.</i> If today is Tuesday, what is tomorrow? <b>EE1.MD.3.b.</b> Demonstrate an understanding that time is the same every day. <i>Ex.</i> Teacher announces “time to go home” and asks, “Does this happen every morning or every afternoon?”</p> <p><b>Level II AA Students will:</b> <b>EE1.MD.3.a.</b> Indicate understanding of the term today. <i>Ex.</i> When asked, identify today. <i>Ex.</i> When shown two picture cards of daily activities, select the event that happens today. <i>Ex.</i> During calendar activity, answer the question, “Show me today on the calendar. What is the weather like today?” <b>EE1.MD.3.b.</b> Demonstrate an understanding of the use of a clock (time). <i>Ex.</i> Indicate the use of a clock when asked what tool is needed to tell time.</p> <p><b>Level I AA Students will:</b> <b>EE1.MD.3.a.</b> Identify an activity that will take place “today.” <i>Ex.</i> Look at visual schedule and using picture symbol, indicate the music symbol to represent the current activity. <b>EE1.MD.3.b.</b> Recognize representations of different parts of the day; morning, noon, and night. <i>Ex.</i> Point to a picture of a bed when prompted. <i>Ex.</i> Point to a picture of a sunrise when prompted. <i>Ex.</i> Point to a clock when prompted.</p>
<p><b>Represent and interpret data.</b></p> <p><b>1.MD.4</b> Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.</p>	<p><b>EE1.MD.4.</b> Interpret data in two categories to determine whether there are more or less in each category.</p>	<p><b>Level IV AA Students will:</b> <b>EE1.MD.4.</b> Collect and count data into at least two categories to determine whether there are more or less in one category than in another. <i>Ex.</i> Collect data about class choices and categorize the count to determine which is the favorite e.g., hot lunch choices, milk choices, or any activity where you are counting and tallying in two or more choices.</p> <p><b>Level III AA Students will:</b> <b>EE1.MD.4.</b> Given a count of the total number of data points in two categories, determine whether there are more or less in each category.</p> <p><b>Level II AA Students will:</b> <b>EE1.MD.4.</b> Put objects and choices into categories. <i>Ex.</i> Tape a paper doll to an attendance chart to represent oneself (e.g., Each girl has a paper doll representing “girl” and each boy has one representing “boy.” After students tape their dolls to the attendance chart, the teacher counts the number of boys and the number of girls on the chart.).</p>

		<p><b>Level I AA Students will:</b>  <b>EE1.MD.4.</b> Participate in data collection by voting or otherwise choosing.  <i>Ex.</i> Indicate pencil or crayon when asked, “Do you like pencils or crayons better?”</p>
<b>Geometry</b>		
<p><b>Reason with shapes and their attributes.</b></p> <p><b>1.G.1</b> Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.</p> <p><b>1.G.2.</b> Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.<sup>3</sup></p> <p><sup>3</sup> <i>Students do not need to learn formal names such as “right rectangular prism.”</i></p>	<p><b>EE1.G.1-2.</b> Identify common two-dimensional shapes: square, circle, triangle, and rectangle.</p>	<p><b>Level IV AA Students will:</b>  <b>EE1.G.1-2.</b> Identify attributes of common two-dimensional shapes: square, circle, triangle, and rectangle.  <i>Ex.</i> Given shapes of different sizes and orientations, sort by shape attribute.</p> <p><b>Level III AA Students will:</b>  <b>EE1.G.1-2.</b> Identify common two-dimensional shapes: square, circle, triangle, and rectangle.  <i>Ex.</i> Given an array of shapes, identify the shape when asked.</p> <p><b>Level II AA Students will:</b>  <b>EE1.G.1-2.</b> Match shape to shape.  <i>Ex.</i> Match a two-dimensional shape to a two-dimensional shape in their environment.</p> <p><b>Level I AA Students will:</b>  <b>EE1.G.1-2.</b> Recognize a shape.  <i>Ex.</i> Given a circle and asked “Show me the circle,” point to the circle.</p> <div data-bbox="2136 316 2526 584" style="text-align: center;"> </div>
<p><b>1.G.3.</b> Partition circles and rectangles into two and four equal shares, describe the shares using the words <i>halves</i>, <i>fourths</i>, and <i>quarters</i>, and use the phrases <i>half of</i>, <i>fourth of</i>, and <i>quarter of</i>. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.</p>	<p><b>EE1.G.3.</b> Put together pieces to make a shape that relates to the whole (i.e., two semicircles to make a circle, two squares to make a rectangle).</p>	<p><b>Level IV AA Students will:</b>  <b>EE1.G.3.</b> Demonstrate part and whole terminology understanding.  <i>Ex.</i> Given an array of different shapes such as tangrams or pattern blocks, select and put them together to make a circle, square, or triangle.</p> <p><b>Level III AA Students will:</b>  <b>EE1.G.3.</b> Put together pieces to make a shape that relates to the whole (i.e., two semicircles to make a circle, two squares to make a rectangle).</p> <p><b>Level II AA Students will:</b>  <b>EE1.G.3.</b> Using a template or a model, put together 2 pieces.  <i>Ex.</i> Using an inset puzzle as a model, put together a whole circle from half circle puzzle parts.</p> <p><b>Level I AA Students will:</b>  <b>EE1.G.3.</b> Using a two-piece template or a model, insert the missing piece.  <i>Ex.</i> Use a touch window to click and drag a shape from the shape bank to insert into the outline of a picture.  <i>Ex.</i> Using an one-shape puzzle, insert the missing piece.</p> <div data-bbox="2217 885 2540 1185" style="text-align: center;"> </div>

# 2014 WYOMING MATHEMATICS STANDARDS EXTENSIONS AND ACHIEVEMENT DESCRIPTORS FOR SECOND GRADE

## Second Grade Mathematics Standards

2012 WY Mathematics Content Standards	2014 Wyoming Content Standards Extensions	Instructional Achievement Level Descriptor
<b>Operations and Algebraic Thinking</b>		
<p><b>Represent and solve problems involving addition and subtraction.</b></p> <p><b>2.OA.1.</b> Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.<sup>1</sup></p> <p><sup>1</sup> See Glossary, Table 1.</p> <p><b>Add and subtract within 20.</b></p> <p><b>2.OA.2.</b> Fluently add and subtract within 20 using mental strategies.<sup>2</sup> By end of Grade 2, know from memory all sums of two one-digit numbers.</p> <p><sup>2</sup> See standard 1.OA.6 for a list of mental strategies.</p>	<p><b>EE2.OA.1-2.</b> Use language to describe aspects of addition and subtraction such as putting together and taking apart.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.OA.1-2.</b> Add and subtract to solve real-world one-step story problems from 0 – 20 when any number in the problem is unknown (result, start, change, difference).</p> <p><b>Level III AA Students will:</b>  <b>EE2.OA.1-2.</b> Add and subtract to solve real-world one-step story problems from 0 – 20 when the result is unknown.  <i>Ex.</i> Given concrete objects, represent and solve a story problem with addition or subtraction with the unknown as the result.</p> <p><b>Level II AA Students will:</b>  <b>EE2.OA.1-2.</b> Given the equation, add to solve real-world one-step story problems from 0 – 10.</p> <p><b>Level I AA Students will:</b>  <b>EE2.OA.1-2.</b> Given a story problem and concrete representations of the objects point to the correct object(s).  <i>Ex.</i> Given a felt board story problem about Johnny Appleseed and when asked, “what you are adding?” indicate apples.</p>
<p><b>Work with equal groups of objects to gain foundations for multiplication.</b></p> <p><b>2.OA.3</b> Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.</p>	<p><b>EE2.OA.3.</b> Equally distributes even numbers of objects between two groups.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.OA.3.</b> Determine that a quantity of objects is even or odd by separating them into two groups.  <i>Ex.</i> Given X quantity of objects, distribute them into 2 groups. Indicate that if there are leftovers, the quantity is odd and if the quantity divides evenly, the number is even.</p> <p><b>Level III AA Students will:</b>  <b>EE2.OA.3.</b> Equally distribute even numbers of objects between 2 groups.  <i>Ex.</i> Distribute 8 objects equally between 2 boxes and count the total number of objects in each box.</p> <p><b>Level II AA Students will:</b>  <b>EE2.OA.3.</b> Separate objects into 2 groups and indicate “how many” are in each group.</p> <p><b>Level I AA Students will:</b>  <b>EE2.OA.3.</b> Make 2 groups of 2.  <i>Ex.</i> Given a group of 4 objects, 2 each of 2 unlike objects (e.g., a ball and a box), separate them into 2 groups of 2 with like objects in each group.</p>

<p><b>2.OA.4.</b> Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.</p>	<p><b>EE2.OA.4.</b> Use addition to find the total number of objects arranged within equal groups up to a total of 10.</p>	<p><b>Level IV AA Students will:</b>  <b>EE.2.OA.4.</b> Use addition to find the total number of objects arranged within equal groups that total above 10.  <i>Ex.</i> Using paper plates, put equal amounts of objects on each plate (1 – 6), and combine and solve for the total number of objects.</p> <p><b>Level III AA Students will:</b>  <b>EE.2.OA.4.</b> Use addition to find the total number of objects arranged within equal groups up to a total of 10.  <i>Ex.</i> Add 2 equal groups of objects (such as counting bears) to get a total.</p> <p><b>Level II AA Students will:</b>  <b>EE2.OA.4.</b> Use addition to find the total number of objects arranged within equal groups up to a total of 6.  <i>Ex.</i> Add 2 equal groups of objects (such as counting bears) to get a total.</p> <p><b>Level I AA Students will:</b>  <b>EE2.OA.4</b> Use addition to find the total number of objects arranged within equal groups up to a total of 4.  <i>Ex.</i> Add 2 equal groups of objects (such as counting bears) to get a total.</p>
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**Number and Operations Base Ten**

<p><b>Understand place value.</b></p> <p><b>2.NBT.1.</b> Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:  <i>a.</i> 100 can be thought of as a bundle of ten tens — called a “hundred.”  <i>b.</i> The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).</p>	<p><b>EE2.NBT.1.</b> Represent numbers through 30 with sets of tens and ones.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.NBT.1.</b> Put numbers through 30 into sets of tens and ones.  <i>Ex.</i> Given a picture of 24 objects, indicate/circle two groups of 10 and four ones. Tell how many tens there are and how many ones there are.</p> <p><b>Level III AA Students will:</b>  <b>EE2.NBT.1.</b> Represent numbers through 30 with sets of tens and ones with objects in columns or arrays.  <i>Ex.</i> Given popsicle sticks less than or equal to 30, make groups of tens and ones.</p> <p><b>Level II AA Students will:</b>  <b>EE2.NBT.1.</b> Given a template, indicate that 10 ones equals one set of 10.</p> <p><b>Level I AA Students will:</b>  <b>EE2.NBT.1.</b> When given two options, choose the correct one that represents 10 ones.</p>
<p><b>2.NBT.2.</b> Count within 1000; skip-count by 5s, 10s, and 100s.</p>	<p><b>EE2.NBT.2.</b> Count by ones.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.NBT.2.</b> Count by ones beyond 30.</p> <p><b>Level III AA Students will:</b>  <b>EE2.NBT.2.</b> Count by ones from 1 to 30.</p> <p><b>Level II AA Students will:</b>  <b>EE2.NBT.2.</b> Count by ones from 1 to 20.</p>


		<p><b>Level I AA Students will:</b>  <b>EE2.NBT.2.</b> Repeat a sequence of 10 numbers between 1 and 30.</p>
<p><b>2.NBT.3.</b> Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.</p>	<p><b>EE2.NBT.3.</b> Identify number symbols 1 to 30.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.NBT.3.</b> Express number symbols beyond 30.</p> <p><b>Level III AA Students will:</b>  <b>EE2.NBT.3.</b> Identify number symbols from 1 to 30.</p> <p><b>Level II AA Students will:</b>  <b>EE2.NBT.3.</b> Identify number symbols from 1 to 10.</p> <p><b>Level I AA Students will:</b>  <b>EE2.NBT.3.</b> Differentiate between numbers and letters.</p>
<p><b>2.NBT.4.</b> Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols to record the results of comparisons.</p>	<p><b>EE2.NBT.4.</b> Compare sets of objects and numbers using appropriate vocabulary (more, less, equal).</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.NBT.4.</b> Compare sets of objects and numbers using appropriate vocabulary (equal, more, or less) with two or fewer units.  <i>Ex.</i> When given 2 reward strips with stickers two or less units apart, determine which strip has more reward stickers on it?</p> <p><b>Level III AA Students will:</b>  <b>EE2.NBT.4.</b> Compare sets of objects and numbers using appropriate vocabulary (more, less, equal).</p> <p><b>Level II AA Students will:</b>  <b>EE2.NBT.4.</b> Determine equality of sets of objects using appropriate vocabulary (equal).</p> <p><b>Level I AA Students will:</b>  <b>EE2.NBT.4.</b> Match groups of objects.</p>
<p><b>Use place value understanding and properties of operations to add and subtract.</b></p> <p><b>2.NBT.5.</b> Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.</p>	<p><b>EE2.NBT.5.</b> Identify the meaning of the “(+)” sign (i.e., combine, plus, add), and the “(=)” sign (equal).</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.NBT.5.</b> Identify the meaning of the (+) sign (i.e., combine, plus, add), the (=) sign (equal), and the (-) sign (minus, take away, less).  <i>Ex.</i> Given a subtraction equation, place the minus sign and the equal sign in the correct places.</p> <p><b>Level III AA Students will:</b>  <b>EE2.NBT.5.</b> Identify the meaning of the (+) sign (i.e., combine, plus, add), and the (=) sign (equal).</p> <p><b>Level II Students will:</b>  <b>EE2.NBT.5.</b> Recognize the (+), (-), and (=) signs.</p> <p><b>Level I AA Students will:</b>  <b>EE2.NBT.5.</b> Match the (+) and (=) signs.</p>




<p><b>2.NBT.6.</b> Add up to four two-digit numbers using strategies based on place value and properties of operations.</p> <p><b>2.NBT.7.</b> Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.</p> <p><b>2.NBT.8.</b> Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.</p> <p><b>2.NBT.9.</b> Explain why addition and subtraction strategies work, using place value and the properties of operations.<sup>3</sup></p> <p><sup>3</sup> Explanations may be supported by drawings or objects.</p>	<p><b>EE2.NBT.6-9.</b> Use objects, representations, and numbers (0-20) to add and subtract.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.NBT.6-9.</b> Use objects, representations, and numbers beyond 20 to add and subtract.</p> <p><b>Level III AA Students will:</b>  <b>EE2.NBT.6-9.</b> Use objects, representations, and numbers (0 – 20) to add and subtract.</p> <p><b>Level II AA Students will:</b>  <b>EE2.NBT.6-9.</b> Use objects, representations, and numbers (0 – 10) to add or subtract.</p> <p><b>Level I AA Students will:</b>  <b>EE2.NBT.6-9.</b> Count objects 1 – 10.</p>
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**Measurement and Data**

<p><b>Measure and estimate lengths in standard units.</b></p> <p><b>2.MD.1.</b> Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.</p> <p><b>2.MD.2.</b> Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.</p>	<p><b>EE2.MD.1-2.</b> Measure the length of objects using standard units.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.MD.1-2.</b> Measure the length of objects using standard tools, such as rulers, yardsticks, and meter sticks.</p> <p><b>Level III AA Students will:</b>  <b>EE2.MD.1-2.</b> Measure the length of objects using non-standard units.  <i>Ex.</i> Count the tiles on the floor to see how many there are from the door of the classroom to the drinking fountain.</p> <p><b>Level II AA Students will:</b>  <b>EE2.MD.1-2.</b> Begin to measure from an end point using a non-standard tool.  <i>Ex.</i> Lay nine cubes end-to-end next to a book to see how long the book is.</p> <p><b>Level I AA Students will:</b>  <b>EE2.MD.1-2.</b> Match objects of like length.  <i>Ex.</i> Given 3 pieces of paper of different length, such as 2 short and 1 long, match the two similar length objects.</p>
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<p><b>2.MD.3.</b> Estimate lengths using units of inches, feet, centimeters, and meters.</p> <p><b>2.MD.4</b> Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.</p>	<p><b>EE2.MD.3-4.</b> Order by length using standard units.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.MD.3-4.</b> Use standard units to measure the length of objects (i.e., paperclips, blocks).</p> <p><b>Level III AA Students will:</b>  <b>EE2.MD.3-4.</b> Use non-standard units to measure the length of objects (i.e., paperclips, blocks).</p> <p><b>Level II AA Students will:</b>  <b>EE2.MD.3-4.</b> Order by length using non-standard units.  <i>Ex.</i> Given three non-standard units of measurement, such as a paperclip, index card, and construction paper, order them by length from shortest to longest.</p> <p><b>Level I AA Students will:</b>  <b>EE2.MD.3-4.</b> Compare an item to a model that is shorter or longer.</p>
<p><b>Relate addition and subtraction to length.</b></p> <p><b>2.MD.5.</b> Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.</p>	<p><b>EE2.MD.5.</b> Increase or decrease length by adding or subtracting unit(s).</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.MD.5.</b> Increase or decrease length by adding or subtracting multiple units.  <i>Ex.</i> Given a chain of 10 pop-beads, decrease the length by removing four beads.</p> <p><b>Level III AA Students will:</b>  <b>EE1.MD.5.</b> Given a count of the total number of data points in two categories, determine whether there are more or less in each category.  <i>Ex.</i> Given a string of three pop-beads, add one to make it longer (a length of four pop-beads).</p> <p><b>Level II AA Students will:</b>  <b>EE2.MD.5.</b> Increase length by adding a single unit.</p> <p><b>Level I AA Students will:</b>  <b>EE2.MD.5.</b> Compare two objects and determine which is longer.  <i>Ex.</i> Given a piece of string 12 inches long and a piece of string two inches long, determine which is longer.</p> 
<p><b>2.MD.6.</b> Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.</p>	<p><b>EE2.MD.6.</b> Use a number line to add one more unit of length.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.MD.6.</b> Use a number line to add or subtract more than one unit of length.</p> <p><b>Level III AA Students will:</b>  <b>EE2.MD.6.</b> Use a number line to add one more unit of length.</p> <p><b>Level II AA Students will:</b>  <b>EE2.MD.6.</b> Count forward on a number line to 10, showing units of length.  <i>Ex.</i> Given a number path and a starting point, count forward to 10 on the number line.</p> <p><b>Level I AA Students will:</b>  <b>EE2.MD.6.</b> Indicate one more number on a number line and track left to right.  <i>Ex.</i> Indicate one more on a number line by tracking to the right.</p>

<p><b>Work with time and money.</b></p> <p><b>2.MD.7.</b> Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.</p>	<p><b>EE2.MD.7.</b> Indicate the digit that tells the hour on a digital clock.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.MD.7.</b> Tell time to the hour on a digital and analog clock.</p> <p><b>Level III AA Students will:</b>  <b>EE2.MD.7.</b> Indicate the digit that tells the hour on a digital clock.</p> <p><b>Level II AA Students will:</b>  <b>EE2.MD.7.</b> Indicate the relationship between a clock and their daily schedule.</p> <p><b>Level I AA Students will:</b>  <b>EE2.MD.7.</b> Match a number to a digit on a clock.</p> <div style="text-align: right;">  </div>
<p><b>2MD.8.</b> Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. <i>Example: If you have 2 dimes and 3 pennies, how many cents do you have?</i></p>	<p><b>EE2.MD.8.</b> Recognize that money has value.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.MD.8.</b> Recognize that money is used in exchange for goods.  <i>Ex.</i> Given a classroom store, purchase goods with money.</p> <p><b>Level III AA Students will:</b>  <b>EE2.MD.8.</b> Recognize that money has value.  <i>Ex.</i> Given blocks and quarters and asked, “If you want to buy a juice, which would you use?” indicate quarters.</p> <p><b>Level II AA Students will:</b>  <b>EE2.MD.8.</b> Sort money from other objects.  <i>Ex.</i> Given three objects, select the coin/dollar.</p> <p><b>Level I AA Students will:</b>  <b>EE2.MD.8.</b> Understand that goods (items) have value.  <i>Ex.</i> The student will exchange money for a preferred item.</p>
<p><b>Represent and interpret data.</b></p> <p><b>2.MD.9.</b> Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.</p> <p><b>2.MD.10.</b> Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems<sup>4</sup> using information presented in a bar graph.</p> <p><sup>4</sup> See Glossary, Table 1.</p>	<p><b>EE2.MD.9-10.</b> Create picture graphs from collected measurement data.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.MD.9-10.</b> Organize, represent, and interpret data using concrete objects to create picture graphs.  <i>Ex.</i> Make a decision based on the measurement data and information from graph.</p> <p><b>Level III AA Students will:</b>  <b>EE2.MD.9-10.</b> Create picture graphs from collected measurement data.</p> <p><b>Level II AA Students will:</b>  <b>EE2.MD.9-10.</b> Create picture graphs from collected data using a model.</p> <p><b>Level I AA Students will:</b>  <b>EE2.MD.9-10.</b> Create a picture graph from collected data using a model.</p>

Geometry		
<p><b>Reason with shapes and their attributes.</b></p> <p><b>2.G.1.</b> Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.<sup>5</sup> Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.</p> <p><sup>5</sup> <i>Sizes are compared directly or visually, not compared by measuring.</i></p> <p><b>2.G.2.</b> Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.</p> <p><b>2.G.3.</b> Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words <i>halves</i>, <i>thirds</i>, <i>half of</i>, <i>a third of</i>, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.</p>	<p><b>EE2.G.1-3.</b> Describe attributes of two-dimensional shapes.</p>	<p><b>Level IV AA Students will:</b>  <b>EE2.G.1-3.</b> Describe mathematical attributes of two- and three-dimensional shapes.  <i>Ex.</i> After the teacher places two- and three-dimensional shapes into a bag, feel one of the shapes and describe it without looking.</p> <p><b>Level III AA Students will:</b>  <b>EE2.G.1-3.</b> Describe attributes of two-dimensional shapes.  <i>Ex.</i> Given a group of objects, sort them by any attribute; then identify what attribute was used to sort (i.e., size, shape, color).</p> <p><b>Level II AA Students will:</b>  <b>EE2.G.1-3.</b> Sort by one attribute (shape).  <i>Ex.</i> Pull out all of the circles from a bowl of circles and squares.</p> <p><b>Level I AA Students will:</b>  <b>EE2.G.1-3.</b> Match 2 shapes to a template or model.</p>

# 2014 WYOMING MATHEMATICS STANDARDS EXTENSIONS AND ACHIEVEMENT DESCRIPTORS FOR THIRD GRADE

## Third Grade Math Standards

2012 WY Mathematics Content Standards	2014 Wyoming Content Standards Extensions	Instructional Achievement Level Descriptor
<b>Operations and Algebraic Thinking</b>		
<p><b>Represent and solve problems involving multiplication and division.</b></p> <p><b>3.0A.1.</b> Interpret products of whole numbers, e.g., interpret <math>5 \times 7</math> as the total number of objects in 5 groups of 7 objects each. <i>For example, describe a context in which a total number of objects can be expressed as <math>5 \times 7</math>.</i></p> <p><b>3.0A.2.</b> Interpret whole-number quotients of whole numbers, e.g., interpret <math>56 \div 8</math> as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as <math>56 \div 8</math>.</p> <p><b>3.0A.3.</b> Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.<sup>1</sup></p> <p><sup>1</sup> See Glossary, Table 2.</p> <p><b>3.0A.4.</b> Determine the unknown whole number in a multiplication or division equation relating three whole numbers.</p>	<p><b>EE3.0A.1-4.</b> Represent and solve problems.</p>	<p><b>Level IV AA Students will:</b>  <b>EE3.0A.1-4.</b> Use repeated addition to find the total number of objects arranged in a square or rectangle array.</p> <p><b>Level III AA Students will:</b>  <b>EE3.0A.1-4.</b> Use repeated addition in equal groups to find the total number of objects to find the sum.</p> <p><b>Level II AA Students will:</b>  <b>EE3.0A.1-4.</b> Use addition to find the total number of objects.</p> <p><b>Level I AA Students will:</b>  <b>EE3.0A.1-4.</b> Identify which group has more or less when objects are added or taken away.</p>

<p><b>Understand properties of multiplication and the relationship between multiplication and division.</b></p> <p><b>3.0A5.</b> Apply properties of operations as strategies to multiply and divide.<sup>2</sup> <i>Examples: If <math>6 \times 4 = 24</math> is known, then <math>4 \times 6 = 24</math> is also known. (Commutative property of multiplication.) <math>3 \times 5 \times 2</math> can be found by <math>3 \times 5 = 15</math>, then <math>15 \times 2 = 30</math>, or by <math>5 \times 2 = 10</math>, then <math>3 \times 10 = 30</math>. (Associative property of multiplication.) Knowing that <math>8 \times 5 = 40</math> and <math>8 \times 2 = 16</math>, one can find <math>8 \times 7</math> as <math>8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56</math>. (Distributive property.)</i></p> <p><sup>2</sup> <i>Students need not use formal terms for these properties.</i></p> <p><b>3.0A6.</b> Understand division as an unknown-factor problem. <i>For example, find <math>32 \div 8</math> by finding the number that makes 32 when multiplied by 8.</i></p>	<p><b>EE3.0A.5-6.</b> Build the foundations for multiplication and division.</p>	<p><b>Level IV AA Students will:</b> <b>EE3.0A5-6.</b> Represent repeated addition. Build more than one model and share equally collections of up to 10 items between 2 to 4 people to solve real-world story problems.</p> <p><b>Level III AA Students will:</b> <b>EE3.0A5-6.</b> Represent repeated addition. Build one model and share equally collections of up to 10 items between 2 to 4 people to solve.</p> <p><b>Level II AA Students will:</b> <b>EE3.0A5-6.</b> Identify a representation of repeated addition.</p> <p><b>Level I AA Students will:</b> <b>EE3.0A5-6.</b> Match a representation of repeated addition.</p>
<p><b>Multiply and divide within 100.</b></p> <p><b>3.0A.7.</b> Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that <math>8 \times 5 = 40</math>, one knows <math>40 \div 5 = 8</math>) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.</p>	<p><b>EE3.0A.7.</b> Fluently use math strategies for multiplication and division.</p>	<p><b>Level IV AA Students will:</b> <b>EE3.0A.7.</b> Solve a multiplication and/or division number sentence within 50.</p> <p><b>Level III AA Students will:</b> <b>EE3.0A.7.</b> Identify the array that solves a multiplication number sentence with multiples of 1's, 2's, and 5's up to 30.</p> <p><b>Level II AA Students will:</b> <b>EE3.0A.7.</b> Identify the array that solves a multiplication number sentence with multiples of 1's and 2's up to 20.</p> <p><b>Level I AA Students will:</b> <b>EE3.0A.7.</b> Match the array that solves a multiplication number sentence with 1's and 2's up to 20.</p>
<p><b>Solve problems involving the four operations, and identify and explain patterns in arithmetic.</b></p> <p><b>3.0A.8.</b> Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.<sup>3</sup></p> <p><sup>3</sup> <i>This standard is limited to problems posed with whole numbers and having whole-number answers; students should</i></p>	<p><b>EE3.0A.8.</b> Add/subtract to solve real-world one-step story problems.</p>	<p><b>Level IV AA Students will:</b> <b>EE3.0A.8.</b> Add/subtract to solve real-world multi-step story problems using various problem solving models.</p> <p><b>Level III AA Students will:</b> <b>EE3.0A.8.</b> Add/subtract to solve real-world one-step story problems by representation in pictures or objects.</p> <p><b>Level II AA Students will:</b> <b>EE3.0A.8.</b> Add to solve word problems identified through symbol representation.</p>

<p><i>know how to perform operations in the conventional order when there are no parentheses to specify a particular order (Order of Operations).</i></p>		<p><b>Level I AA Students will:</b>  <b>EE3.OA.8.</b> Identify the object(s) that appear in real-world one-step story problems.</p>
<p><b>3.OA.9.</b> Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. <i>For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.</i></p>	<p><b>EE3.OA.9.</b> Identify arithmetic patterns.</p>	<p><b>Level IV AA Students will:</b>  <b>EE3.OA.9.</b> Complete a complex arithmetic pattern.  <i>Ex. Complete the pattern using more than two numbers - ABCABC... (2, 3, 6, 8, 9, 12, __, ...)</i></p> <p><b>Level III AA Students will:</b>  <b>EE3.OA.9.</b> Identify arithmetic patterns.  <i>Ex. When provided arithmetic patterns on a hundreds chart identify the next number in the pattern.</i></p> <p><b>Level II AA Students will:</b>  <b>EE3.OA.9.</b> Identify a pattern.</p> <p><b>Level I AA Students will:</b>  <b>EE3.OA.9.</b> Follow a pattern.</p>
<p><b>Numbers and Operations Base Ten</b></p>		
<p><b>Use place value understanding and properties of operations to perform multi-digit arithmetic.<sup>4</sup></b></p> <p><sup>4</sup> <i>A range of algorithms may be used.</i></p> <p><b>3.NBT.1.</b> Use place value understanding to round whole numbers to the nearest 10 or 100.</p> <p><b>3.NBT.2.</b> Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.</p> <p><b>3.NBT.3.</b> Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., <math>9 \times 80</math>, <math>5 \times 60</math>) using strategies based on place value and properties of operations.</p>	<p><b>EE3.NBT.1-3.</b> Understand place value.</p>	<p><b>Level IV AA Students will:</b>  <b>EE3.NBT.1-3.</b> Compare place value up to 50.  <i>Ex. Compare multiples of 10 up to 50. Is 13 closer to 10 or 20?</i></p> <p><b>Level III AA Students will:</b>  <b>EE3.NBT.1-3.</b> Identify place value up to 50.  <i>Ex. Identify the number in the 10s place value for the number 46.</i>  <i>Ex. Count by 10s up to 50.</i></p> <p><b>Level II AA Students will:</b>  <b>EE3.NBT.1-3.</b> Identify whole numbers to 10.  <i>Ex. Identify 10s on a number line.</i>  <i>Ex. Count to 10 using 1:1 correspondence.</i></p> <p><b>Level I AA Students will:</b>  <b>EE3.NBT.1-3.</b> Identify a number.  <i>Ex. Identify more or less.</i>  <i>Ex. Count to 10.</i></p>

**Numbers and Operations – Fractions<sup>5</sup>** <sup>5</sup>Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, & 8.

**Develop understanding of fractions as numbers.**

**3.NF.1.** Understand a fraction  $1/b$  as the quantity formed by 1 part when a whole is partitioned into  $b$  equal parts; understand a fraction  $a/b$  as the quantity formed by  $a$  parts of size  $1/b$ .

**3.NF.2.** Understand a fraction as a number on the number line; represent fractions on a number line diagram.

**3.NF.3.** Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

**EE3.NF.1-3.** Understand fractions.

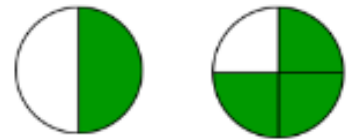
**Level IV AA Students will:**  
**EE3.NF.1-3.** Identify halves or fourths as related to the whole using a symbolic representation for each equal part of a fraction. (See image to the right)

**Level III AA Students will:**  
**EE3.NF.1-3.** Differentiate a fractional part from a whole.

**Level II AA Students will:**  
**EE3.NF.1-3.** Recognize that fractions are part of a whole, using halves.

**Level I AA Students will:**  
**EE3.NF.1-3.** Identify parts.  
*Ex. Identify a whole. Identify equal parts.*

*Third grade AA students are not developmentally ready for this, therefore standards 3.NF.1 and 3.NF.2 were combined.*



**Measurement and Data**

**Solve problems involving measurement and estimation of intervals of time, liquid, volumes and masses of objects.**

**3.MD.1.** Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

**EE3.MD.1.** Tell time to the hour on a clock.

**Level IV AA Students will:**  
**EE3.MD.1.** Tell time to the half hour using a clock.

**Level III AA Students will:**  
**EE3.MD.1.** Tell time to the hour on a clock.

**Level II AA Students will:**  
**EE3.MD.1.** Identify which is the hour on a clock.

**Level I AA Students will:**  
**EE3.MD.1.** Differentiate a clock from other measurement tools as a tool for telling time.



**3.MD.2.** Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (L).<sup>6</sup> Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.<sup>7</sup>

<sup>6</sup> Excludes compound units such as  $cm^3$  and finding the geometric volume of a container.

<sup>7</sup> Excludes multiplicative comparison problems (problems involving notions of “times as much”).

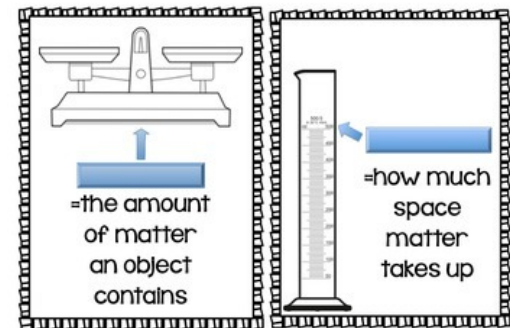
**EE3.MD.2.** Identify standard units of measure for mass and liquid.

**Level IV AA Students will:**  
**EE3.MD.2.** Measure liquid volumes and masses of objects using standard units of grams (g), kilograms (kg) and liters (L).

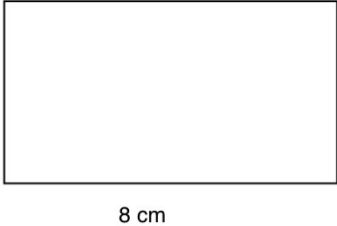
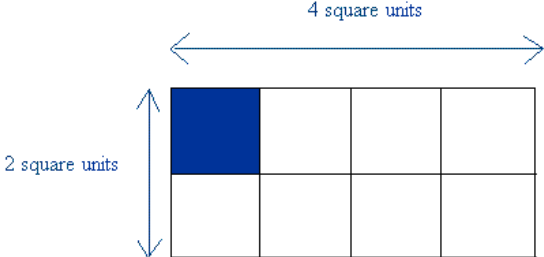
**Level III AA Students will:**  
**EE3.MD.2.** Identify standard units of measure for mass and liquid.

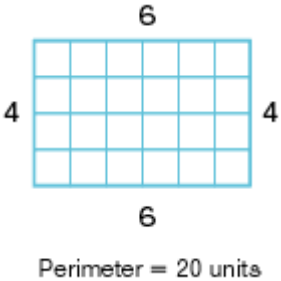
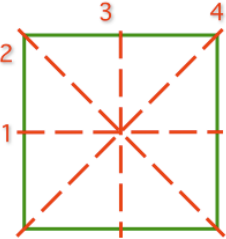
**Level II AA Students will:**  
**EE3.MD.2.** Select the appropriate tool to measure a solid or a liquid.

**Level I AA Students will:**  
**EE3.MD.2.** Determine if an object is a solid or a liquid.





<p><b>Represent and interpret data.</b></p> <p><b>3.MD.3.</b> Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. <i>For example, draw a bar graph in which each square in the bar graph might represent 5 pets.</i></p> <p><b>3.MD.4.</b> Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.</p>	<p><b>EE3.MD.3-4.</b> Represent and interpret data.</p>	<p><b>Level IV AA Students will:</b>  <b>EE3.MD.3-4.</b> Interpret and collect data to answer questions.  <i>Ex. Measure the length of objects using standard tools such as rulers, yardsticks and meter sticks, with real-world problems.</i></p> <p><b>Level III AA Students will:</b>  <b>EE3.MD.3-4.</b> Collect and represent data to answer questions.  <i>Ex. Measure the length of objects using standard tools such as rulers, yardsticks, and meter sticks.</i></p> <p><b>Level II AA Students will:</b>  <b>EE3.MD.3-4.</b> Collect data to answer questions.  <i>Ex. Measure the length of an object with non-standard units of measurement. Then, organize the data into tables or charts.</i></p> <p><b>Level I AA Students will:</b>  <b>EE3.MD.3-4.</b> Select simple data.  <i>Ex. Select the appropriate representation between two data to be placed on a simple picture graph.</i>  <i>Ex. Place a standard measuring tool where one would begin to measure the length of an object.</i>  <i>Ex. Select the appropriate measuring tool.</i></p>
<p><b>Geometric measurement: understand concepts of area and relate area to multiplication and addition.</b></p> <p><b>3.MD.5</b> Recognize area as an attribute of plane figures and understand concepts of area measurement.</p> <ol style="list-style-type: none"> <li>A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area.</li> <li>A plane figure which can be covered without gaps or overlaps by <math>n</math> unit squares is said to have an area of <math>n</math> square units.</li> </ol> <p><b>3.MD.6</b> Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).</p> <p><b>3.MD.7</b> Relate area to the operations of multiplication and addition.</p> <ol style="list-style-type: none"> <li>Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.</li> <li>Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.</li> <li>Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths <math>a</math> and <math>b + c</math> is</li> </ol>	<p><b>EE3.MD.5-7.</b> Understand concepts of area.</p>	<p><b>Level IV AA Students will:</b>  <b>EE3.MD.5-7.</b> Compute the area of a given rectangle with whole number side lengths.</p> <div style="text-align: center;">  </div> <p><b>Level III AA Students will:</b>  <b>EE3.MD.5-7.</b> Find the area of rectangles with whole number side lengths by counting unit squares.</p> <div style="text-align: center;">  </div> <p><b>Level II AA Students will:</b>  <b>EE3.MD.5-7.</b> Identify two side lengths of a given area.</p> <p><b>Level I AA Students will:</b>  <b>EE3.MD.5-7.</b> Identify one side length of a given area.</p>

<p>the sum of <math>a \times b</math> and <math>a \times c</math>. Use area models to represent the distributive property in mathematical reasoning.</p> <p><b>d.</b> Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.</p>		
<p><b>Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.</b></p> <p><b>3.MD.8.</b> Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.</p>	<p><b>EE3.MD.8</b> Build understanding of perimeter.</p>	<p><b>Level IV AA Students will:</b>  <b>EE3.MD.8.</b> Find the perimeter of rectangles by counting the number of unit squares that fit around the shape.</p> <p><b>Level III AA Students will:</b>  <b>EE3.MD.8.</b> Place unit squares around the perimeter of a given rectangle.</p> <p><b>Level II AA Students will:</b>  <b>EE3.MD.8.</b> Trace the perimeter of a given rectangle.</p> <p><b>Level I AA Students will:</b>  <b>EE3.MD.8.</b> Identify the sides of a rectangle.</p> <div style="text-align: center;">  </div>
<b>Geometry</b>		
<p><b>Reason with shapes and their attributes.</b></p> <p><b>3.G.1.</b> Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.</p>	<p><b>EE3.G.1.</b> Recognize shapes.</p>	<p><b>Level IV AA Students will:</b>  <b>EE3.G.1.</b> Identify the shared attributes of shapes in different categories.</p> <p><b>Level III AA Students will:</b>  <b>EE3.G.1.</b> Recognize that shapes in different categories can share attributes.</p> <p><b>Level II AA Students will:</b>  <b>EE3.G.1.</b> Sort shapes by attributes.</p> <p><b>Level I AA Students will:</b>  <b>EE3.G.1.</b> Match shapes.</p>
<p><b>3.G.2.</b> Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. <i>For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape</i></p>	<p><b>EE3.G.2.</b> Recognize that shapes can be partitioned into equal areas.</p>	<p><b>Level IV AA Students will:</b>  <b>EE3.G.2.</b> Given shapes with multiple lines of symmetry, be able to identify equal areas.</p> <p><b>Level III AA Students will:</b>  <b>EE3.G.2.</b> Recognize that shapes can be partitioned into equal areas.</p> <p><b>Level II AA Students will:</b>  <b>EE3.G.2.</b> Create shapes.</p> <p><b>Level I AA Students will:</b>  <b>EE3.G.2.</b> Match shapes.</p> <div style="text-align: center;">  </div>

# 2014 WYOMING MATHEMATICS STANDARDS EXTENSIONS AND ACHIEVEMENT DESCRIPTORS FOR FOURTH GRADE

## Fourth Grade Mathematics Standards

2012 WY Mathematics Content Standards	2014 Wyoming Content Standards Extensions	Instructional Achievement Level Descriptor
<b>Operations and Algebraic Thinking</b>		
<p><b>Use the four operations with whole numbers to solve problems.</b></p> <p><b>4.OA.1.</b> Interpret a multiplication equation as a comparison, e.g., interpret <math>35 = 5 \times 7</math> as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.</p>	<p><b>EE4.OA.1.</b> Use operations to solve problems.</p>	<p><b>Level IV AA Students will:</b> <b>EE4.OA.1.</b> Apply repeated addition to solve a multiplication problem represented with numbers.</p> <p><b>Level III AA Students will:</b> <b>EE4.OA.1.</b> Demonstrate the connection between repeated addition and multiplication.</p> <p><b>Level II AA Students will:</b> <b>EE4.OA.1.</b> Demonstrate repeated addition to sums of 10.</p> <p><b>Level I AA Students will:</b> <b>EE4.OA.1.</b> Make a set of 10 and count to 10.</p>
<p><b>4.OA.2.</b> Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.<sup>1</sup></p> <p><sup>1</sup> See <i>Glossary, Table 2.</i></p> <p><b>4.OA.3.</b> Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.</p>	<p><b>EE4.OA.2-3.</b> Use operations to solve word problems.</p>	<p><b>Level IV AA Students will:</b> <b>EE4.OA.2-3.</b> Solve two-step word problems using addition or subtraction when a number in the problem is unknown.</p> <p><b>Level III AA Students will:</b> <b>EE4.OA.2-3.</b> Solve one-step word problems using addition or subtraction.</p> <p><b>Level II AA Students will:</b> <b>EE4.OA.2-3.</b> Solve one-step addition or subtraction problems up to 10.</p> <p><b>Level I AA Students will:</b> <b>EE4.OA.2-3.</b> Add two numbers with a sum from 1 to 5.</p> <p>** Standard 4.OA.2-3 were combined due to the similar nature of solving word problems.</p>
<p><b>Gain familiarity with factors and multiples.</b></p> <p><b>4.OA.4.</b> Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the</p>	<p><b>EE4.OA.4.</b> Build understanding of multiplication and division.</p>	<p><b>Level IV AA Students will:</b> <b>EE4.OA.4.</b> Show multiple ways to arrive at the same product. <i>Ex.</i> Given an equation on a dry erase board (<math>2 \times 4 = 8</math>) make equal groups to show possible factors for 8. (1 group of 8, 2 groups of 4, 4 groups of 2).</p> <p><b>Level III AA Students will:</b> <b>EE4.OA.4.</b> Show one way to arrive at a product.</p>

<p>range 1–100 is prime or composite.</p>		<p><b>Level II AA Students will:</b>  <b>EE4.OA.4.</b> Make equal sets and count to determine the product.</p> <p><b>Level I AA Students will:</b>  <b>EE4.OA.4.</b> Replicate one way to arrive at a product.</p>
<p><b>Generate and analyze patterns.</b></p> <p><b>4.OA.5</b> Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. <i>For example, given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.</i></p>	<p><b>EE4.OA.5</b> Analyze patterns.</p>	<p><b>Level IV AA Students will:</b>  <b>EE4.OA.5.</b> Create a pattern based on a given rule and their prediction of what comes next.  <i>Ex. Given an AABCAABC rule, create a pattern based on the rule.</i></p> <p><b>Level III AA Students will:</b>  <b>EE4.OA.5.</b> Use repeating patterns to make predictions.</p> <p><b>Level II AA Students will:</b>  <b>EE4.OA.5.</b> Replicate a pattern.</p> <p><b>Level I AA Students will:</b>  <b>EE4.OA.5.</b> Identify a pattern.</p>
<p><b>Numbers and Operations in Base Ten<sup>2</sup></b> <sup>2</sup>Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.</p>		
<p><b>Generalize place value understanding for multi-digit whole numbers.</b></p> <p><b>4.NBT.1.</b> Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. <i>For example, recognize that <math>700 \div 70 = 10</math> by applying concepts of place value and division.</i></p>	<p><b>EE4.NBT.1.</b> Compare numbers to each other based on place value groups.</p>	<p><b>Level IV AA Students will:</b>  <b>EE4.NBT.1.</b> Compare numbers to each other based on place value groups by composing and decomposing numbers greater than 50.  <i>Ex. Given a number over 50, use place value blocks to indicate the value of each digit.</i></p> <p><b>Level III AA Students will:</b>  <b>EE4.NBT.1.</b> Compare numbers to each other based on place value groups by composing and decomposing numbers up to 50.</p> <p><b>Level II AA Students will:</b>  <b>EE4.NBT.1.</b> Compose and decompose whole numbers to 20.</p> <p><b>Level I AA Students will:</b>  <b>EE4.NBT.1.</b> Identify whole numbers to 20.</p>
<p><b>4.NBT.2.</b> Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols to record the results of comparisons.</p>	<p><b>EE4.NBT.2.</b> Compare whole numbers.</p>	<p><b>Level IV AA Students will:</b>  <b>EE4.NBT.2.</b> Compare a variety of whole numbers using symbols (<math>&lt;</math>, <math>&gt;</math>, <math>=</math>).  <i>Ex. Utilize the number line to compare two numbers greater than 50 and place a card with the correct symbol on the line to show the relationship (<math>&lt;</math>, <math>&gt;</math>, <math>=</math>).</i></p> <p><b>Level III AA Students will:</b>  <b>EE4.NBT.2.</b> Compare 2 whole numbers (<math>&lt;</math>, <math>&gt;</math>, <math>=</math>).</p>

		<p><b>Level II AA Students will:</b>  <b>EE4.NBT.2.</b> Compare whole numbers (&lt;, &gt;, =) from 0-20.</p> <p><b>Level I AA Students will:</b>  <b>EE4.NBT.2.</b> Compare whole numbers, (&lt;, &gt;) from 0-10.</p>
<p><b>4.NBT.3.</b> Use place value understanding to round multi-digit whole numbers to any place.</p>	<p><b>EE4.NBT.3.</b> Round one- and two-digit whole numbers.</p>	<p><b>Level IV AA Students will:</b>  <b>EE4.NBT.3.</b> Round one- and two-digit numbers greater than 50, to the nearest 10.  Ex. Using a hundreds chart and a given number between 50 and 100, round to the nearest 10s place.</p> <p><b>Level III AA Students will:</b>  <b>EE4.NBT.3.</b> Round one- and two-digit numbers from 0-50, to the nearest 10.</p> <p><b>Level II AA Students will:</b>  <b>EE4.NBT.3.</b> Round one- and two-digit numbers from 0-30, to the nearest 10.</p> <p><b>Level I AA Students will:</b>  <b>EE4.NBT.3.</b> Identify numbers that are more or less than 5.</p>
<p><b>Use place value understanding and properties of operations to perform multi-digit arithmetic.</b></p> <p><b>4.NBT.4.</b> Fluently add and subtract multi-digit whole numbers using the standard algorithm.</p>	<p><b>EE4.NBT.4.</b> Add and subtract double-digit whole numbers.</p>	<p><b>Level IV AA Students will:</b>  <b>EE4.NBT.4.</b> Add and subtract multi-digit whole numbers.</p> <p><b>Level III AA Students will:</b>  <b>EE4.NBT.4.</b> Add and subtract double-digit whole numbers.</p> <p><b>Level II AA Students will:</b>  <b>EE4.NBT.4.</b> Solve addition problems with numbers 20-50 and subtraction problems with numbers 0-20.</p> <p><b>Level I AA Students will:</b>  <b>EE4.NBT.4.</b> Solve single digit addition problems.</p>
<p><b>4.NBT.5.</b> Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</p> <p><b>4.NBT.6.</b> Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</p>	<p><b>EE5.NBT.5-6.</b> Extend understanding of multiplication and division.</p>	<p><b>Level IV AA Students will:</b>  <b>EE4.NBT.5-6.</b> Illustrate multiplication and division by making 2 equal-sized groups of up to 10.</p> <p><b>Level III AA Students will:</b>  <b>EE4.NBT.5-6.</b> Illustrate multiplication by making 2 equal-sized groups of up to 10.</p> <p><b>Level II AA Students will:</b>  <b>EE4.NBT.5-6.</b> Identify two equal groups.</p> <p><b>Level I AA Students will:</b>  <b>EE4.NBT.5-6.</b> Match two equal groups.</p>

**Extend understanding of fraction equivalence and ordering.**

**4.NF.1.** Explain why a fraction  $a/b$  is equivalent to a fraction  $(n \times a) / (n \times b)$  by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

**4.NF.2.** Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as  $1/2$ . Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols  $>$ ,  $=$ , or  $<$ , and justify the conclusions, e.g., by using a visual fraction model.

**EE4.NF.1-2.** Extend understanding of fractions.

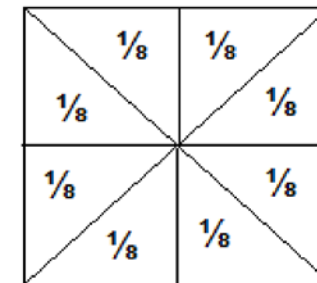
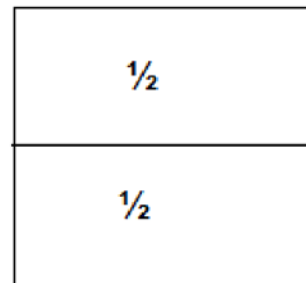
**Level IV AA Students will:**  
**EE4.NF.1-2.** Understand two fractions having unlike denominators are equivalent if they represent the same size portion of a whole.  
*Ex.* Given two squares of paper, one scored for  $1/2$ s and one scored for  $1/8$ s, fold each paper as scored, then unfold the paper scored for  $1/8$ s and compare to the one folded into  $1/2$  to find the same size portion (e.g.,  $4/8 = 1/2$ ).  
*Ex.* Use tangrams.

**Level III AA Students will:**  
**EE4.NF.1-2.** Understand  $2/4 = 1/2$ .

**Level II AA Students will:**  
**EE4.NF.1-2.** Understand  $4/4$  or  $2/2 = 1$ .

**Level I AA Students will:**  
**EE4.NF.1-2.** Understand that two halves is equivalent to one whole.

\*\*Standards 4.NF.1 and 4.NF.2 were combined due to the difficulty of fractions.



**Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.**

**4.NF.3** Understand a fraction  $a/b$  with  $a > 1$  as a sum of fractions  $1/b$ .

- Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
- Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples:*  $3/8 = 1/8 + 1/8 + 1/8$ ;  $3/8 = 1/8 + 2/8$ ;  $2 \frac{1}{8} = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$ .
- Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
- Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.

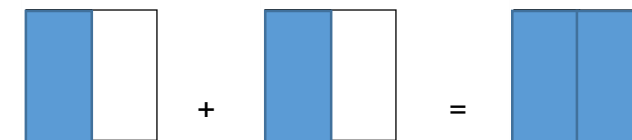
**EE4.NF.3-4.** Apply understanding of fractions in relationship to operations on whole numbers.

**Level IV AA Students will:**  
**EE4.NF.3-4.** Use a real-world model to determine the sum, difference, or multiplication of two fractions.  
*Ex.* Demonstrate that multiplying a fraction by a whole number is similar to taking a fraction of each whole piece and adding them together.  
 $\frac{1}{2} \times 2 = \frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1$   
*(2 pieces of  $1/2$  each)*

**Level III AA Students will:**  
**EE4.NF.3-4.** Use models to determine the sum or multiplication of two fractions.

**Level II AA Students will:**  
**EE4.NF.3-4.** Identify halves or fourths as related to the whole.  
*Ex.* Recognize that multiplying a fraction by a whole number is similar to taking a fraction of each whole piece and adding them together. (see graphic in level IV)

**Level I AA Students will:**  
**EE4.NF.3-4.** Recognize that fraction parts equal a whole.  
*Ex.* Match halves or fourths as related to the whole.



<p><b>4.NF.4.</b> Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.</p> <p>a. Understand a fraction <math>a/b</math> as a multiple of <math>1/b</math>. For example, use a visual fraction model to represent <math>5/4</math> as the product <math>5 \times (1/4)</math>, recording the conclusion by the equation <math>5/4 = 5 \times (1/4)</math>.</p> <p>b. Understand a multiple of <math>a/b</math> as a multiple of <math>1/b</math>, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express <math>3 \times (2/5)</math> as <math>6 \times (1/5)</math>, recognizing this product as <math>6/5</math>. (In general, <math>n \times (a/b) = (n \times a)/b</math>.)</p> <p>c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat <math>3/8</math> of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?</p>		
<p><b>Understand decimal notation for fractions and compare decimal fractions.</b></p> <p><b>4.NF.5.</b> Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.<sup>4</sup> For example, express <math>3/10</math> as <math>30/100</math>, and add <math>3/10 + 4/100 = 34/100</math>.</p> <p><sup>4</sup> Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.</p> <p><b>4.NF.6.</b> Use decimal notation for fractions with denominators 10 or 100. For example, rewrite <math>0.62</math> as <math>62/100</math>; describe a length as <math>0.62</math> meters; locate <math>0.62</math> on a number line diagram.</p> <p><b>4.NF.7.</b> Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols <math>&gt;</math>, <math>=</math>, or <math>&lt;</math>, and justify the conclusions, e.g., by using a visual model.</p>	<p><b>EE4.NF.5-7.</b> Extend understanding of 10ths and 100ths.</p>	<p><b>Level IV AA Students will:</b>  <b>EE4.NF.5-7.</b> Demonstrate <math>1/10</math> and <math>10/100</math> as an equivalent fraction on a provided graphic organizer.  Ex. Students compare two numbers using 10ths (<math>3/10</math>) and 100ths (<math>34/100</math>).</p> <p><b>Level III AA Students will:</b>  <b>EE4.NF.5-7.</b> Identify <math>1/10</math> and <math>10/100</math> as an equivalent fraction.  Ex. Label <math>1/10</math> and <math>10/100</math> on a given representation of each.  Ex. Label two decimals to the 10ths when given a representation of each.</p> <p><b>Level II AA Students will:</b>  <b>EE4.NF.5-7.</b> Identify numbers in the 10ths place.  Ex. Identify a given representation of <math>1/10</math>.  Ex. Label one decimal to the 10ths when given a representation.</p> <p><b>Level I AA Students will:</b>  <b>EE4.NF.5-7.</b> Match numbers in the 10ths place.  Ex. Match a given representation of <math>1/10</math>.  Ex. Match visual representations of 10ths.</p> <p>** Standards 4.NF.6 and 4.NF.7 require similar skills to complete tasks, therefore they were combined.</p>

**Measurement and Data**

**Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.**

**4.MD.1.** Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; L, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*

**4.MD.2.** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

**4.MD.3.** Apply the area and perimeter formulas for rectangles in real-world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*

**Represent and interpret data.**

**4.MD.4.** Make a line plot to display a data set of measurements in fractions of a unit ( $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ ). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*

**EE4.MD.1-3.** Solve problems involving measurement.

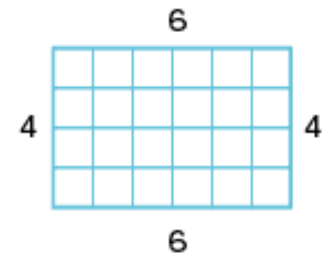
**Level IV AA Students will:**

**EE4.MD.1-3.** Use appropriate measuring tools to demonstrate the solution to a problem.

*Ex.* Solve problems by demonstrating whole units can be broken into smaller units. (e.g., 1 ft. is the same as 12 inches).

*Ex.* Use the appropriate measurement tools to solve problems. (e.g., ruler, yardstick, clock, teaspoon, cup, gallon, etc.).

*Ex.* Find the perimeter and area of rectangles with whole number side lengths by counting unit squares.



Perimeter = 20 units

Area = 24 square units

**Level III AA Students will:**

**EE4.MD.1-3.** Identify the appropriate measuring tool(s) and units to find the solution to a problem.

*Ex.* Identify the smaller measurement units that divide a larger unit within a measurement system. (e.g., Identify the inches within a foot).

*Ex.* Select the appropriate measurement tool from two related options to solve problems.

*Ex.* Identify the perimeter and area of rectangles with whole number side lengths by counting unit squares.

**Level II AA Students will:**

**EE4.MD.1-3.** Identify the appropriate measuring tool and units for a given situation.

*Ex.* Identify standard units of measure.

*Ex.* Select the appropriate measurement tool from two unrelated options to solve problems.

*Ex.* Find the area of rectangles with whole number side lengths by counting unit squares.

**Level I AA Students will:**

**EE4.MD.1-3.** Identify the appropriate measuring tool for a given situation.

*Ex.* Identify measurement tools.

*Ex.* Match the area of a rectangle for an object less than 10 square units.

**EE4.MD.4.a&b.**

Represent and interpret data.

**Level IV AA Students will:**

**EE4.MD.4a.** Insert data into a graph to represent a data set with a scale equal to 10. (0-10 by 1s)

*Ex.* Using a bar graph, enter one unit for each student to show their favorite activity in the correct category (lunch, physical therapy, music, PE) to determine the most popular and the least popular.


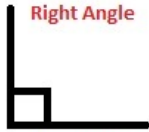




*Ex.* Go to the lost and found, categorize and count types of items, and graph them to determine most and least.

**EE4.MD.4b.** Create questions that can be answered by data on a provided picture and bar graph.

*Ex.* Cut simple graphs from newspapers / magazines and glue them onto card stock, create questions / answers based on the graph.

*Ex.* Create questions / answers based on the information from a graph showing class preferences between two different activities.



		<p><b>Level III AA Students will:</b>  <b>EE4.MD.4a.</b> Insert data to a pre-constructed bar graph template.  <b>EE4.MD.4b.</b> Interpret data from a variety of graphs to answer questions.</p> <p><b>Level II AA Students will:</b>  <b>EE4.MD.4a.</b> Identify an appropriate scale for the data set.  <b>EE4.MD.4b.</b> Make observational statements about data in a picture and bar graph.</p> <p><b>Level I AA Students will:</b>  <b>EE4.MD.4a.</b> Given a topic, identify appropriate data to collect.  <b>EE4.MD.4b.</b> Demonstrate awareness that symbols may be used to represent objects and events.</p>
<p><b>Geometric measurement: understand concepts of angle and measure angles.</b></p> <p><b>4.MD.5.</b> Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:</p> <p><b>a.</b> An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through <math>1/360</math> of a circle is called a “one-degree angle,” and can be used to measure angles.</p> <p><b>b.</b> An angle that turns through <math>n</math> one-degree angles is said to have an angle measure of <math>n</math> degrees.</p> <p><b>4.MD.6.</b> Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.</p> <p><b>4.MD.7.</b> Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real-world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.</p>	<p><b>EE4.MD.5&amp;7.</b> Recognize angles in geometric shapes.</p> <hr/> <p><b>EE4.MD.6.</b> Identify angles as larger and smaller.</p>	<p><b>Level IV AA Students will:</b>  <b>EE4.MD.5&amp;7.</b> Label different types of angles in geometric shapes.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>Acute Angle</p>  <p>Less than <math>90^\circ</math></p> </div> <div style="text-align: center;"> <p>Right Angle</p>  <p>Exactly <math>90^\circ</math></p> </div> <div style="text-align: center;"> <p>Obtuse Angle</p>  <p>Greater than <math>90^\circ</math> but less than <math>180^\circ</math></p> </div> </div> <p><b>Level III AA Students will:</b>  <b>EE4.MD.5&amp;7.</b> Recognize angles in geometric shapes.</p> <p><b>Level II AA Students will:</b>  <b>EE4.MD.5&amp;7.</b> Identify an angle.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>Straight Angle</p>  <p>Exactly <math>180^\circ</math></p> </div> <div style="text-align: center;"> <p>Reflex Angle</p>  <p>Greater than <math>180^\circ</math></p> </div> <div style="text-align: center;"> <p>Full Rotation</p>  <p>Exactly <math>360^\circ</math></p> </div> </div> <p><b>Level I AA Students will:</b>  <b>EE4.MD.5&amp;7.</b> Identify shapes that contain angles.</p> <p>** Standards EE4.MD.5 and EE4.MD.7 use the same skills in relationship to angles, therefore they were combined.</p> <hr/> <p><b>Level IV AA Students will:</b>  <b>EE4.MD.6.</b> Construct angles of various sizes.</p> <p><b>Level III AA Students will:</b>  <b>EE4.MD.6.</b> Identify angles as larger and smaller.</p> <p><b>Level II AA Students will:</b>  <b>EE4.MD.6.</b> Differentiate angles in shapes.</p> <p><b>Level I AA Students will:</b>  <b>EE4.MD.6.</b> Replicate an angle.</p>

**Geometry**

**Draw and identify lines and angles and classify shapes by properties of their lines and angles.**

**4.G.1.** Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

**4.G.2.** Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

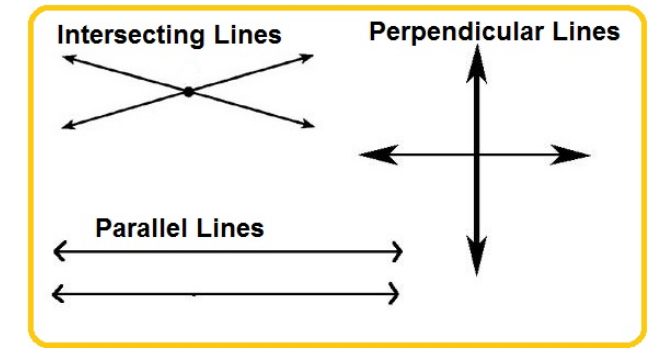
**EE4.G.1-2.** Identify lines, angles, and properties of shapes.

**Level IV AA Students will:**  
**EE4.G.1-2.** Demonstrate an understanding of lines, angles, and shapes.  
*Ex.* Create a representation of parallel and intersecting lines.  
*Ex.* Classify shapes according to their attributes.  
*Ex.* After reading “The Button Box,” determine which attributes can be used to sort geometric buttons (buttons can also be felt by visually impaired students or the teacher can trace the shapes into the palm of a hand).  
*Ex.* Given several shapes, classify the shapes according to attributes such as shape and angles. (The teacher will trace the geometric shape into the student’s palm and, after given choices of shapes, activate a switch to indicate a category of attribute.)

**Level III AA Students will:**  
**EE4.G.1-2.** Distinguish between different attributes of lines, curves, and angles.  
*Ex.* Distinguish between parallel and intersecting lines.

**Level II AA Students will:**  
**EE4.G.1-2.** Identify different attributes of lines, curves, and angles.  
*Ex.* Identify an intersecting line.

**Level I AA Students will:**  
**EE4.G.1-2.** Identify a line or a curve.



**4.G.3.** Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

**EE4.G.3.** Identify lines of symmetry in simple shapes.

**Level IV AA Students will:**  
**EE4.G.3.** Locate the line of symmetry in a geometric shape.  
*Ex.* Fold paper, in a geometric shape, and have the student trace the fold line to identify the line of symmetry.  
*Ex.* Using magnetic shapes, match a given pattern of shapes to create a symmetrical design.

**Level III AA Students will:**  
**EE4.G.3.** Recognize a line of symmetry in a simple shape.

**Level II AA Students will:**  
**EE4.G.3.** Place a line of symmetry on a simple shape.

**Level I AA Students will:**  
**EE4.G.3.** Match a line of symmetry on a simple shape (square, triangle, rectangle).

# 2014 WYOMING MATHEMATICS STANDARDS EXTENSIONS AND ACHIEVEMENT DESCRIPTORS FOR FIFTH GRADE

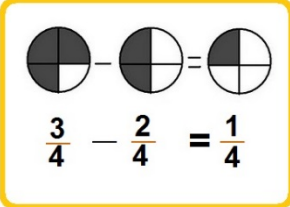
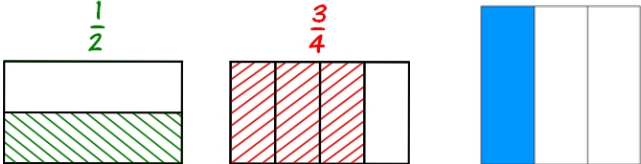
## Fifth Grade Mathematics Standards

2012 WY Mathematics Content Standards	2014 Wyoming Content Standards Extensions	Instructional Achievement Level Descriptor
<b>Operations and Algebraic Thinking</b>		
<p><b>Write and interpret numerical expressions.</b></p> <p><b>5.OA.1.</b> Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.</p> <p><b>5.OA.2.</b> Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. <i>For example, express the calculation “add 8 and 7, then multiply by 2” as <math>2 \times (8 + 7)</math>. Recognize that <math>3 \times (18932 + 921)</math> is three times as large as <math>18932 + 921</math>, without having to calculate the indicated sum or product.</i></p>	<p><b>EE5.OA.1-2.</b> Write numerical expressions.</p>	<p><b>Level IV AA Students will:</b>  <b>EE5.OA.1-2.</b> Write a simple expression using parentheses and three or more numbers from 0 to 5.  <i>Ex. Write the sum of 3 and 1, then multiply by 2. <math>(3+1) \times 2</math></i></p> <p><b>Level III AA Students will:</b>  <b>EE5.OA.1-2.</b> Generate a math sentence using appropriate symbols (+, -, =).</p> <p><b>Level II AA Students will:</b>  <b>EE5.OA.1-2.</b> Identify a math sentence which uses appropriate symbols (+, -, =).</p> <p><b>Level I AA Students will:</b>  <b>EE5.OA.1-2.</b> Identify a math symbol (+, -, =).</p>
<p><b>Analyze patterns and relationships.</b></p> <p><b>5.OA.3.</b> Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. <i>For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.</i></p>	<p><b>EE5.OA.3.</b> Identify and extend numerical patterns.</p>	<p><b>Level IV AA Students will:</b>  <b>EE5.OA.3.</b> When given a rule, generate the pattern.  <i>Ex. Show me a pattern that increases by 2 and starts at 0 (e.g., 0,2,4,6...).</i></p> <p><b>Level III AA Students will:</b>  <b>EE5.OA.3.</b> Identify and extend numerical patterns.</p> <p><b>Level II AA Students will:</b>  <b>EE5.OA.3.</b> Extend a picture pattern.</p> <p><b>Level I AA Students will:</b>  <b>EE5.OA.3.</b> Repeat a pattern.</p>
<b>Numbers and Operations in Base Ten</b>		
<p><b>Understand the place value system.</b></p> <p><b>5.NBT.1.</b> Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.</p>	<p><b>EE5.NBT.1.</b> Compare numbers to each other based on place value.</p>	<p><b>Level IV AA Students will:</b>  <b>EE5.NBT.1.</b> Compare numbers by composing and decomposing in two different ways.  <i>Ex. Decompose numbers by place value and compare by hundreds, tens, and ones (with the understanding that one 100, two 10s, and three ones combined is 123 ones).  Ex. Compose numbers based on place value and compare to another number on the number line.  Ex. Compare two numbers with different numbers in the tens place (e.g., 20 compared to 60 on the number line and explain 20 has two 10s or 20 ones and 60 is made of six 10s or 60 ones as it is written.</i></p> <p><b>Level III AA Students will:</b>  <b>EE5.NBT.1.</b> Compare numbers to each other based on place value groups by composing and decomposing to 99.</p>

		<p><b>Level II AA Students will:</b> EE5.NBT.1. Compare numbers to 50.</p> <p><b>Level I AA Students will:</b> EE5.NBT.1. Compare numbers 20.</p>
<p><b>5.NBT.2.</b> Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.</p>	<p><b>EE5.NBT.2.</b> Recognize patterns when multiplying a number by powers of 10.</p>	<p><b>Level IV AA Students will:</b> EE5.NBT.2. Extend patterns in the number of 0s, when multiplying by the powers of 10, up to 1000. Ex. Place numbers in order.</p> <p><b>Level III AA Students will:</b> EE5.NBT.2. Recognize patterns in the number of 0s when multiplying a number by powers of 10.</p> <p><b>Level II AA Students will:</b> EE5.NBT.2. Order multiples of 10 ranging from 0-50, from least to greatest.</p> <p><b>Level I AA Students will:</b> EE5.NBT.2. Indicate the sequential order of numbers to 20.</p>
<p><b>5.NBT.3.</b> Read, write, and compare decimals to thousandths.</p> <p><b>a.</b> Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., <math>347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)</math>.</p> <p><b>b.</b> Compare two decimals to thousandths based on meanings of the digits in each place, using <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols to record the results of comparisons.</p> <p><b>5.NBT.4.</b> Use place value understanding to round decimals to any place.</p>	<p><b>EE5.NBT.3-4.</b> Understand rounding in the place value system.</p>	<p><b>Level IV AA Students will:</b> EE5.NBT.3-4. Round three-digit whole numbers to hundreds place. Ex. Choose card with correct answer on it after being presented a three-digit number and told to round to the nearest hundreds place value. Ex. Given a three-digit number, generate (speaks, types, etc.) the answer for rounding to the nearest hundreds place value.</p> <p><b>Level III AA Students will:</b> EE5.NBT.3-4. Round two-digit whole numbers between 50 and 90 to nearest ten.</p> <p><b>Level II AA Students will:</b> EE5.NBT.3-4. Round two-digit whole numbers between 10 and 50 to the nearest ten.</p> <p><b>Level I AA Students will:</b> EE5.NBT.3-4. Determine if a single-digit number is closer to 0 or ten.</p>
<p><b>Perform operations with multi-digit whole numbers and with decimals to hundredths.</b></p> <p><b>5.NBT.5.</b> Fluently multiply multi-digit whole numbers using the standard algorithm.</p> <p><b>5.NBT.6.</b> Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using</p>	<p><b>EE5.NBT.5-7.</b> Perform operations with whole numbers.</p>	<p><b>Level IV AA Students will:</b> EE5.NBT.5-7. Perform operations with multi-digit whole numbers (0-100).</p> <p><b>Level III AA Students will:</b> EE5.NBT.5-7. Solve addition and subtraction problems when the initial number is unknown ( <math>\_\_ + 2 = 10</math>; <math>\_\_ - 2 = 8</math> ).</p>

<p>strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</p> <p><b>5.NBT.7.</b> Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.</p>		<p><b>Level II AA Students will:</b>  <b>EE5.NBT.5-7.</b> Use concrete objects to solve addition and subtraction problems.</p> <p><b>Level I AA Students will:</b>  <b>EE5.NBT.5-7.</b> Duplicate addition/subtraction problems using concrete objects.</p>
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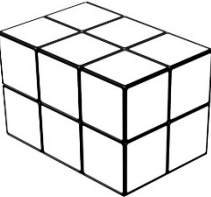
**Number and Operations - Fractions**

<p><b>Use equivalent fractions as a strategy to add and subtract fractions.</b></p> <p><b>5.NF.1.</b> Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. <i>For example, <math>2/3 + 5/4 = 8/12 + 15/12 = 23/12</math>. (In general, <math>a/b + c/d = (ad + bc)/bd</math>.)</i></p> <p><b>5.NF.2.</b> Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. <i>For example, recognize an incorrect result <math>2/5 + 1/2 = 3/7</math>, by observing that <math>3/7 &lt; 1/2</math>.</i></p>	<p><b>EE5.NF.1-2.</b> Develop an understanding of addition and subtraction with fractions.</p>	<p><b>Level IV AA Students will:</b>  <b>EE5.NF.1-2.</b> Solve word problems by adding and subtracting fractions with like denominators (halves, thirds, fourths).</p> <p><b>Level III AA Students will:</b>  <b>EE5.NF.1-2.</b> Solve word problems by adding fractions with like denominators (halves, thirds, fourths).</p> <p><b>Level II AA Students will:</b>  <b>EE5.NF.1-2.</b> Identify halves, thirds, and fourths.</p> <p><b>Level I AA Students will:</b>  <b>EE5.NF.1-2.</b> Match halves, thirds, and fourths.</p> <div style="text-align: right;">  </div> <div style="text-align: center;">  </div>
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<p><b>Apply and extend previous understandings of multiplication and division to multiply and divide fractions.</b></p> <p><b>5.NF.3, 5.NF.4, 5.NF.5, 5.NF.6, &amp; 5.NF.7</b></p>	<p><b>EE5.NF.3-7.</b>          Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>
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**Measurement and Data**

<p><b>Convert like measurement units within a given measurement system.</b></p> <p><b>5.MD.1.</b> Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions</p>	<p><b>EE5.MD.1.</b> Solve measurement problems.</p>	<p><b>Level IV AA Students will:</b>  <b>EE5.MD.1.</b> Solve measurement problems across at least three standard measurement units (time, length, mass, money).</p> <p><b>Level III AA Students will:</b>  <b>EE5.MD.1.</b> Solve measurement problems across at least two standard measurement units (time, length,</p>
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<p>in solving multi-step, real-world problems.</p>		<p>mass, money).</p> <p><b>Level II AA Students will:</b>  <b>EE5.MD.1.</b> Solve measurement problems across at least one standard measurement unit (time, length, mass, money).</p> <p><b>Level I AA Students will:</b>  <b>EE5.MD.1.</b> Identify customary units.</p>
<p><b>Represent and interpret data.</b></p> <p><b>5.MD.2.</b> Make a line plot to display a data set of measurements in fractions of a unit (<math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{8}</math>). Use operations on fractions for this grade to solve problems involving information presented in line plots. <i>For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.</i></p>	<p><b>EE5.MD.2.</b>  Represent and interpret data.</p>	<p><b>Level IV AA Students will:</b>  <b>EE5.MD.2.</b> Collect, organize and interpret data. Create a graph and display the data on a graph.  <i>Ex.</i> Count the number of students who like dogs and the number who like cats. Show where on the graph to put the bar for dogs and for cats and where to indicate the number of votes and enter the results on the graph. Determine if the result shown seems reasonable and why (e.g., graph shows that students have more snakes as pets than dogs).  <i>Ex.</i> Based on class observation (how many wore red today), determine how to graph data and show a graph telling which one was more, less, or the same.</p> <p><b>Level III AA Students will:</b>  <b>EE5.MD.2.</b> Represent and interpret data on a picture, line plot, or bar graph given a model and a graph to complete.</p> <p><b>Level II AA Students will:</b>  <b>EE5.MD.2.</b> Display data on a picture, line plot, or bar graph.</p> <p><b>Level I AA Students will:</b>  <b>EE5.MD.2.</b> Identify a simple graph.</p>
<p><b>Geometric measurement: understand concepts of volume and relate volume to multiplication and addition.</b></p> <p><b>5.MD.3.</b> Recognize volume as an attribute of solid figures and understand concepts of volume measurement.</p> <ol style="list-style-type: none"> <li>A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.</li> <li>A solid figure which can be packed without gaps or overlaps using <math>n</math> unit cubes is said to have a volume of <math>n</math> cubic units.</li> </ol> <p><b>5.MD.4.</b> Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.</p> <p><b>5.MD.5.</b> Relate volume to the operations of multiplication</p>	<p><b>EE5.MD.3-5.</b>  Determine volume of a cube by counting units of measure.</p>	<p><b>Level IV AA Students will:</b>  <b>EE5.MD.3-5.</b> Figure the volume of a cube using mathematical operations.</p> <p><b>Level III AA Students will:</b>  <b>EE5.MD.3-5.</b> Determine the volume of a cube by counting units of measure.</p> <p><b>Level II AA Students will:</b>  <b>EE5.MD.3-5.</b> Identify objects that have volume.</p> <p><b>Level I AA Students will:</b>  <b>EE5.MD.3-5.</b> Identify solid or liquid, full or empty.</p> 

<p>and addition and solve real-world and mathematical problems involving volume.</p> <ol style="list-style-type: none"> <li>Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.</li> <li>Apply the formulas <math>V = l \times w \times h</math> and <math>V = b \times h</math> for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real-world and mathematical problems.</li> <li>Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems.</li> </ol>		
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**Geometry**

<p><b>Graph points on the coordinate plane to solve real-world and mathematical problems.</b></p> <p>5.G.1. 5.G.2.</p>	<p><b>EE5.G.1-2.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>
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<p><b>Classify two-dimensional figures into categories based on their properties.</b></p> <p><b>5.G.3.</b> Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. <i>For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.</i></p> <p><b>5.G.4.</b> Classify two-dimensional figures in a hierarchy based on properties.</p>	<p><b>EE5.G.3-4.</b> Classify two-dimensional figures.</p>	<p><b>Level IV AA Students will:</b>  <b>EE5.G.3-4.</b> Sort two-dimensional figures into quadrant tables and describe figures by two common attributes.  <i>Ex.</i> Sort two-dimensional figures by color and shape.  <i>Ex.</i> Sort two-dimensional figures by congruent and non-congruent.  <i>Ex.</i> Sort two-dimensional figures by angle and number of sides.</p> <table border="1" data-bbox="2153 964 2440 1101"> <tr> <td>Blue circles</td> <td>Red circles</td> </tr> <tr> <td>Blue squares</td> <td>Red squares</td> </tr> </table> <p><b>Level III AA Students will:</b>  <b>EE5.G.3-4.</b> Sort two-dimensional figures and describe the common attributes such as angles, number of sides, corners (dimension), and color.</p> <p><b>Level II AA Students will:</b>  <b>EE5.G.3-4.</b> Sort two-dimensional figures based on a given attribute.</p> <p><b>Level I AA Students will:</b>  <b>EE5.G.3-4.</b> Indicate two-dimensional shapes named.</p> <p>** Standards 5.G.3 and 5.G.4 require complementary skills, therefore they were combined.</p>	Blue circles	Red circles	Blue squares	Red squares
Blue circles	Red circles					
Blue squares	Red squares					

# 2014 WYOMING MATHEMATICS STANDARDS EXTENSIONS AND ACHIEVEMENT DESCRIPTORS FOR SIXTH GRADE

## Sixth Grade Mathematics Standards

2012 WY Mathematics Content Standards	2014 Wyoming Content Standards Extensions	Instructional Achievement Level Descriptor
<b>Ratios and Proportional Relationships</b>		
<p><b>Understand ratio concepts and use ratio reasoning to solve problems.</b></p> <p><b>6.RP.1.</b> Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. <i>For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly 3 votes”</i></p> <p><b>6.RP.2.</b> Understand the concept of a unit rate <math>a/b</math> associated with a ratio <math>a:b</math> with <math>b \neq 0</math>, and use rate language in the context of a ratio relationship. <i>For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is <math>\frac{3}{4}</math> cup of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.”<sup>1</sup></i></p> <p><sup>1</sup> Expectations for unit rates in this grade are limited to non-complex fractions.</p> <p><b>6.RP.3.</b> Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.</p> <ol style="list-style-type: none"> <li>a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.</li> <li>b. Solve unit rate problems including those involving unit pricing and constant speed. <i>For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?</i></li> <li>c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.</li> <li>d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</li> </ol>	<p><b>EE6.RP.1-3.</b> Demonstrate a simple ratio relationship.</p>	<p><b>Level IV AA Students will:</b> <b>EE6.RP.1-3.</b> Use a ratio to describe a relationship using numbers and objects. <i>Ex. Given an even number of red beads and twice as many green beads, identify the ratio of green beads compared to red beads.</i> <i>Ex. While preparing a recipe, fill in a ratio of flour to sugar (e.g., one cup of sugar to four cups of flour).</i> <i>Ex. Compare the number of male students to female students.</i> <i>Ex. Given the quantity of materials available and the number of groups who will conduct a science experiment, use a ratio relationship to describe how much each group will receive.</i></p> <p><b>Level III AA Students will:</b> <b>EE6.RP.1-3.</b> Demonstrate a simple ratio relationship using a sharing model. <i>Ex. Evenly distribute 10 cookies among 5 students.</i> <i>Ex. Evenly split \$20 among four students.</i></p> <p><b>Level II AA Students will:</b> <b>EE6.RP.1-3.</b> Match items according to a simple ratio relationship. <i>Ex. Give a pen and pencil to each classmate.</i> <i>Ex. Complete a ratio of two-to-one (e.g., AABAABAAB pattern; jump, jump, clap, jump, jump, clap)</i></p> <p><b>Level I AA Students will:</b> <b>EE6.RP.1-3.</b> Identify a one-to-one relationship. (Indicate each object using touch, hand over hand, eye gaze, etc...) <i>Ex. Given a stack of napkins, give a napkin to each classmate.</i> <i>Ex. When sorting mail in the main office, place one copy of the school newsletter in each teacher’s mailbox.</i> <i>Ex. Indicate each object as the teacher counts.</i></p>



**The Number System**

**Apply and extend previous understandings of multiplication and division to divide fractions by fractions.**

**6.NS.1.** Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for  $(2/3) \div (3/4)$  and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that  $(2/3) \div (3/4) = 8/9$  because  $3/4$  of  $8/9$  is  $2/3$ . (In general,  $(a/b) \div (c/d) = ad/bc$ .) How much chocolate will each person get if 3 people share  $1/2$  lb of chocolate equally? How many  $3/4$ -cup servings are in  $2/3$  of a cup of yogurt? How wide is a rectangular strip of land with length  $3/4$  mi and area  $1/2$  square mi?*

**EE6.NS.1.** Compare relationships between fractions and understand that a number can be expressed as a fraction.

**Level IV AA Students will:**

**EE6.NS.1.** Compute a quotient when a whole number is already divided into parts.  
*Ex. How much chocolate will each person get if 3 people share  $1/2$  lb of chocolate equally? (could also use pizza)*  
*Ex. How many dimes are in a dollar? How many quarters are in a dollar?*

**Level III AA Students will:**

**EE6.NS.1.** Using a model, compute a quotient when a number is already divided.  
*Ex. If I had half of a cookie, cut it in half, and gave one piece to a friend, how much of a cookie will my friend get?*

**Level II AA Students will:**

**EE6.NS.1.** Divide a whole number into halves, thirds, and quarters. (using visuals)  
*Ex. Use fractions disks to indicate wholes, halves, thirds, and quarters.*

**Level I AA Students will:**

**EE6.NS.1.** Indicate half or a quarter of a whole.  
*Ex. Indicate half of a dollar using quarters. Or indicate half of a pizza using slices.*

**Compute fluently with multi-digit numbers and find common factors and multiples.**

**6.NS.2.** Fluently divide multi-digit numbers using the standard algorithm.

$$\begin{array}{r}
 193 \\
 5 \overline{)965} \\
 \underline{-5} \phantom{0} \\
 46 \phantom{0} \\
 \underline{-45} \phantom{0} \\
 15 \phantom{0} \\
 \underline{15} \\
 0
 \end{array}$$

$3 \times 5 = 15$

**EE6.NS.2.** Divide two-digit / three-digit numbers without remainders.

**Level IV AA Students will:**

**EE6.NS.2.** Divide up to three-digit whole number dividends by one- or two-digit numbers.

**Level III AA Students will:**

**EE6.NS.2.** Divide up to three-digit whole number dividends by one- or two-digit numbers using models.

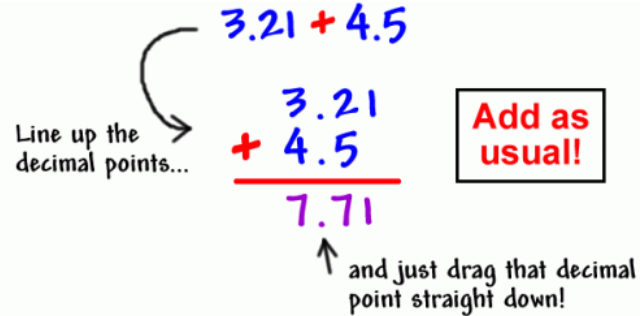
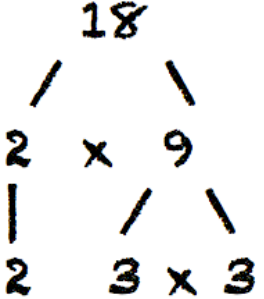
**Level II AA Students will:**

**EE6.NS.2.** Divide a two-digit dividend by a single divisor with or without models.


**Level I AA Students will:**

**EE6.NS.2.** Indicate the correct quotient when a two-digit dividend is divided by a single-digit.  
*Ex. Given 10 chips, divide them into two equal piles.*  
*Ex. Indicate the quotient using number cards.*

$$\begin{array}{r}
 34 \\
 2 \overline{)68} \\
 \underline{-6} \phantom{0} \\
 08 \\
 \underline{-8} \\
 0
 \end{array}$$

<p><b>6.NS.3.</b> Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p>	<p><b>EE6.NS.3.</b> Add, subtract, multiply, and divide whole numbers with decimals up to the hundredths place.</p>	<p><b>Level IV AA Students will:</b>  <b>EE6.NS.3.</b> Add, subtract, multiply, and divide multi-digit numbers with decimals (with or without models).</p> <p><b>Level III AA Students will:</b>  <b>EE6.NS.3.</b> Add and subtract multi-digit numbers with decimals (with or without models).</p> <p><b>Level II AA Students will:</b>  <b>EE6.NS.3.</b> Add and subtract multi-digit numbers (with or without models).  <i>Ex. One dollar minus 50 cents is 50.</i></p> <p><b>Level I AA Students will:</b>  <b>EE6.NS.3.</b> Add multi-digit numbers (with or without models).  <i>Ex. 50 cents plus 50 cents is 1 dollar.</i></p> 
<p><b>6.NS.4.</b> Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. <i>For example, express <math>36 + 8</math> as <math>4(9 + 2)</math>.</i></p>	<p><b>EE6.NS.4.</b> Identify common factors within numbers.</p>	<p><b>Level IV AA Students will:</b>  <b>EE6.NS.4.</b> List the factors for numbers 1 through 20, without models.</p> <p><b>Level III AA Students will:</b>  <b>EE6.NS.4.</b> List the factors for numbers 1 through 20, with models.</p> <p><b>Level II AA Students will:</b>  <b>EE6.NS.4.</b> List the factors for numbers 1 through 10, without models.</p> <p><b>Level I AA Students will:</b>  <b>EE6.NS.4.</b> List the factors for numbers 1 through 10, with models.</p> 
<p><b>Apply and extend previous understandings of numbers to the system of rational numbers.</b></p> <p><b>6.NS.5.</b> Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive / negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.</p>	<p><b>EE6.NS.5.</b> Compare the value of numbers.</p>	<p><b>Level IV AA Students will:</b>  <b>EE6.NS.5.</b> Apply positive and negative numbers in real-world contexts from greater than positive 10 to less than negative 10.</p> <p><b>Level III AA Students will:</b>  <b>EE6.NS.5.</b> Order positive and negative numbers from least to greatest.</p> <p><b>Level II AA Students will:</b>  <b>EE6.NS.5.</b> Order positive numbers from least to greatest.</p> <p><b>Level I AA Students will:</b>  <b>EE6.NS.5.</b> Identify which is greater than and less than, using positive numbers less than 10.</p>

<p><b>6.NS.6.</b> Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</p> <ol style="list-style-type: none"> <li>Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., <math>-(-3) = 3</math>, and that 0 is its own opposite.</li> <li>Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.</li> <li>Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.</li> </ol>	<p><b>EE6.NS.6.</b> Compare the value of numbers.</p>	<p><b>Level IV AA Students will:</b>  <b>EE6.NS.6.</b> Count forward and backward on the number line from negative ten to ten.</p> <p><b>Level III AA Students will:</b>  <b>EE6.NS.6.</b> Count forward on the number line from negative ten to ten.</p> <p><b>Level II AA Students will:</b>  <b>EE6.NS.6.</b> Count forward and backward on the number line from zero to ten.</p> <p><b>Level I AA Students will:</b>  <b>EE6.NS.6.</b> Count forward on the number line from zero to ten.</p>
<p><b>Apply and extend previous understandings of numbers to the system of rational numbers.</b></p> <p><b>6.NS.7. &amp; 6.NS.8.</b></p>	<p><b>EE6.NS.7-8.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</p>
<p><b>Expressions and Equations</b></p>		
<p><b>6.EE.1.</b> Write and evaluate numerical expressions involving whole-number exponents.</p> <p><b>6.EE.2.</b> Write, read, and evaluate expressions in which letters stand for numbers.</p> <ol style="list-style-type: none"> <li>Write expressions that record operations with numbers and with letters standing for numbers. <i>For example, express the calculation "Subtract y from 5" as <math>5 - y</math>.</i></li> <li>Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. <i>For example, describe the expression <math>2(8 + 7)</math> as a product of two factors; view <math>(8 + 7)</math> as both a single entity and a sum of two terms.</i></li> <li>Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order</li> </ol>	<p><b>EE6.EE.1-2.</b>  Evaluate algebraic expressions.</p>	<p><b>Level IV AA Students will:</b>  <b>EE6.EE.1-2.</b> Given a scenario, identify the correct number sentence.  <i>Ex. There are 6 cookies and 2 chocolates for each of 4 people. How many treats are there altogether? Select the correct number sentence (expression): <math>6(4 + 2)</math>, <math>2(4 + 6)</math>, <math>4(6 + 2)</math>.</i></p> <p><b>Level III AA Students will:</b>  <b>EE6.EE.1-2.</b> Match a number sentence with the correct representation.  <i>Ex. Demonstrate <math>6-2</math>, using manipulatives.</i></p> <p><b>Level II AA Students will:</b>  <b>EE6.EE.1-2.</b> Demonstrate a simple math sentence.  <i>Ex. Given the number sentence, choose the correct representation.</i></p> <p><b>Level I AA Students will:</b>  <b>EE6.EE.1-2.</b> Identify math symbols (e.g., = means equal to [<math>&lt;</math>, <math>&gt;</math>, <math>+</math>, <math>-</math>, <math>\times</math>, <math>\div</math>]).</p>

<p>when there are no parentheses to specify a particular order (Order of Operations). <i>For example, use the formulas <math>V = s^3</math> and <math>A = 6s^2</math> to find the volume and surface area of a cube with sides of length <math>s = 1/2</math>.</i></p>		
<p><b>6.EE.3.</b> Apply the properties of operations to generate equivalent expressions. <i>For example, apply the distributive property to the expression <math>3(2 + x)</math> to produce the equivalent expression <math>6 + 3x</math>; apply the distributive property to the expression <math>24x + 18y</math> to produce the equivalent expression <math>6(4x + 3y)</math>; apply properties of operations to <math>y + y + y</math> to produce the equivalent expression <math>3y</math>.</i></p> <p><b>6.EE.4.</b> Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). <i>For example, the expressions <math>y + y + y</math> and <math>3y</math> are equivalent because they name the same number regardless of which number <math>y</math> stands for.</i></p>	<p><b>EE6.EE.3-4.</b> Demonstrate understanding of equivalent expressions.</p>	<p><b>Level IV AA Students will:</b>  <b>EE6.EE.3-4.</b> Solve equivalent expressions to illustrate that they are equivalent or demonstrate their equivalence.  <i>Ex. Given the expression <math>4 + 2 = 3 + 3</math>, the student must demonstrate that both of these are 6.</i></p> <p><b>Level III AA Students will:</b>  <b>EE6.EE.3-4.</b> Demonstrate understanding of equivalent expressions.  <i>Ex. Given two expressions, indicate if they are equivalent.</i></p> <p><b>Level II AA Students will:</b>  <b>EE6.EE.3-4.</b> Indicate matching displays of the equal quantities.  <i>Ex. Given two blue cubes, which is the same? 1 ship, 2 bears, or 3 ducks?</i></p> <p><b>Level I AA Students will:</b>  <b>EE6.EE.3-4.</b> Match different displays of the same quantity.  <i>Ex. Are these two values equivalent? 3 ducks and two cubes</i></p> 
<p><b>Reason about and solve one-variable equations and inequalities.</b></p> <p><b>6.EE.5.</b> Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.</p> <p><b>6.EE.6.</b> Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p>	<p><b>EE6.EE.5-6.</b> Match an equation to a real-world problem in which variables are used to represent numbers.</p>	<p><b>Level IV AA Students will:</b>  <b>EE6.EE.5-6.</b> Using a variable, generate an equivalent equation that represents a real-world problem.  <i>Ex. We had ten cookies left today. Tomorrow we will bake some more cookies, and then we will have 18 cookies. Create an equation for this situation. (i.e. <math>10 + c = 18</math>)</i></p> <p><b>Level III AA Students will:</b>  <b>EE6.EE.5-6.</b> Match an equation to a real-world problem in which variables are used to represent numbers.  <i>Ex. We had ten cookies left today. Tomorrow we will bake some more cookies, and then we will have 18 cookies. How many cookies did we bake? 10, 8, or 18?</i></p> <p><b>Level II AA Students will:</b>  <b>EE6.EE.5-6.</b> Determine what is unknown in an equation.  <i>Ex. For the equation <math>4 + z = 6</math>, which part is the unknown?</i></p> <p><b>Level I AA Students will:</b>  <b>EE6.EE.5-6.</b> Identify the letter in a mathematical sentence.  <i>Ex. For <math>Z = 6</math>, identify the value of the variable <math>Z</math>.</i></p>

Reason about and solve one-variable equations and inequalities. 6.EE.7. & 6.EE.8.	EE6.EE.7-8. Not Applicable	***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.
Represent and analyze quantitative relationships between dependent and independent variables. 6.EE.9.	EE6.EE.9. Not Applicable	***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.

**Geometry**

**Solve real-world and mathematical problems involving area, surface area, and volume.**

**6.G.1.** Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

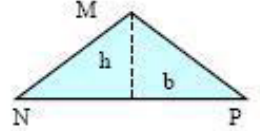
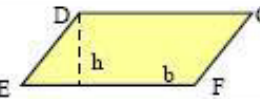
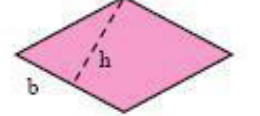

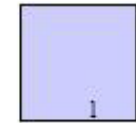
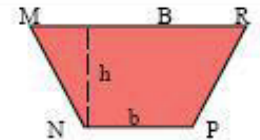
**EE6.G.1.**  
Demonstrate area.

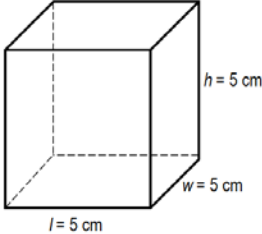
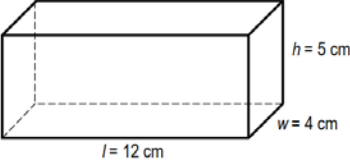
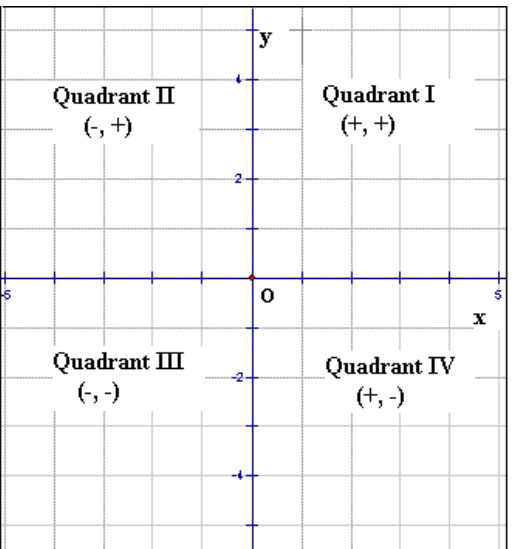

**Level IV AA Students will:**  
**EE6.G.1.** Calculate the area of triangles, quadrilaterals, and polygons using a formula.

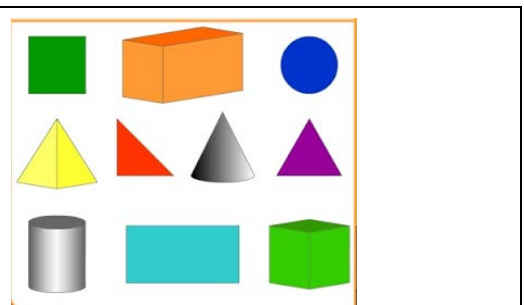
**Level III AA Students will:**  
**EE6.G.1.** Decompose a parallelogram into a rectangle or quadrilateral and triangles; find the area of a square.

**Level II AA Students will:**  
**EE6.G.1.** Given two shapes to compare, identify which shape has a larger area.  
*Ex. Which shape has a larger area, a square or a pentagon?*

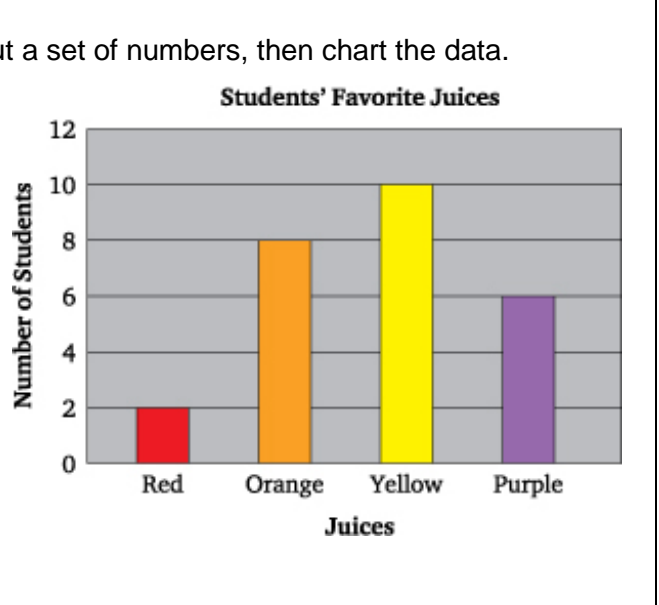
**Level I AA Students will:**  
**EE6.G.1.** Identify triangles and squares, and indicate correctly the shaded area.

NAME	FIGURE	AREA
TRIANGLE		$A = \frac{b \times h}{2}$
PARALLELOGRAM		$A = b \times h$
RHOMBUS		$A = b \times h$
RECTANGLE		$A = L \times w$
SQUARE		$A = l^2$
TRAPEZOID		$A = \frac{(B+b) \times h}{2}$

<p><b>6.G.2.</b> Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas <math>V = lwh</math> and <math>V = bh</math> to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.</p>	<p><b>EE6.G.2.</b> Demonstrate volume.</p>	<p><b>Level IV AA Students will:</b>  <b>EE6.G.2.</b> Calculate the volume of right rectangular prisms (using a formula) and describe the volume.</p> <p><b>Level III AA Students will:</b>  <b>EE6.G.2.</b> Given numerical representations of volume, place three objects in order from least to greatest volume.</p> <p><b>Level II AA Students will:</b>  <b>EE6.G.2.</b> Given two shapes to compare, identify which shape has a larger volume.</p> <p><b>Level I AA Students will:</b>  <b>EE6.G.2.</b> Identify rectangular prisms and cubes, and fill the inside to represent volume.</p>	<p style="text-align: center;">Volume of Rectangular Prisms  <b>Volume (V) = length (l) × width (w) × height (h)</b></p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p><b>Volume (V) = 5cm × 5cm × 5cm = 125cm<sup>3</sup></b></p> </div> <div style="text-align: center;">  <p><b>Volume (V) = 12cm × 4cm × 5cm = 240cm<sup>3</sup></b></p> </div> </div>
<p><b>6.G.3.</b> Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.</p>	<p><b>EE6.G.3.</b> Plot points on a coordinate grid.</p>	<p><b>Level IV AA Students will:</b>  <b>EE6.G.3.</b> Plot the points of a given shape in quadrant 1.</p> <p><b>Level III AA Students will:</b>  <b>EE6.G.3.</b> Identify the points plotted in quadrant 1 on a coordinate grid.</p> <p><b>Level II AA Students will:</b>  <b>EE6.G.3.</b> Plot one point in quadrant 1 of a coordinate grid.</p> <p><b>Level I AA Students will:</b>  <b>EE6.G.3.</b> Connect the points plotted on a coordinate grid to draw a polygon.</p>	
<p><b>6.G.4.</b> Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.</p>	<p><b>EE6.G.4.</b> Identify common three-dimensional shapes.</p>	<p><b>Level IV AA Students will:</b>  <b>EE6.G.4.</b> Identify three-dimensional shapes as using a two-dimensional representation (net).  <i>Ex. Given a cylinder, what is the matching real-world object?</i></p> <p><b>Level III AA Students will:</b>  <b>EE6.G.4.</b> As related to real-world objects, identify common three-dimensional shapes. (i.e. sphere, cube, cylinder)</p>	

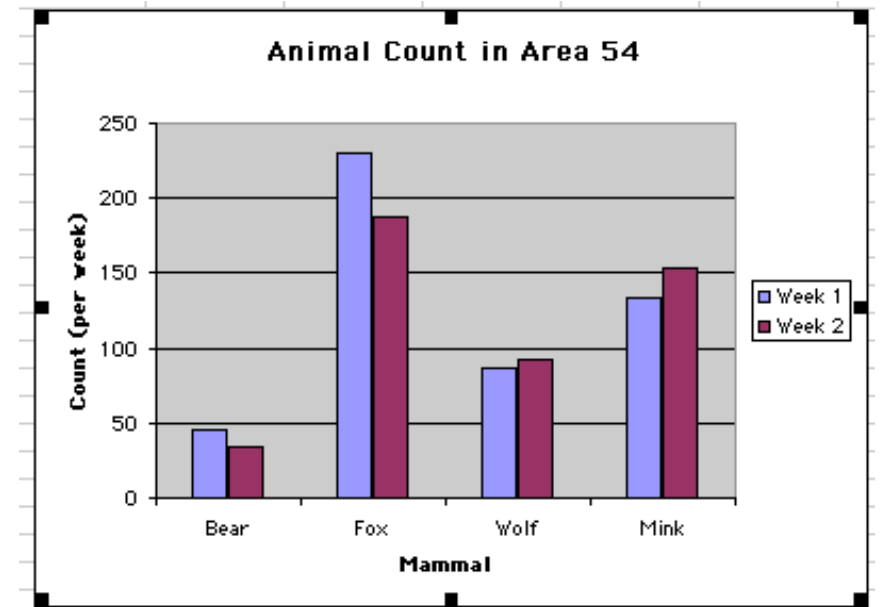
		<p><b>Level II AA Students will:</b>  <b>EE6.G.4.</b> Sort three-dimensional shapes and two-dimensional shapes.</p> <p><b>Level I AA Students will:</b>  <b>EE6.G.4.</b> Match shapes.</p>	
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**Statistics and Probability**

<p><b>Develop understanding of statistical variability.</b></p> <p><b>6.SP.1.</b> Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. <i>For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.</i></p>	<p><b>EE6.SP.1.</b> Develop a statistical question.</p>	<p><b>Level IV AA Students will:</b>  <b>EE6.SP.1.</b> Collect data, ask three questions about a set of numbers, then chart the data.</p> <p><b>Level III AA Students will:</b>  <b>EE6.SP.1.</b> Display data on a graph or table and ask two questions about the data.</p> <p><b>Level II AA Students will:</b>  <b>EE6.SP.1.</b> Organize data and ask one question about the data.</p> <p><b>Level I AA Students will:</b>  <b>EE6.SP.1.</b> Sort information into two categories and answer one question about the data.  <i>Ex. Separate/organize the data into two categories and determine which group has more.</i></p>	<p style="text-align: center;"><b>Students’ Favorite Juices</b></p>  <table border="1"> <caption>Students’ Favorite Juices</caption> <thead> <tr> <th>Juice Color</th> <th>Number of Students</th> </tr> </thead> <tbody> <tr> <td>Red</td> <td>2</td> </tr> <tr> <td>Orange</td> <td>8</td> </tr> <tr> <td>Yellow</td> <td>10</td> </tr> <tr> <td>Purple</td> <td>6</td> </tr> </tbody> </table>	Juice Color	Number of Students	Red	2	Orange	8	Yellow	10	Purple	6
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Yellow	10												
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<p><b>6.SP.2.</b> Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.</p> <p><b>6.SP.3.</b> Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.</p>	<p><b>EE6.SP.2-3.</b> Analyze data with mean, median, mode, and range.</p>	<p><b>Level IV AA Students will:</b>  <b>EE6.SP.2-3.</b> Collect data and calculate mean, median, mode, and range; make two observations about the calculations.</p> <p><b>Level III AA Students will:</b>  <b>EE6.SP.2-3.</b> Interpret given data on mean, median, mode, and range; make two observations about the data.</p> <p><b>Level II AA Students will:</b>  <b>EE6.SP.2-3.</b> Interpret given data on any two of the following: mean, median, mode, and range; make two observations about the data.</p> <p><b>Level I AA Students will:</b>  <b>EE6.SP.2-3.</b> Interpret given data on mean, median, mode, and range or make an observation about the data.</p>
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<p><b>Summarize and describe distributions.</b> <b>6.SP.4</b></p>	<p><b>EE6.SP.4.</b> Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</p>
<p><b>6.SP.5.</b> Summarize numerical data sets in relation to their context, such as by:</p> <ul style="list-style-type: none"> <li>a. Reporting the number of observations.</li> <li>b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.</li> <li>c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.</li> <li>d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.</li> </ul>	<p><b>EE6.SP.5.</b> Summarize data distributions on a graph or table.</p>	<p><b>Level IV AA Students will:</b> <b>EE6.SP.5.</b> Summarize the data distributions on a graph or table in multiple ways.</p> <p><b>Level III AA Students will:</b> <b>EE6.SP.5.</b> Summarize data distributions on a graph or table in one way.</p> <p><b>Level II AA Students will:</b> <b>EE6.SP.5.</b> Use a graph to determine which category has the greatest value (using a graph with multiple values).</p> <p><b>Level I AA Students will:</b> <b>EE6.SP.5.</b> Identify which has more or less (using a graph with two values).</p>





# 2014 WYOMING MATHEMATICS STANDARDS EXTENSIONS AND ACHIEVEMENT DESCRIPTORS FOR SEVENTH GRADE

## Seventh Grade Mathematics Standards

2012 WY Mathematics Content Standards	2014 Wyoming Content Standards Extensions	Instructional Achievement Level Descriptor
<b>Ratios and Proportional Relationships</b>		
<p><b>Analyze proportional relationships and use them to solve real-world and mathematical problems. Analyze proportional relationships and use them to solve real-world and mathematical problems.</b></p> <p><b>7.RP.1.</b> Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. <i>For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction <math>1/2 / 1/4</math> miles per hour, equivalently 2 miles per hour.</i></p> <p><b>7.RP.2.</b> Recognize and represent proportional relationships between quantities.</p> <ol style="list-style-type: none"> <li>a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.</li> <li>b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.</li> <li>c. Represent proportional relationships by equations. <i>For example, if total cost <math>t</math> is proportional to the number <math>n</math> of items purchased at a constant price <math>p</math>, the relationship between the total cost and the number of items can be expressed as <math>t = pn</math>.</i></li> <li>d. Explain what a point <math>(x, y)</math> on the graph of a proportional relationship means in terms of the situation, with special attention to the points <math>(0, 0)</math> and <math>(1, r)</math> where <math>r</math> is the unit rate.</li> </ol> <p><b>7.RP.3.</b> Use proportional relationships to solve multistep ratio and percent problems. <i>Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.</i></p>	<p><b>EE7.RP.1-3.</b> Understand how to use ratios to solve problems.</p>	<p><b>Level IV AA Students will:</b> <b>EE7.RP.1-3.</b> Identify the unit rate, and solve problems that describe a relationship between quantities. <i>Ex. For every vote Candidate A received, Candidate B received three votes. If Candidate A received 10 votes, how many did Candidate B receive?</i></p> <p><b>Level III AA Students will:</b> <b>EE7.RP.1-3.</b> Solve problems involving units of rate.</p> <p><b>Level II AA Students will:</b> <b>EE7.RP.1-3.</b> Given the visual model, extend the given ratio. <i>Ex. Given 3 red blocks and 2 blue blocks, if we add 3 more red blocks, how many more blue blocks are needed to continue the pattern?</i></p> <p><b>Level I AA Students will:</b> <b>EE7.RP.1-3.</b> Given a visual model, identify ratios involving relationships between two quantities. <i>Ex. Roll the dice and move one spot for each spot on the die.</i> <i>Ex. Continue the pattern <math>xx\ y\ xx\ y\ xx\ \dots</math></i></p>

**The Number System**

**Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.**

**7.NS.1.** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

- a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.*
- b. Understand  $p + q$  as the number located a distance  $|q|$  from  $p$ , in the positive or negative direction depending on whether  $q$  is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts
- c. Understand subtraction of rational numbers as adding the additive inverse,  $p - q = p + (-q)$ . Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
- d. Apply properties of operations as strategies to add and subtract rational numbers.

**EE7.NS.1.** Add and subtract fractions with like denominators (halves, thirds, fourths, and tenths) so the solution is less than or equal to one.

**Level IV AA Students will:**

**EE7.NS.1.** Add and subtract fractions with like denominators (halves, thirds, fourths, and tenths) so the solution is less than or equal to one.

**Level III AA Students will:**

**EE7.NS.1.** Add fractions with like denominators (halves, thirds, fourths, and tenths) so the solution is less than or equal to one.

**Level II AA Students will:**

**EE7.NS.1.** Use models to add halves, thirds, and fourths.

*Ex. Given 3 red blocks and 2 blue blocks, if we add 3 more red blocks, how many more blue blocks are needed to continue the pattern?*

**Level I AA Students will:**

**EE7.NS.1.** Use models to identify the whole and find the missing pieces of a whole.

*Ex. Roll the dice and move one spot for each spot on the die.*

*Ex. Continue the pattern  $xx\ y\ xx\ y\ xx\ \dots$*

**Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.**

**7.NS.2.** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

- a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as  $(-1)(-1) = 1$  and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
- b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If  $p$  and  $q$  are integers, then  $-(p/q) = (-p)/q = p/(-q)$ . Interpret quotients of rational numbers by describing real-world contexts.
- c. Apply properties of operations as strategies to multiply and divide rational numbers.
- d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

**EE7.NS.2.** Solve multiplication and division problems involving fractions.

**Level IV AA Students will:**

**EE7.NS.2.** Multiply and divide fractions with like denominators (halves, thirds, fourths, and tenths).

**Level III AA Students will:**

**EE7.NS.2.** Multiply fractions with like denominators (halves, thirds, fourths, and tenths) so the solution is less than or equal to one.

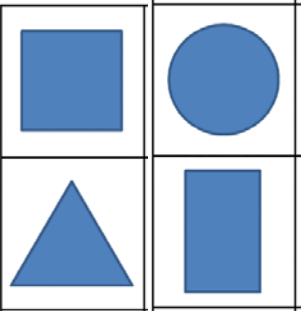
**Level II AA Students will:**


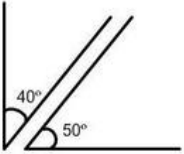
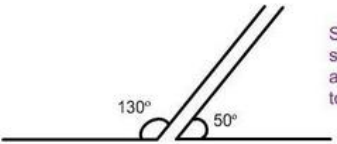
**EE7.NS.2.** Use models to multiply halves, thirds, and fourths.

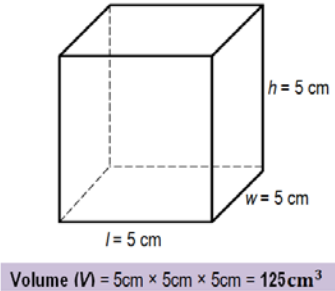
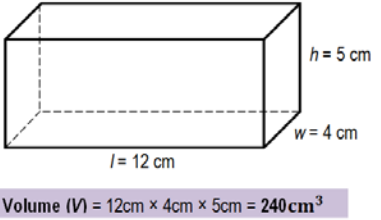
**Level I AA Students will:**

**EE7.NS.2.** Use models to identify the whole and find the missing pieces of a whole.

<p><b>7.NS.3.</b> Solve real-world and mathematical problems involving the four operations with rational numbers.<sup>1</sup></p> <p><sup>1</sup> <i>Computations with rational numbers extend the rules for manipulating fractions to complex fractions.</i></p>	<p><b>EE7.NS.3.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EE7.NS.1-2.)</b></p>
<p><b>Expressions and Equations</b></p>		
<p><b>Use properties of operations to generate equivalent expressions.</b></p> <p><b>7.EE.1.</b> Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</p> <p><b>7.EE.2.</b> Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. <i>For example, <math>a + 0.05a = 1.05a</math> means that “increase by 5%” is the same as “multiply by 1.05.”</i></p>	<p><b>EE7.EE.1-2.</b> Use the relationship within addition and/or multiplication to illustrate that two expressions are equivalent.</p>	<p><b>Level IV AA Students will:</b> <b>EE7.EE.1-2.</b> Apply the properties of operations to complete an equation.</p> <p><b>Level III AA Students will:</b> <b>EE7.EE.1-2.</b> Show a property of operations to be true.</p> <p><b>Level II AA Students will:</b> <b>EE7.EE.1-2.</b> Show equivalence using a property of operation.</p> <p><b>Level I AA Students will:</b> <b>EE7.EE.1-2.</b> Understand that different displays of the same quantity are equal. <i>Ex. Does <math>4 + 3 = 3 + 4</math>?</i></p>
<p><b>Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</b></p> <p><b>7.EE.3.</b> Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. <i>For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.</i></p>	<p><b>EE7.EE.3.</b> Solve two-step real-world addition and subtraction equations using positive and negative numbers.</p>	<p><b>Level IV AA Students will:</b> <b>EE7.EE.3.</b> Solve two-step real-world addition and subtraction equations using positive and negative numbers between -20 and 20.</p> <p><b>Level III AA Students will:</b> <b>EE7.EE.3.</b> Solve two-step real-world addition and subtraction equations using positive and negative numbers between -10 and 10.</p> <p><b>Level II AA Students will:</b> <b>EE7.EE.3.</b> Solve two-step real-world addition and subtraction equations using positive numbers between 0 and 10.</p> <p><b>Level I AA Students will:</b> <b>EE7.EE.3.</b> Given a two-step real-world addition equation, using positive and negative numbers, determine if the solution is positive or negative.</p>
<p><b>7.EE.4.</b> Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> <p><b>a.</b> Solve word problems leading to equations of the form <math>px + q = r</math> and <math>p(x + q) = r</math>, where <math>p</math>, <math>q</math>, and <math>r</math> are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. <i>For example, the perimeter of a rectangle is 54 cm. Its</i></p>	<p><b>EE7.EE.4.</b> Use the concept of equality with models to solve addition and subtraction equations.</p>	<p><b>Level IV AA Students will:</b> <b>EE7.EE.4.</b> Use the concept of equality to solve two-step real-world addition and subtraction equations.</p> <p><b>Level III AA Students will:</b> <b>EE7.EE.4.</b> Use the concept of equality to solve two-step real-world addition equations.</p> <p><b>Level II AA Students will:</b> <b>EE7.EE.4.</b> Use the concept of equality to solve one-step real-world addition and subtraction</p>

<p><i>length is 6 cm. What is its width?</i></p> <p><b>b.</b> Solve word problems leading to inequalities of the form <math>px + q &gt; r</math> or <math>px + q &lt; r</math>, where <math>p</math>, <math>q</math>, and <math>r</math> are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. <i>For example: As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality ... and describe the solutions.</i></p>		<p>equations.</p> <p><b>Level I AA Students will:</b>  <b>EE7.EE.4.</b> Recognize equal quantities on both sides of an equation</p>
<b>Geometry</b>		
<p><b>Draw, construct, and describe geometrical figures and describe the relationships between them.</b></p> <p><b>7.G.1.</b> Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.</p>	<p><b>EE7.G.1.</b> Recognize similarities among basic two-dimensional geometric figures.</p>	<p><b>Level IV AA Students will:</b>  <b>EE7.G.1.</b> Create a 2:1 scale drawing of a two-dimensional geometric figure.</p> <p><b>Level III AA Students will:</b>  <b>EE7.G.1.</b> Reproduce a 1:1 scale drawing of a two-dimensional geometric figure.</p> <p><b>Level II AA Students will:</b>  <b>EE7.G.1.</b> Match two-dimensional shapes when given a group of various geometric figures.</p> <p><b>Level I AA Students will:</b>  <b>EE7.G.1.</b> Demonstrate the ability to recognize a two-dimensional shape (triangle, rectangle, square) when given a complete shape.</p>
<p><b>Draw, construct, and describe geometrical figures and describe the relationships between them.</b></p> <p><b>7.G.2.</b> Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.</p>	<p><b>EE7.G.2.</b> Draw, model, or trace basic two-dimensional geometric shapes without a model. (circle, triangle, rectangle, square)</p>	<p><b>Level IV AA Students will:</b>  <b>EE7.G.2.</b> Draw or model three basic two-dimensional geometric shapes.</p> <p><b>Level III AA Students will:</b>  <b>EE7.G.2.</b> Draw or model a basic two-dimensional geometric shape.</p> <p><b>Level II AA Students will:</b>  <b>EE7.G.2.</b> Model or trace three basic two-dimensional geometric shapes.</p> <p><b>Level I AA Students will:</b>  <b>EE7.G.2.</b> Model or trace a basic two-dimensional geometric shape.</p> 
<p><b>7.G.3.</b> Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.</p>	<p><b>EE7.G.3.</b> Match a two-dimensional shape with a three-dimensional shape that shares an attribute.</p>	<p><b>Level IV AA Students will:</b>  <b>EE7.G.3.</b> Deconstruct a three-dimensional shape into two-dimensional figures (i.e. nets).</p> <p><b>Level III AA Students will:</b>  <b>EE7.G.3.</b> Match a two-dimensional shape with a three-dimensional shape that shares an attribute.</p> <p><b>Level II AA Students will:</b>  <b>EE7.G.3.</b> Describe common attributes of two- and three-dimensional shapes.</p>

		<p><b>Level I AA Students will:</b>  <b>EE7.G.3.</b> Replicate the two-dimensional cross-section of a three-dimensional shape (cube, pyramid, rectangular prism) when given a complete shape.</p>
<p><b>Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</b></p> <p><b>7.G.4.</b> Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.</p>	<p><b>EE7.G.4.</b> Understand area and circumference as these concepts relate to circles.</p>	<p><b>Level IV AA Students will:</b>  <b>EE7.G.4.</b> Calculate the area and circumference of a circle (when given the formulas).</p> <p><b>Level III AA Students will:</b>  <b>EE7.G.4.</b> Calculate the area or circumference of a circle (when give the formulas).</p> <p><b>Level II AA Students will:</b>  <b>EE7.G.4.</b> Identify the area and circumference of a circle.</p> <p><b>Level I AA Students will:</b>  <b>EE7.G.4.</b> Trace or indicate either the area or circumference of a circle.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Circumference  <math>C = \pi \cdot d</math>  <math>C = \pi (8)</math></p> </div> <div style="text-align: center;"> <p>Area  <math>A = \pi \cdot r^2</math>  <math>A = \pi (4)^2</math></p> </div> </div>
<p><b>7.G.5.</b> Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.</p>	<p><b>EE7.G.5.</b> Understand different types of angles.</p>	<p><b>Level IV AA Students will:</b>  <b>EE7.G.5.</b> Create a model that illustrate supplementary and complementary angles.</p> <p><b>Level III AA Students will:</b>  <b>EE7.G.5.</b> Identify adjacent, supplementary, and complementary angles when given multiple pieces to fit together.</p> <p><b>Level II AA Students will:</b>  <b>EE7.G.5.</b> Identify adjacent and supplementary angles when given multiple pieces to fit together.</p> <p><b>Level I AA Students will:</b>  <b>EE7.G.5.</b> Identify adjacent angles when given a figure showing intersecting lines.</p> <div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;"><b>Complementary and Supplementary Angles</b></p> <p>Complementary angles are angle pairs that have a sum of 90°. They don't have to be adjacent and any two angles that add up to 90°, like the angles to the right, are complementary.</p>  <p>Supplementary angles are angle pairs that have a sum of 180°. They don't have to be adjacent and any two angles that add up to 180°, like the angles to the left, are supplementary.</p>  </div>

<p><b>7.G.6.</b> Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.</p>	<p><b>EE7.G.6.</b> Understand the geometric concepts of area, volume, and surface area.</p>	<p><b>Level IV AA Students will:</b>  <b>EE7.G.6.</b> Demonstrate the area of a square or rectangle, the volume of a cube or rectangular prism, and the surface area of a cube or rectangular prism <i>and</i> calculate one of the three. (may use their related objects)</p> <p><b>Level III AA Students will:</b>  <b>EE7.G.6.</b> Demonstrate the volume and surface area of a cube or rectangular prism, and demonstrate the area of a square or rectangle. (may use other related objects)</p> <p><b>Level II AA Students will:</b>  <b>EE7.G.6.</b> Demonstrate the volume of a cube or rectangular prism and the area of a square or rectangle. (may use other related objects)</p> <p><b>Level I AA Students will:</b>  <b>EE7.G.6.</b> Demonstrate the area of a square or rectangle. (may use other related objects)</p> <div style="text-align: right;"> <p><b>Volume of Rectangular Prisms</b>  <b>Volume (V) = length (l) × width (w) × height (h)</b></p>   </div>
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**Statistics and Probability**

<p><b>Use random sampling to draw inferences about a population.</b></p> <p><b>7.SP.1.</b> Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.</p>	<p><b>EE7.SP.1.</b> Understand characteristics of sampling.</p>	<p><b>Level IV AA Students will:</b>  <b>EE7.SP.1.</b> Select which inference is most valid when given a selection of inferences based on a sample.</p> <p><b>Level III AA Students will:</b>  <b>EE7.SP.1.</b> Select which sample provides for more valid generalization when provided with two sets of information based on different sample sizes.</p> <p><b>Level II AA Students will:</b>  <b>EE7.SP.1.</b> Understand how sampling different populations can produce different results.</p> <p><b>Level I AA Students will:</b>  <b>EE7.SP.1.</b> Understand that a sample is a group within a group.</p>
<p><b>7.SP.2.</b> Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. <i>For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.</i></p>	<p><b>EE7.SP.2.</b> Answer a question related to data from an experiment, given a model of data, or from data collected by the student using</p>	<p><b>Level IV AA Students will:</b>  <b>EE7.SP.2.</b> Answer three or more questions about data collected from a random sample gathered by the student and explain or demonstrate the results.</p> <p><b>Level III AA Students will:</b>  <b>EE7.SP.2.</b> Answer two questions related to data collected from a random sample.</p>

	a random sample.	<p><b>Level II AA Students will:</b>  <b>EE7.SP.2.</b> Collect data to answer a given question.</p> <p><b>Level I AA Students will:</b>  <b>EE7.SP.2.</b> Answer a question from a data collection.</p>
<p><b>Draw informal comparative inferences about two populations.</b></p> <p><b>7.SP.3.</b> Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. <i>For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.</i></p>	<p><b>EE7.SP.3.</b> Compare two sets of data within a single data display (such as a picture graph, line plot, or bar graph) and make inferences based on the comparison.</p>	<p><b>Level IV AA Students will:</b>  <b>EE7.SP.3.</b> Compare data from two picture graphs, two line plots, or two bar graphs, and make three or more inferences based on the comparison.</p> <p><b>Level III AA Students will:</b>  <b>EE7.SP.3.</b> Compare two sets of data within a single data display such as a picture graph, line plot, or bar graph, and make two inferences based on the comparison.</p> <p><b>Level II AA Students will:</b>  <b>EE7.SP.3.</b> Summarize data on a graph or table in one way.</p> <p><b>Level I AA Students will:</b>  <b>EE7.SP.3.</b> Read data from one given source.</p>
<p><b>Draw informal comparative inferences about two populations.</b></p> <p><b>7.SP.4.</b></p>	<p><b>EE7.SP.4.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</p>
<p><b>Investigate chance processes and develop, use, and evaluate probability models.</b></p> <p><b>7.SP.5.</b></p>	<p><b>EE7.SP.5.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</p>
<p><b>7.SP.6.</b> Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. <i>For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.</i></p>	<p><b>EE7.SP.6.</b> Make predictions regarding the probability of a chance event based on data.</p>	<p><b>Level IV AA Students will:</b>  <b>EE7.SP.6.</b> Create a question and collect data regarding a chance event and make a prediction based on those data.</p> <p><b>Level III AA Students will:</b>  <b>EE7.SP.6.</b> When given a question, collect data and make a prediction regarding the probability of a chance event.</p> <p><b>Level II AA Students will:</b>  <b>EE7.SP.6.</b> Make a prediction regarding the probability of a chance event when given data by the teacher.</p> <p><b>Level I AA Students will:</b>  <b>EE7.SP.6.</b> Describe the probability of an event occurring.  <i>Ex. Will the sun rise tomorrow? Yes or No</i></p>
<p><b>Investigate chance processes and develop, use, and evaluate probability models.</b></p> <p><b>7.SP.7. 7.SP.8.</b></p>	<p><b>EE7.SP.7-8.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</p>

# 2014 WYOMING MATHEMATICS STANDARDS EXTENSIONS AND ACHIEVEMENT DESCRIPTORS FOR EIGHTH GRADE

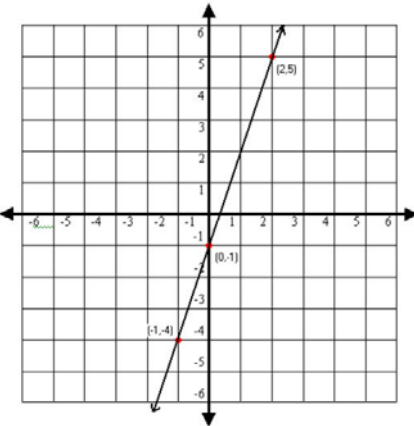
## Eighth Grade Mathematics Standards

2012 WY Mathematics Content Standards	2014 Wyoming Content Standards Extensions	Instructional Achievement Level Descriptor
<b>The Number System</b>		
<p><b>Know that there are numbers that are not rational, and approximate them by rational numbers.</b></p> <p><b>8.NS.1.</b> Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.</p>	<p><b>EE8.NS.1.</b> Understand the comparability between fractions and decimals.</p>	<p><b>Level IV AA Students will:</b>  <b>EE8.NS.1.</b> Round a number to the nearest hundredth when given a number containing a digit in the thousandths place.</p> <p><b>Level III AA Students will:</b>  <b>EE8.NS.1.</b> Understand how to convert simple fractions into decimals, and expand a number through the hundredths place.</p> <p><b>Level II AA Students will:</b>  <b>EE8.NS.1.</b> Understand how to convert simple fractions into decimals.</p> <p><b>Level I AA Students will:</b>  <b>EE8.NS.1.</b> Match / recognize equivalent fractions or decimals.</p>
<p><b>8.NS.2.</b> Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., <math>\pi^2</math>). <i>For example, by truncating the decimal expansion of <math>\sqrt{2}</math>, show that <math>\sqrt{2}</math> is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.</i></p>	<p><b>EE8.NS.2.</b> Understand the comparability between fractions and decimals.</p>	<p><b>Level IV AA Students will:</b>  <b>EE8.NS.2.</b> On a number line, plot a number that contains digits in the tenths and hundredths places.</p> <p><b>Level III AA Students will:</b>  <b>EE8.NS.2.</b> On a number line, plot a number that contains a digit in the tenths place.</p> <p><b>Level II AA Students will:</b>  <b>EE8.NS.2.</b> Plot a number that falls between two whole numbers (i.e. 1.5, 4.5, 9.5).</p> <p><b>Level I AA Students will:</b>  <b>EE8.NS.2.</b> Identify whole numbers on a number line.</p>
<b>Expressions and Equations</b>		
<p><b>Work with radicals and integer exponents.</b></p> <p><b>8.EE.1.</b> Know and apply the properties of integer exponents to generate equivalent numerical expressions. <i>For example, <math>32 \times 3^{-5} = 3^{-3} = 1/33 = 1/27</math>.</i></p>	<p><b>EE8.EE.1.</b> Know and apply the properties of integer exponents to whole numbers greater than 1.</p>	<p><b>Level IV AA Students will:</b>  <b>EE8.EE.1.</b> Deconstruct two-digit whole numbers with integer exponents into multiplication expressions and calculate the product.</p> <p><b>Level III AA Students will:</b>  <b>EE8.EE.1.</b> Deconstruct two-digit whole numbers with integer exponents into multiplication expressions.</p> <p><b>Level II AA Students will:</b>  <b>EE8.EE.1.</b> Deconstruct single-digit whole numbers with integer exponents into multiplication expressions and calculate the product.</p>

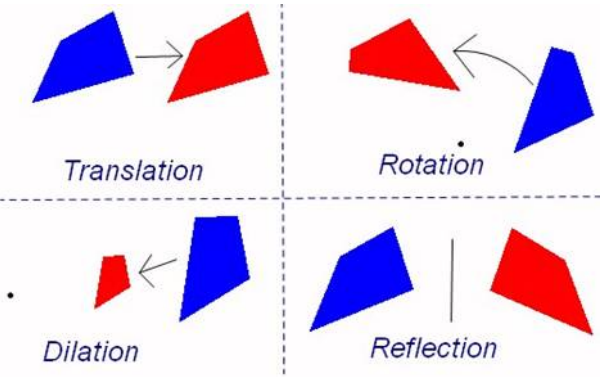


		<p><b>Level I AA Students will:</b>  <b>EE8.EE.1.</b> Deconstruct single-digit whole numbers with integer exponents into multiplication expressions.</p>
<p><b>8.EE.2.</b> Use square root and cube root symbols to represent solutions to equations of the form <math>x^2 = p</math> and <math>x^3 = p</math>, where <math>p</math> is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that <math>\sqrt{2}</math> is irrational.</p>	<p><b>EE8.EE.2.</b> Understand and use square roots as they relate to small perfect squares up to 100.</p>	<p><b>Level IV AA Students will:</b>  <b>EE8.EE.2.</b> Demonstrate the relationship between whole numbers with integer exponents and square roots for small perfect squares up to 100.  <i>Ex. <math>\sqrt{25} = 5</math>; <math>5^2 = 25</math></i></p> <p><b>Level III AA Students will:</b>  <b>EE8.EE.2.</b> Using a calculator, students will find the square root of small perfect squares up to 100.</p> <p><b>Level II AA Students will:</b>  <b>EE8.EE.2.</b> Students will identify the square root of small perfect squares up to 100. (using a chart)</p> <p><b>Level I AA Students will:</b>  <b>EE8.EE.2.</b> Identify the square root symbol.</p>
<p><b>8.EE.3.</b> Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. <i>For example, estimate the population of the United States as 3 times <math>10^8</math> and the population of the world as 7 times <math>10^9</math>, and determine that the world population is more than 20 times larger.</i></p>	<p><b>EE8.EE.3</b> Understand and use a number expressed in the form of a single digit times an integer power up to 10 to estimate quantity and size.</p>	<p><b>Level IV AA Students will:</b>  <b>EE8.EE.3.</b> Without an external resource, compare single digit numbers with integer powers up to ten and determine which is larger.</p> <p><b>Level III AA Students will:</b>  <b>EE8.EE.3.</b> When provided with a resource (i.e. chart, calculator), distinguish which is larger when provided with four single digit numbers with integer powers up to ten.</p> <p><b>Level II AA Students will:</b>  <b>EE8.EE.3.</b> When provided with a resource (i.e. chart, calculator), distinguish which is larger when provided with two single digit numbers with integer powers up to ten.</p> <p><b>Level I AA Students will:</b>  <b>EE8.EE.3.</b> When given a visual model, distinguish which is larger when provided with two single digit numbers with integer powers up to ten.</p>
<p><b>8.EE.4.</b> Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.</p>	<p><b>EE8.EE.4</b> Use scientific notation to choose the appropriate expression for very large or very small quantities.</p>	<p><b>Level IV AA Students will:</b>  <b>EE8.EE.4.</b> When given a whole number, create a scientific notation to express quantity.</p> <p><b>Level III AA Students will:</b>  <b>EE8.EE.4.</b> When given a visual model, distinguish which is larger when provided with two numbers displayed using scientific notation (from <math>10^{-10}</math> to <math>10^{10}</math>).</p> <p><b>Level II AA Students will:</b>  <b>EE8.EE.4.</b> When given a visual model, distinguish which is larger when provided with two numbers displayed using scientific notation (from 0 to <math>10^{10}</math>).</p>

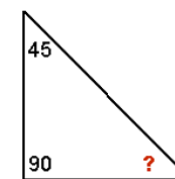
		<p><b>Level I AA Students will:</b>  <b>EE8.EE.4.</b> Match an expression to a picture representing quantity.</p>
<p><b>Understand the connections between proportional relationships, lines, and linear equations.</b></p> <p><b>8.EE.5.</b> Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. <i>For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.</i></p>	<p><b>EE8.EE.5.</b>  Understand proportional relationships.</p>	<p><b>Level IV AA Students will:</b>  <b>EE8.EE.5.</b> Collect data, create a graph, and make inferences regarding the relationship between the two items being graphed.</p> <p><b>Level III AA Students will:</b>  <b>EE8.EE.5.</b> When provided with data, create a graph and make inferences regarding the relationship between the two items being graphed.</p> <p><b>Level II AA Students will:</b>  <b>EE8.EE.5.</b> When provided with data and a graph, make inferences regarding the relationship between the two items being graphed.</p> <p><b>Level I AA Students will:</b>  <b>EE8.EE.5.</b> When provided with data, a graph, and a set of two inferences, determine which inference is most valid.</p>
<p><b>Understand the connections between proportional relationships, lines, and linear equations.</b></p> <p><b>8.EE.6.</b></p>	<p><b>EE8.EE.6.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</p>
<p><b>Analyze and solve linear equations and pairs of simultaneous linear equations.</b></p> <p><b>8.EE.7. &amp; 8.EE.8.</b></p>	<p><b>EE8.EE.7-8.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</p>
<b>Functions</b>		
<p><b>Define, evaluate, and compare functions.</b></p> <p><b>8.F.1.</b> Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.<sup>1</sup></p> <p><sup>1</sup> <i>Function notation is not required in Grade 8.</i></p>	<p><b>EE8.F.1.</b>  Understand that a function is a rule that assigns to each input exactly one output.</p>	<p><b>Level IV AA Students will:</b>  <b>EE8.F.1.</b> Given a function table, identify the function and apply it for a missing variable.</p> <p><b>Level III AA Students will:</b>  <b>EE8.F.1.</b> Given a function table and the pattern, identify the function.</p> <p><b>Level II AA Students will:</b>  <b>EE8.F.1.</b> Identify the relationship between two numbers (increasing and decreasing).</p> <p><b>Level I AA Students will:</b>  <b>EE8.F.1.</b> Identify the relationship between two numbers (increasing).</p>
<p><b>Define, evaluate, and compare functions.</b></p> <p><b>8.F.2. &amp; 8.F.3.</b></p>	<p><b>EE8.F.2-3.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</p>

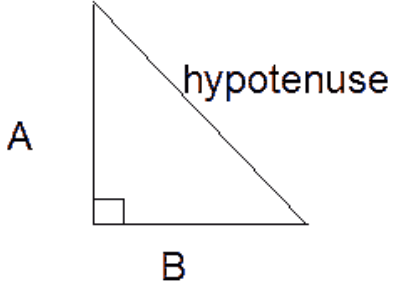
<p><b>Use functions to model relationships between quantities.</b></p> <p><b>8.F.4.</b></p>	<p><b>EE8.F.4.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>
<p><b>8.F.5.</b> Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.</p>	<p><b>EE8.F.5.</b> Describe the functional relationship between two positive quantities by analyzing a linear graph.</p>	<p><b>Level IV AA Students will:</b> <b>EE8.F.5.</b> Describe how a linear graph represents a relationship between two quantities and use the graph to answer questions using that relationship.</p> <p><b>Level III AA Students will:</b> <b>EE8.F.5.</b> Describe how a graph represents a relationship between two quantities. <i>Ex. Student indicates where points or levels are to be colored to create a graphical relationship.</i></p> <p><b>Level II AA Students will:</b> <b>EE8.F.5.</b> When given three possible options, choose which statement best describes the relationship illustrated by a linear graph.</p> <p><b>Level I AA Students will:</b> <b>EE8.F.5.</b> Use the words “increase” or “decrease” to describe the relationship illustrated by a linear graph.</p> 

**Geometry**

<p><b>Understand congruence and similarity using physical models, transparencies, or geometry software.</b></p> <p><b>8.G.1.</b> Verify experimentally the properties of rotations, reflections, and translations:</p> <ol style="list-style-type: none"> <li>Lines are taken to lines, and line segments to line segments of the same length.</li> <li>Angles are taken to angles of the same measure.</li> <li>Parallel lines are taken to parallel lines.</li> </ol>	<p><b>EE8.G.1.</b> Understand rotation, reflection, and translation in objects and shapes containing angles.</p>	<p><b>Level IV AA Students will:</b> <b>EE8.G.1.</b> Manipulate shapes containing angles to demonstrate rotation, reflection, and translation.</p> <p><b>Level III AA Students will:</b> <b>EE8.G.1.</b> When given a shape containing angles, identify whether a comparison shape is a rotation, reflection, or translation.</p> <p><b>Level II AA Students will:</b> <b>EE8.G.1.</b> When given a shape containing angles, identify whether a comparison shape is a rotation or translation.</p> <p><b>Level I AA Students will:</b> <b>EE8.G.1.</b> When given a shape containing angles, identify whether a comparison shape is a rotation.</p>	
<p><b>8.G.2.</b> Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.</p>	<p><b>EE8.G.2.</b> Understand the principles of congruency.</p>	<p><b>Level IV AA Students will:</b> <b>EE8.G.2.</b> Create a two-dimensional figure that is congruent to a figure provided by the teacher.</p> <p><b>Level III AA Students will:</b> <b>EE8.G.2.</b> When provided with a two-dimensional figure, identify all of the congruent figures from a group of 5 two-dimensional figures.</p>	

		<p><b>Level II AA Students will:</b>  <b>EE8.G.2.</b> When provided with a two-dimensional figure, identify the congruent figure from a group of 2 two-dimensional figures.</p> <p><b>Level I AA Students will:</b>  <b>EE8.G.2.</b> When provided with a two-dimensional figure, trace the congruent figures.</p>
<p><b>8.G.3.</b> Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.</p>	<p><b>EE8.G.3.</b>  Understand dilation in objects and shapes containing angles.</p>	<p><b>Level IV AA Students will:</b>  <b>EE8.G.3.</b> Given coordinates, create a two-dimensional figure and demonstrate dilation.</p> <p><b>Level III AA Students will:</b>  <b>EE8.G.3.</b> Manipulate shapes containing angles to demonstrate dilation.</p> <p><b>Level II AA Students will:</b>  <b>EE8.G.3.</b> When provided with a two-dimensional figure and a dilation, provide an explanation of how the figure is dilated.</p> <p><b>Level I AA Students will:</b>  <b>EE8.G.3.</b> When given a shape containing angles, identify whether a comparison shape is a dilation.</p>
<p><b>8.G.4.</b> Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.</p>	<p><b>EE8.G.4.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EE8.G.1-3.)</b></p>
<p><b>8.G.5.</b> Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. <i>For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.</i></p>	<p><b>EE8.G.5.</b>  Understand the relationship among angles within a right triangle, and understand that the angles within any triangle add up to 180°.</p>	<p><b>Level IV AA Students will:</b>  <b>EE8.G.5.</b> When given the measurements for 2 angles within a triangle, find the measurement of the third angle.</p> <p><b>Level III AA Students will:</b>  <b>EE8.G.5.</b> Understand that all angles of a triangle add up to 180°. <i>Ex. Given 3 angle measurements and a right triangle, with a right degree symbol at the right angle, have the student place the angles in their appropriate location.</i></p> <p><b>Level II AA Students will:</b>  <b>EE8.G.5.</b> When shown a right triangle, determine which angle is a right angle and apply the right angle symbol.</p> <p><b>Level I AA Students will:</b>  <b>EE8.G.5.</b> When shown a selection of three triangles, identify the right triangle.</p>
<p><b>Understand and apply the Pythagorean Theorem.</b>  <b>8.G.6.</b></p>	<p><b>EE8.G.6.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population</b></p>



<p><b>8.G.7.</b> Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.</p>	<p><b>EE8.G.7.</b> Understand the basic principles of right triangles.</p>	<p><b>Level IV AA Students will:</b> <b>EE8.G.7.</b> When given the formula <math>a^2 + b^2 = c^2</math>, the lengths of <math>a</math> and <math>b</math>, the squares of <math>a</math> and <math>b</math>, and the right angle, find the hypotenuse.</p> <p><b>Level III AA Students will:</b> <b>EE8.G.7.</b> Identify sides <math>a</math>, <math>b</math>, and <math>c</math> of a right triangle, and understand that side <math>c</math> is the hypotenuse.</p> <p><b>Level II AA Students will:</b> <b>EE8.G.7.</b> Identify a right triangle, and understand that the longest side is the hypotenuse.</p> <p><b>Level I AA Students will:</b> <b>EE8.G.7.</b> When shown a right triangle, determine which angle is a right angle.</p> <div style="text-align: right;">  </div>
<p><b>Understand and apply the Pythagorean Theorem.</b> <b>8.G.8.</b></p>	<p><b>EE8.G.8.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>
<p><b>Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.</b></p> <p><b>8.G.9.</b> Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</p>	<p><b>EE8.G.9.</b> Understand the concept of volume as it relates to cylinders, cones, and spheres.</p>	<p><b>Level IV AA Students will:</b> <b>EE8.G.9.</b> When given the formulas for the volumes of cones, cylinders, and spheres, calculate the volume for a given shape (when given the unit of measure).</p> <p><b>Level III AA Students will:</b> <b>EE8.G.9.</b> Understand common units used to measure volume, and describe the concept of volume.</p> <p><b>Level II AA Students will:</b> <b>EE8.G.9.</b> Distinguish among cones, cylinders, and spheres, and predict which shape has the greatest volume when provided with two shapes of equivalent bases.</p> <p><b>Level I AA Students will:</b> <b>EE8.G.9.</b> Demonstrate the volume of cones, cylinders, and spheres. <i>Ex. Point to the empty container. Now point to full container. Which one holds more?</i></p>

**Statistics and Probability**

**8.SP.1.** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

**8.SP.4.** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*

**EE8.SP.1&4.** Understand associations between two pieces of data and how scatter plots can help convey these associations.

**Level IV AA Students will:**  
**EE8.SP.1.** When provided a prompt and a question to investigate, collect data, create a scatter plot, and make two inferences based on the results.

**Level III AA Students will:**  
**EE8.SP.1.** When provided a prompt, a question, and a set of data, create a scatter plot and make an inference based on the results.

**Level II AA Students will:**  
**EE8.SP.1.** When provided with a scatter plot, interpret the display by making at least one inference.

**Level I AA Students will:**  
**EE8.SP.1.** When provided various graphs (bar, pie, line, scatter plot), choose the scatter plot graph.

**8.SP.2.** Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

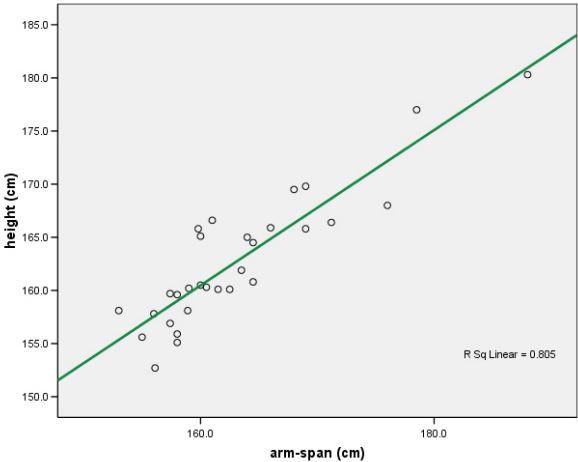
**EE8.SP.2.** Understand the use of straight lines within scatter plots to suggest a linear association.

**Level IV AA Students will:**  
**EE8.SP.2.** Informally fit a straight line into a scatter plot that suggests a linear association and describe the association.

**Level III AA Students will:**  
**EE8.SP.2.** Informally fit a straight line into a scatter plot that suggests a linear association.

**Level II AA Students will:**  
**EE8.SP.2.** Determine whether a scatter plot suggests a linear association between two variables.

**Level I AA Students will:**  
**EE8.SP.2.** Determine if a straight line could be placed on a scatter plot to show a linear association.



**8.SP.3.** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm / hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*

**EE8.SP.3.** Not Applicable

**\*\*\*The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.**

# 2014 WYOMING MATHEMATICS STANDARDS EXTENSIONS AND ACHIEVEMENT DESCRIPTORS FOR HIGH SCHOOL

## High School Mathematics Standards

<b>2012 WY Mathematics Content Standards</b> <b>NOTE: (+) designated for complex mathematics (advanced courses). A Table of these standards can be found at the end of the H.S. Standards Extensions document.</b>	<b>2014 Wyoming Content Standards Extensions</b>	<b>Instructional Achievement Level Descriptor</b>
<b>Number and Quantity - The Real Number System</b>		
<p><b>Extend the properties of exponents to rational exponents.</b></p> <p><b>N-RN.1.</b> Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.</p> <p><i>For example, we define <math>5^{1/3}</math> to be the cube root of 5 because we want <math>(5^{1/3})^3 = 5^{(1/3)3}</math> to hold, so <math>(5^{1/3})^3</math> must equal 5.</i></p>	<p><b>EEN-RN.1.</b> Solve division problems with remainders using concrete objects.</p>	<p><b>Level IV AA Students will:</b>  <b>EEN-RN.1.</b> Illustrate the concept of remainders using objects and numerical representations.  <i>Ex. A group of 6 students sits down to have a snack. You have 25 cookies. How many cookies does each student get? Are there any leftover? (e.g., Write the number sentence <math>25 \div 6 = 4 \text{ r}1</math>).</i>  <i>Ex. If a pack of gum costs \$0.49 and there are 5 sticks per pack, how much does each stick cost? Use real objects (gum and coins) to show division (e.g., <math>49 \div 5 = 9 \text{ r}4</math>).</i></p> <p><b>Level III AA Students will:</b>  <b>EEN-RN.1.</b> Solve division problems with remainders using concrete objects.  <i>Ex. A group of 6 students sits down to have a snack. You have 15 cookies. How many cookies does each student get? Are there any leftover?</i>  <i>Ex. A student has 5 quarters and wants to buy a soda that costs \$1.00. How much money is left over?</i></p> <p><b>Level II AA Students will:</b>  <b>EEN-RN.1.</b> Identify the difference between equal and not equal groups.  <i>Ex. Using drawings of objects or groups of objects, determine if the groups are equal or not equal.</i>  <i>Ex. When passing out 10 pencils to 9 people, do you have 1 for each person? Are there some left over?</i>  <i>Ex. Are 2 nickels equal to \$0.11?</i></p> <p><b>Level I AA Students will:</b>  <b>EEN-RN.1.</b> Recognize that a whole can be divided into parts.  <i>Ex. Use models to represent quantities as parts of a whole.</i>  <i>Ex. Given two sets of objects with one set divided into smaller groups, point to the quantities that have been divided when prompted.</i></p>
<p><b>N-RN.2.</b></p>	<p><b>EEN-RN.2.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEF-GMD.1-4.)</b></p>
<p><b>Use properties of rational and irrational numbers.</b></p> <p><b>N-RN.3.</b></p>	<p><b>EEN-RN.3.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEN-CN.2.)</b></p>

Number and Quantity - Quantities		
<p><b>Reason quantitatively and use units to solve problems.</b></p> <p><b>N-Q.1.</b> Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p><b>N-Q.2.</b> Define appropriate quantities for the purpose of descriptive modeling.</p> <p><b>N-Q.3.</b> Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p>	<p><b>EEN-Q.1-3.</b> Express quantities to the appropriate precision of measurement.</p>	<p><b>Level IV AA Students will:</b> <b>EEN-Q.1-3.</b> Choose solutions to problems using the appropriate precision of measurements. <i>Ex.</i> Using a measuring tape, determine if a large object would fit into a smaller space. <i>Ex.</i> If it takes 30 minutes to get home, will I be home by 6:00 p.m. if I leave at 5:45 p.m.?</p> <p><b>Level III AA Students will:</b> <b>EEN-Q.1-3.</b> Express quantities to the appropriate precision of measurement. <i>Ex.</i> Measure the length of an object to the nearest half and quarter of an inch. <i>Ex.</i> Measure time in quarter hour increments (e.g. How much time do I have with my friends after I eat lunch). <i>Ex.</i> Measure ingredients for a recipe accurately.</p> <p><b>Level II AA Students will:</b> <b>EEN-Q.1-3.</b> Select the appropriate type of unit as a measurement tool. <i>Ex.</i> Which measurement would you use to measure the length of a book: inches, yards, or feet? <i>Ex.</i> What unit of measure would you use to measure the length of the room: length, weight, volume? <i>Ex.</i> Which is best to describe your weight, pounds or inches? <i>Ex.</i> Which is best to measure a glass of lemonade: inch, liter, or pound? <i>Ex.</i> Record the daily temperature for a week using degrees. <i>Ex.</i> Match a thermometer to two non-standard units of measurement.</p> <p><b>Level I AA Students will:</b> <b>EEN-Q.1-3.</b> Identify measurement tools. Identify the attribute to be measured (e.g. weight, length, temperature). <i>Ex.</i> Of these items, which is a measurement tool for length: pencil, ruler, can? <i>Ex.</i> Match units of measurement to measurement tools (e.g. days and hours measure time, inches and feet measure length).</p>
Number and Quantity - The Complex Number System		
<p><b>Perform arithmetic operations with complex numbers.</b></p> <p><b>N-CN.1.</b></p>	<p><b>EEN-CN.1.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>
<p><b>N-CN.2.</b> Use the relation <math>i^2 = -1</math> and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.</p>	<p><b>EEN-CN.2.</b> Use the operations of addition, subtraction, and multiplication with decimals (decimal value x whole number) in real-world situations using money as the standard units</p>	<p><b>Level IV AA Students will:</b> <b>EEN-CN.2.</b> Apply the operations of addition, subtraction, and multiplication in real-world situations using money as the standard units (\$50, \$20, \$10, \$5, \$1, \$0.25, \$0.10, \$0.05, and \$0.01). <i>Ex.</i> Using a checkbook register, calculate <math>\\$55.55 - \\$10.10 = \underline{\hspace{2cm}}</math>. <i>Ex.</i> Your bill at the restaurant is \$20.25 and you want to leave a 15% tip. How much would the tip be? (e.g. <math>20.25 \times 0.15 = \underline{\hspace{2cm}}</math>) <i>Ex.</i> Calculate the cost of 6 movie tickets that are \$7.50 each. <i>Ex.</i> If I have \$4.20, and I buy an item for \$3.50, how much change will I get?</p> <p><b>Level III AA Students will:</b> <b>EEN-CN.2.</b> Use the operations of addition, subtraction, and multiplication with decimals (decimal value x whole</p>



	(\$20, \$10, \$5, \$1, \$0.25, \$0.10, \$0.05, and \$0.01).	<p>number) in real-world situations using money as the standard units (\$20, \$10, \$5, \$1, \$0.25, \$0.10, \$0.05, and \$0.01).  <i>Ex.</i> Using a checkbook register, add <math>\\$6.50 + \\$3</math> (e.g., If you have \$6.50 in your bank account and you receive a gift for \$3.00, how much money do you have in your bank account?)  <i>Ex.</i> Calculate the cost of 2 movie tickets that are \$6.50 each.</p> <p><b>Level II AA Students will:</b>  <b>EEN-CN.2.</b> Show the operations of addition, subtraction, and multiplication up to the tenths place with decimals.  <i>Ex.</i> If I have a nickel and two dimes, how much money do I have?  <i>Ex.</i> If I have \$3.50 and I spend \$2.50, how much money do I have?</p> <p><b>Level I AA Students will:</b>  <b>EEN-CN.2.</b> Select the operations of addition, subtraction, and multiplication with whole numbers less than 20.  <i>Ex.</i> If Sam bought 3 cats and they each cost \$2, how much did he pay for all 3 cats (<math>3 \times \\$2 = \\$6</math>).  <i>Ex.</i> <math>4 + 36 = \underline{\quad}</math>.  <i>Ex.</i> <math>67 - 33 = \underline{\quad}</math>.  <i>Ex.</i> <math>20 \times 3 = \underline{\quad}</math>.  <i>Ex.</i> Mary received \$2 from her uncle and \$5 from her sister for her birthday. How much money did she receive?</p>
<b>Use complex numbers in polynomial identities and equations. N-CN.7.</b>	<b>EEN-CN.7.</b> Not Applicable	<b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b>
<b>Algebra - Seeing Structure in Expressions</b>		
<p><b>Interpret the structure of expressions.</b></p> <p><b>A-SSE.1.</b> Interpret expressions that represent a quantity in terms of its context</p> <ol style="list-style-type: none"> <li>Interpret parts of an expression, such as terms, factors, and coefficients.</li> <li>Interpret complicated expressions by viewing one or more of their parts as a single entity.</li> </ol> <p><i>For example, interpret <math>P(1+r)^n</math> as the product of <math>P</math> and a factor not depending on <math>P</math>.</i></p>	<p><b>EEA-SSE.1.</b> Match or write an algebraic expression involving one or more operations to represent a given expression with illustrations.</p>	<p><b>Level IV AA Students will:</b>  <b>EEA-SSE.1.</b> Write an algebraic expression involving one or more operations to represent a given expression with illustrations.  <i>Ex.</i> In a classroom there are 3 tables of girls and 2 tables of boys. Which expression represents this classroom: <math>b + g</math>, <math>3g + 2b</math>, or <math>5bg</math>?  <i>Ex.</i> Match 2 dimes, 3 nickels, and 4 pennies to an expression when <math>d</math> represents dimes, <math>n</math> represents nickels and <math>p</math> represents pennies. <math>(2d + 3n + 4p)</math></p> <p><b>Level III AA Students will:</b>  <b>EEA-SSE.1.</b> Match an algebraic expression involving one or more operations to represent a given expression with illustrations.  <i>Ex.</i> Shown a picture of 3 hamburgers at \$4 each, match an expression to the picture given when asked, "Which is the correct way to express the cost of 3 hamburgers if each hamburger is \$4.00 (<math>3 \times \\$4</math>)?"  <i>Ex.</i> Shown 2 drinks for \$2 each, plus 3 slices of pizza for \$3 each, match an expression to the picture given when asked, "Which one shows the cost of 2 drinks plus 3 slices of pizza if <math>d</math> represents drinks and <math>p</math> represents pizza?"  <i>Ex.</i> Match 2 dimes and 3 nickels to an expression where <math>d</math> represents dimes and <math>n</math> represents nickels.</p> <p><b>Level II AA Students will:</b>  <b>EEA-SSE.1.</b> Identify the operation used for word expressions as indicated by an illustration.  <i>Ex.</i> Jose has 3 times as many baseball cards as his brother. What operation (addition or multiplication) do you use to find how many baseball cards Jose has as indicated by an illustration?  <i>Ex.</i> One box has 6 books in it and another box only has 2. What operation (addition or multiplication) do you use to find how many how many books there are altogether?</p>

		<p><b>Level I AA Students will:</b>  <b>EEA-SSE.1.</b> Recognize the symbol for an operation.  <i>Ex. Match words (and, more, take away, times, sum, difference) to addition, subtraction, and multiplication.</i></p>
<p><b>A-SSE.2.</b> Use the structure of an expression to identify ways to rewrite it.</p> <p><i>For example, see <math>x^4 - y^4</math> as <math>(x^2)^2 - (y^2)^2</math>, thus recognizing it as a difference of squares that can be factored as <math>(x^2 - y^2)(x^2 + y^2)</math>.</i></p>	<p><b>EEA-SSE.2.</b> Calculate equivalent expressions.</p>	<p><b>Level IV AA Students will:</b>  <b>EEA-SSE.2.</b> Calculate equivalent equations involving variables.  <i>Ex. Calculate what <math>r + r</math> is equivalent to (<math>2r</math>, <math>2</math>, <math>rr</math> or <math>r</math>).</i></p> <p><b>Level III AA Students will:</b>  <b>EEA-SSE.2.</b> Calculate equivalent equations using 3 or more real numbers.  <i>Ex. Determine if <math>4 + 2 + 3 = 3 + 2 + 4</math>  <i>Ex. Determine if <math>3 \times 5 \times 2 = 2 \times 5 \times 3</math>.</i></i></p> <p><b>Level II AA Students will:</b>  <b>EEA-SSE.2.</b> Calculate equivalent equations using fewer than 3 real numbers.  <i>Ex. Determine if <math>4 + 2 = 2 + 4</math>  <i>Ex. Determine if <math>3 \times 5 = 5 \times 3</math>.</i></i></p> <p><b>Level I AA Students will:</b>  <b>EEA-SSE.2.</b> Match equivalent groups.  <i>Ex. Given piles of 5 red chips, 3 blue chips, and 5 yellow chips, match/indicate the equivalent piles.</i></p>
<p><b>Write expressions in equivalent forms to solve problems.</b></p> <p><b>A-SSE.3.</b> Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.</p> <ol style="list-style-type: none"> <li>Factor a quadratic expression to reveal the zeros of the function it defines.</li> <li>Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.</li> <li>Use the properties of exponents to transform expressions for exponential functions. <i>For example the expression <math>1.15^t</math> can be rewritten as <math>(1.15^{1/12})^{12t} \approx 1.012^{12t}</math> to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.</i></li> </ol>	<p><b>EEA-SSE.3.</b> Solve simple one-step equations (multiplication or division) with a variable.</p>	<p><b>Level IV AA Students will:</b>  <b>EEA-SSE.3.</b> Solve one-step equations, multiplication or division of two digits, with a variable.  <i>Ex. Solve the equation <math>x \div 16 = 2</math> (If I buy 2 cakes that cost \$16 each, how much money did I spend?).  <i>Ex. Solve the equation <math>\\$11.00 \times \underline{\hspace{1cm}} = \\$33</math> (If a ticket to the movies costs \$11, how many tickets did I buy if I spent 33 dollars?).  <i>Ex. Solve the equation <math>15 \times \underline{\hspace{1cm}} = 45</math> (e.g. The teacher could, with prompting and support say, "If I have 15 rows of desks and 45 desks total, how many desks are in each row?).</i></i></i></p> <p><b>Level III AA Students will:</b>  <b>EEA-SSE.3.</b> Solve simple one-step equations (multiplication and division) with a variable.  <i>Ex. Solve the equation <math>x \div 8 = 2</math> (e.g. If there are 8 people and only 2 cars, how many people can ride in each car?).  <i>Ex. Solve the equation <math>2 \times p = 16</math> (e.g. If there are 16 apples and each person gets 2 apples, how many people are there?).</i></i></p> <p><b>Level II AA Students will:</b>  <b>EEA-SSE.3.</b> Solve basic equations.  <i>Ex. <math>4 + 3 = N</math> (If I have 4 cups and I get 3 more, I will have <math>N</math> cups).  <i>Ex. Use a number line to show how 7 is made of many different combinations: <math>5 + 2</math>, <math>6 + 1</math>, etc.  <i>Ex. Solve picture problems: 2 balloons (picture) + 2 balloons.  <i>Ex. If you have \$10 and spend \$4, what will your change be?</i></i></i></i></p>

		<p><b>Level I AA Students will:</b>  <b>EEA-SSE.3.</b> Identify the quantity and match it to the number, up to 100.  <i>Ex.</i> Match the number of objects to correct numerals.  <i>Ex.</i> Count objects (e.g., up to 100) and match the numerals.  <i>Ex.</i> Match 5 \$1 bills to the number 5.  <i>Ex.</i> Count 3 tallies and match to the number 3.</p>
<p><b>Write expressions in equivalent forms to solve problems.</b>  <b>A-SSE.4.</b></p>	<p><b>EEA.-SSE.4.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>

**Algebra - Arithmetic with Polynomials and Rational Expressions**

<p><b>Perform arithmetic operations on polynomials.</b>  <b>A-APR.1.</b></p> <p><b>Understand the relationship between zeros and factors of polynomials</b>  <b>A-APR.2-3</b></p> <p><b>Understand polynomial identities to solve problems</b>  <b>A-APR.4</b></p> <p><b>Rewrite rational expressions</b>  <b>A-APR.6</b></p>	<p><b>EEA.-APR.1-4.&amp;6.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>
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**Algebra - Creating Equations**

<p><b>Create equations that describe numbers or relationships.</b></p> <p><b>A-CED.1.</b> Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i></p>	<p><b>EEA-CED.1.</b>  Solve an algebraic expression using one variable.</p>	<p><b>Level IV AA Students will:</b>  <b>EEA-CED.1.</b> Create and solve an algebraic expression with one variable.  <i>Ex.</i> If I have 2 bills, 1 of them is a \$5 bill and 1 of them is a \$1 bill, how much more money do I need to have \$10 altogether? (i.e. <math>5 + 1 + N = 10</math>)  <i>Ex.</i> If I have some money in my pocket, and I still need \$3 more to buy the bird that cost \$10, how much money is in my pocket? (i.e. <math>N + 3 = 10</math>)</p> <p><b>Level III AA Students will:</b>  <b>EEA-CED.1.</b> Solve an algebraic expression with one variable.  <i>Ex.</i> If I need \$10 and I have \$5, how much more money do I need? <math>5 + N = 10</math>  <i>Ex.</i> If I have 2 bills, 1 of them is a \$5 bill and one of them is unknown, what is the value of the unknown bill if I have \$10 total?</p> <p><b>Level II AA Students will:</b>  <b>EEA-CED.1.</b> Solve simple equations with unknown / missing values (without variables).  <i>Ex.</i> If I have 3 dogs and 1 is given to a friend, how many dogs do I now have?  <i>Ex.</i> I walked to the store to buy a book. I gave the cashier \$10 and she gave me back \$7. How much was the book?  <i>Ex.</i> If I have 2 pens in my backpack when I get to school, and I left home with 5 pens, how many pens were given</p>
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		<p>away on the trip from home to school? (i.e. <math>5 - \underline{\quad} = 2</math>)</p> <p><b>Level I AA Students will:</b>  <b>EEA-CED.1.</b> Identify what is unknown.  Ex. John has 3 cats and some dogs. Do we know the number of cats John has? Do we know the number of dogs John has?</p>
<b>A-CED.2-4.</b>	<b>EEA-CED.2-4</b> Not Applicable	<b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b>
<b>Algebra - Reasoning with Equations and Inequalities</b>		
<p><b>Understand solving equations as a process of reasoning and explain the reasoning.</b></p> <p><b>A-REI.1.</b> Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.</p> <p><b>A-REI.2.</b> Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.</p>	<b>EEA-REI.1-2.</b> Not Applicable	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEA-REI.10-12., EEA-CED.1., EES-ID.3., etc.)</b></p>
<p><b>Solve equations and inequalities in one variable.</b></p> <p><b>A-REI.3.</b> Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p> <p><b>A-REI.4.</b> Solve quadratic equations in one variable.</p> <p><b>a.</b> Use the method of completing the square to transform any quadratic equation in <math>x</math> into an equation of the form <math>(x - p)^2 = q</math> that has the same solutions. Derive the quadratic formula from this form.</p> <p><b>b.</b> Solve quadratic equations by inspection (e.g., for <math>x^2 = 49</math>), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as <math>a \pm bi</math> for real numbers <math>a</math> and <math>b</math>.</p>	<b>EEA-REI.3-4</b> Not Applicable	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEA-CED.1-2.)</b></p>

<p><b>A-REI.5.</b> Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.</p> <p><b>A-REI.6.</b> Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.</p> <p><b>A-REI.7.</b> Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line <math>y = -3x</math> and the circle <math>x^2 + y^2 = 3</math>.</p>	<p><b>EEA-REI.5.</b> Not Applicable</p> <p><b>EEA-REI.6-7.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEA- CED.2-4.)</b></p> <p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEA-REI.10-12.)</b></p>
<p><b>Represent and solve equations and inequalities graphically.</b></p> <p><b>A-REI.10.</b> Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).</p> <p><b>A-REI.11.</b> Explain why the x-coordinates of the points where the graphs of the equations <math>y = f(x)</math> and <math>y = g(x)</math> intersect are the solutions of the equation <math>f(x) = g(x)</math>; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where <math>f(x)</math> and/or <math>g(x)</math> are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.</p> <p><b>A-REI.12.</b> Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes</p>	<p><b>EEA-REI.10-12.</b> Represent/solve equations graphically.</p>	<p><b>Level IV AA Students will:</b> <b>EEA-REI.10-12.</b> Make predictions and represent equations graphically. <i>Ex.</i> Given the graph of a linear function based on the cost per pizza and the number of pizzas bought [e.g., If pizza is \$5, then the total cost (<math>y</math>) = 5 times the number bought (<math>x</math>)], use this information to make predictions (e.g., if you bought 6 pizzas, what would the cost be?).</p> <p><b>Level III AA Students will:</b> <b>EEA-REI.10-12.</b> Represent / solve equations graphically. <i>Ex.</i> Follow the line on the graph to determine information at a given point (e.g. the cost of pizza and how many pizzas were bought.).</p> <p><b>Level II AA Students will:</b> <b>A-REI.10-12.</b> Identify points on a graph to answer a real-world problem. <i>Ex.</i> Locate a point on a map with pictorial cues using two coordinates.</p> <p><b>Level I AA Students will:</b> <b>A-REI.10-12.</b> Recognize information shown on a graph. <i>Ex.</i> Point to the numbers that tell me how many items I bought. <i>Ex.</i> Trace the line with your finger – show where the line would go if it continued.</p>

**Functions - Interpreting Functions**

**Understand the concept of a function and use function notation.**

**F-IF.1.** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If  $f$  is a function and  $x$  is an element of its domain, then  $f(x)$  denotes the output of  $f$  corresponding to the input  $x$ . The graph of  $f$  is the graph of the equation  $y = f(x)$ .

**F-IF.2.** Use function notations, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

**F-IF.3.** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by  $f(0) = f(1) = 1$ ,  $f(n+1) = f(n) + f(n-1)$  for  $n \geq 1$ .*

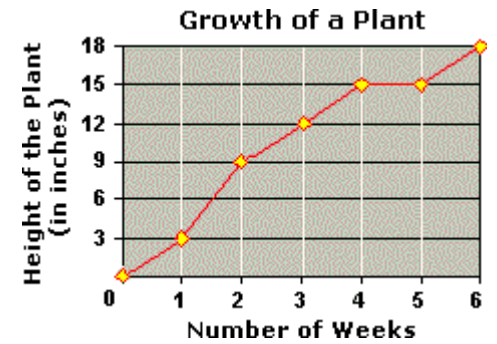
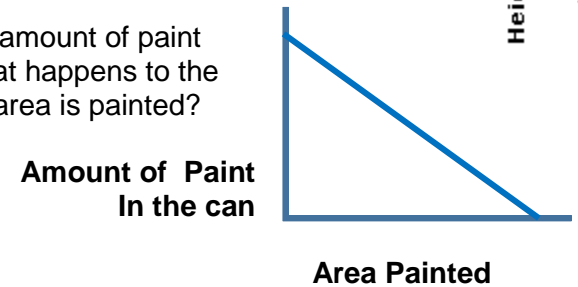
**EEF-IF.1-3.** Use the concept of function to solve problems.

**Level IV AA Students will:**

**EEF-IF.1-3.** Use the concept of functions to identify how the two variables are affected.

*Ex.* Given a graph showing the growth of a plant over a period of 6 weeks, what happens to the plant height as the number of weeks increases for the first 4 weeks?

*Ex.* Given a graph that shows the amount of paint in a can and the area painted, what happens to the amount of paint in the can as the area is painted?



*Ex.* Using a store scenario, one store charges students \$2 more than another store for the same item. Tom purchases a caramel apple for \$5. What should Becky expect to pay for an identical apple at the more expensive store?

**Level III AA Students will:**

**EEF-IF.1-3.** Use the concept of function to solve problems.

*Ex.* Look at a graph to identify the relationship between two variables (distance - time, cost - product, etc.). If every item cost \$1 at a store, how much would 5 items cost?

*Ex.* Determine the total distance traveled in 20 minutes using a table if you are traveling at a constant speed of 1 mile every 10 minutes.

**Level II AA Students will:**

**EEF-IF.1-3.** Use the concept of function to solve problems using a table that shows basic relationships (may not involve a true function).

*Ex.* Look at a weather chart to identify relationships between the day of the week and the temperature.

*Ex.* Determine the number of shoes worn by 4 people using a graph that incorporates picture representations.

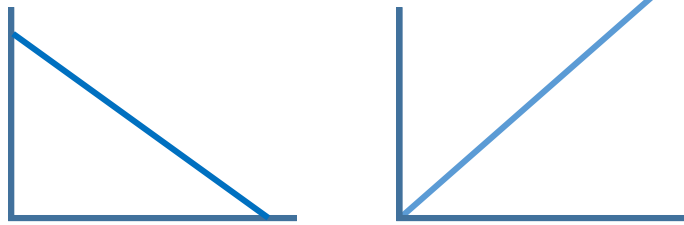
*Ex.* From a given table displaying the cost of movie tickets, determine the cost of 1 ticket, 2 tickets, and 3 tickets.

*Ex.* From a five-day weather forecast, identify the weather for Wednesday.

**Level I AA Students will:**

**EEF-IF.1-3.** Identify basic information located on graphs.

		<p>Ex. Tell the day of the week on a graph/point to the activity on the graph.</p> <p>Ex. Identify a line on a line graph.</p> <p>Ex. Identify the highest bar on a bar graph.</p> <p>Ex. Recognize different types of graphs.</p>
<p><b>Interpret functions that arise in applications in terms of the context.</b></p> <p><b>F-IF.4.</b> For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i></p> <p><b>F-IF.5.</b> Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. <i>For example, if the function <math>h(n)</math> gives the number of person-hours it takes to assemble <math>n</math> engines in a factory, then the positive integers would be an appropriate domain for the function.</i></p> <p><b>F-IF.6.</b> Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.</p>	<p><b>EEF-IF.4-6.</b> Interpret rate of change (e.g., higher / lower, faster / slower).</p>	<p><b>Level IV AA Students will:</b>  <b>EEF-IF.4-6.</b> Evaluate key features of a graph (e.g. increasing, decreasing, constant).  <i>Ex. Determine parts of graph illustrating an increase or decrease in speed on a time/distance graph.</i>  <i>Ex. Using a graph illustrating change in temperature over a day, indicate times when the temperature increased, decreased, or stayed the same.</i></p> <p><b>Level III AA Students will:</b>  <b>EEF-IF.4-6.</b> Interpret rate of change (e.g. higher / lower, faster / slower).  <i>Ex. Compare two graphs with different slopes to determine faster/slower rate</i>  <i>Ex. Compare the temperature in two cities over a week. Which city had the greatest change in temperature?</i></p> <p><b>Level II AA Students will:</b>  <b>EEF-IF.4-6.</b> Graph a simple linear equation represented by a table of values.  <i>Ex. Match the graph to its corresponding story.</i>  <i>Ex. Plot the points from a table of values less than 10.</i></p> <p><b>Level I AA Students will:</b>  <b>EEF-IF.4-6.</b> Read a table.  <i>Ex. From a given table, find information.</i>  <i>Ex. Given a daily schedule, determine the time of lunch during the school day.</i></p>
<p><b>Analyze functions using different representations.</b></p> <p><b>F-IF.7.</b> Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.</p>	<p><b>EEF-IF.7.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEF-IF.1-3.)</b></p>

<p><b>Analyze functions using different representations.</b></p> <p><b>F-IF.8.</b></p>	<p><b>EEF-IF.8.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>
<p><b>F-IF.9.</b> Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.</i></p>	<p><b>EEF-IF.9.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEF-IF.4-6.)</b></p>
<p><b>Functions - Building Functions</b></p>		
<p><b>Build a function that models a relationship between two quantities.</b></p> <p><b>F-BF.1.</b> Write a function that describes a relationship between two quantities.</p> <ol style="list-style-type: none"> <li>Determine an explicit expression, a recursive process, or steps for calculation from a context.</li> <li>Combine standard function types using arithmetic operations. <i>For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.</i></li> <li>(+) <b>designated for complex mathematics (advanced courses)</b></li> </ol>	<p><b>EEF-BF.1.</b> Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change.</p>	<p><b>Level IV AA Students will:</b> <b>EEF.BF.1.</b> Complete the appropriate graphical representation (first quadrant) given a situation involving constant rate of change. <i>Ex. Students are given the following scenario and a graphical representation with missing information; If I mow 1 lawn and make \$25, and I mow 3 lawns and make \$75, how much will I make if I mow 2 lawns?</i> <i>Ex. Students are given the following scenario and a graphical representation with missing information; If hamburgers are 4 for \$1 and I buy 4 hamburgers, it will cost \$1; if I buy 12, it will cost \$3. Complete the graph for 8 hamburgers.</i></p> <p><b>Level III AA Students will:</b> <b>EEF.BF.1.</b> Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change. <i>Ex. See Examples in Level IV above</i></p> <p><b>Level II AA Students will:</b> <b>EEF-BF.1.</b> Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change where the difference is very clear. <i>Ex. A dog has 4 bones and eats 1 each day. Given the following graphs, pick the graph that would represent this concept.</i></p> <div style="display: flex; justify-content: space-around; align-items: center;">  </div> <p><b>Level I AA Students will:</b> <b>EEF-BF.1.</b> Identify the terms in a sequence. <i>Ex. Identify an ABABABABAB pattern out of two different pattern sets of colored blocks using black (B) and white (W) and one set is BWBWBWBWBW and the other pattern set is BBWBBWBBWBBW.</i></p>
<p><b>F-BF.2.</b> Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between</p>	<p><b>EEF-BF.2.</b> Build an arithmetic sequence when provided a linear pattern</p>	<p><b>Level IV AA Students will:</b> <b>EEF-BF.2.</b> Build an arithmetic sequence when provided a linear pattern with decreasing terms, decimals, or fractions.</p>



<p>the two forms.</p>	<p>with whole numbers.</p>	<p><i>Ex.</i> Starting at 100, subtract 5 each time to build a sequence.  <i>Ex.</i> Starting at \$5.50, add/subtract \$0.50 each time to build a sequence.</p> <p><b>Level III AA Students will:</b>  <b>EEF-BF.2.</b> Build an arithmetic sequence when provided a linear pattern with whole numbers.  <i>Ex.</i> Starting at 4, add 4 each time to build a sequence (e.g., If one dog has 4 legs, how many legs will 2 dogs have? 3 dogs? etc.).  <i>Ex.</i> Starting at 5, add 7 each time to build a sequence (e.g., If I have \$5 and I earn \$7 each hour, how much money will I have in 4 hours?).</p> <p><b>Level II AA Students will:</b>  <b>EEF-BF.2.</b> Identify a term in a sequence.  <i>Ex.</i> Given a clear sequence (2, 4, 6, 8,...), identify the next number in the set.</p> <p><b>Level I AA Students will:</b>  <b>EEF-BF.2.</b> Recognize a sequence.  <i>Ex.</i> Given two lists of numbers or a set of manipulatives, identify the sequence in 5, 4, 3, 2, 1.  <i>Ex.</i> Given two lists of numbers or a set of manipulatives, identify the sequence in 2, 4, 6, 8.</p>
<p><b>Build new functions from existing functions.</b>  <b>F-BF.3. F-BF.4.</b></p>	<p><b>EEF-BF.3-4.</b>          Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>

**Functions - Linear, Quadratic, and Exponential Models**

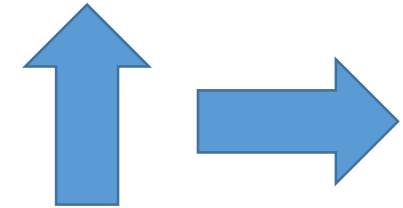
<p><b>Construct and compare linear, quadratic, and exponential models and solve problems.</b></p> <p><b>F-LE.1.</b> Distinguish between situations that can be modeled with linear functions and with exponential functions.</p> <ol style="list-style-type: none"> <li>Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.</li> <li>Recognize situations in which one quantity changes at a constant rate per unit interval.</li> <li>Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.</li> </ol> <p><b>F-LE.2.</b> Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or</p>	<p><b>EEF-LE.1-4.</b> Interpret a simple linear function such as <math>y = mx</math> to show functions grow by equal factors over equal intervals.</p>	<p><b>Level IV AA Students will:</b>  <b>EEF-LE.1-4.</b> Plot points in the first quadrant on a graph, using whole numbers, and explain how <math>y</math> increases or decreases as <math>x</math> changes.  <i>Ex.</i> If you go to the store where every item costs \$1, students should state <math>y = x</math>, where <math>y</math> = the total cost and <math>x</math> = the number of items (the number of items I buy will tell me the cost). Students will then plot this on the graph and determine if <math>y</math> is increasing or decreasing.  <i>Ex.</i> If I get 2 apples for every orange I buy, students should state that <math>y = 2x</math>, or for every orange I buy (<math>x</math>), I will get two apples (<math>y</math>), therefore <math>x</math> times 2 tells me the number of apples each time. Students should then plot this on the graph and determine if <math>y</math> is increasing or decreasing.</p> <p><b>Level III AA Student will:</b>  <b>EEF-LE.1-4.</b> Interpret a simple linear function such as <math>y = mx</math> to show functions grow by equal factors over equal intervals.  <i>Ex.</i> Determine a simple relationship of <math>y</math> to <math>x</math> by looking at the first quadrant of a graph.  <i>Ex.</i> Look at a graph that shows a constant ratio of boys to girls and state the relationship between <math>x</math> and <math>y</math>.  <i>Ex.</i> Given data points in the first quadrant, identify the named point and state the two pieces of information that one dot provides.</p>
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<p>two input-output pairs (include reading these from a table).</p> <p><b>F-LE.3.</b> Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.</p> <p><b>F-LE.4.</b> For exponential models, express as a logarithm the solution to <math>ab^{ct} = d</math> where <math>a</math>, <math>c</math>, and <math>d</math> are numbers and the base <math>b</math> is 2, 10, or <math>e</math>; evaluate the logarithm using technology.</p>		<p><b>Level II AA Students will:</b>  <b>EEF-LE.1-4.</b> Identify a specific data point in the first quadrant and explain the meaning behind it.  <i>Ex.</i> Identify the cost per item on a simple graph where every item in the store cost the same amount and state the relationship between <math>x</math> and <math>y</math>.  <i>Ex.</i> When given a simple graph that shows the total cost of items purchased at a store where every item is \$1, tell the cost of 4 items, the cost of 2 items, etc.</p> <p><b>Level I AA Students will:</b>  <b>EEF-LE.1-4.</b> Describe a graph with linear functions.  <i>Ex.</i> When shown two lines on a graph, tell which one is rising faster.  <i>Ex.</i> When shown a graph of distance driven and gas left in the tank, recognize that the further one drives the less gas one has left.</p>
<p><b>Interpret expressions for functions in terms of the situation they model.</b></p> <p><b>F-LE.5.</b> Interpret the parameters in a linear or exponential function in terms of a context.</p>	<p><b>EEF-LE.5.</b> Indicate the boundaries of a function.</p>	<p><b>Level IV AA Students will:</b>  <b>EEF-LE.5.</b> Calculate the boundaries of a function  <i>Ex.</i> Given a car holding 20 gallons of gas that can travel 30 miles per gallon, what is the farthest you can travel before running out of gas?</p> <p><b>Level III AA Student will:</b>  <b>EEF-LE.5.</b> Indicate the boundaries of a function.  <i>Ex.</i> What is the least and the most amount of gas that can be in a tank that holds up to 20 gallons?</p> <p><b>Level II AA Students will:</b>  <b>EEF-LE.5.</b> Describe one of the boundaries of a graph.  <i>Ex.</i> Using a graph, have the student describe what happens at the point at the end of the slope. (e.g. Can you go 600 miles on this tank of gas?)</p> <p><b>Level I AA Students will:</b>  <b>EEF-LE.5.</b> Recognize that the graph has boundaries.  <i>Ex.</i> On a graph, have the student point to spot that would represent where the car runs out of gas.</p>
<p><b>Functions - Trigonometric Functions</b></p>		
<p><b>Extend the domain of trigonometric functions using the unit circle.</b>  <b>F-TF.1. F-TF.2.</b></p>	<p><b>EEF-TF.1-2.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</p>
<p><b>Model periodic phenomena with trigonometric functions.</b>  <b>F-TF.5.</b></p>	<p><b>EEF-TF.5.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</p>
<p><b>Prove and apply trigonometric identities.</b>  <b>F-TF.8.</b></p>	<p><b>EEF-TF.8.</b>  Not Applicable</p>	<p>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</p>


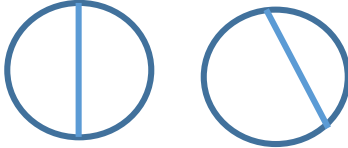
**Geometry - Congruence**

<p><b>Experiment with transformations in the plane.</b></p> <p><b>G.CO.1.</b> Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.</p>	<p><b>EEG-CO.1.</b> Recognize the attributes of perpendicular lines, parallel lines, and line segments, angles, and circles.</p>	<p><b>Level IV AA Students will:</b>  <b>EEG-CO.1.</b> Compare attributes of perpendicular lines, parallel lines, line segments, angles, and circles.  <i>Ex.</i> Draw examples of perpendicular lines, parallel lines, line segments, angles, and circles.  <i>Ex.</i> How are lines and line segments different?  <i>Ex.</i> How are lines and circles similar?  <i>Ex.</i> How are parallel and perpendicular lines similar? How are they different?</p> <p><b>Level III AA Students will:</b>  <b>EEG-CO.1.</b> Describe the attributes of perpendicular lines, parallel lines, line segments, angles, and circles.  <i>Ex.</i> Draw examples of ____?  <i>Ex.</i> Which shape represents perpendicular? +    O  <i>Ex.</i> Given a grid on a floor with masking tape, identify parallel lines.  <i>Ex.</i> Given a map, identify a road that runs somewhat perpendicular to another road.</p> <p><b>Level II AA Students will:</b>  <b>EEG-CO.1.</b> Recognize the attributes of lines, circles, and angles with equivalent measure.  <i>Ex.</i> Recognize line, circle, and angles (e.g., circles are round).  <i>Ex.</i> Put two objects next to each other and determine which is longer.  <i>Ex.</i> Draw a line, a circle, or an angle.</p> <p><b>Level I AA Students will:</b>  <b>EEG-CO.1.</b> Manipulate lines and shapes (e.g., circle, square, triangle).  <i>Ex.</i> Point to a line.  <i>Ex.</i> Align two objects side-by-side.  <i>Ex.</i> Move an object in a straight line.  <i>Ex.</i> Sort shapes into groups by name.  <i>Ex.</i> Find objects in the environment that represent / model circles, squares, or triangles.</p>
<p><b>G-CO.2.</b> Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).</p>	<p><b>EEG-CO.2.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEF-CO.4-5.)</b></p>
<p><b>G-CO.3.</b> Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.</p>	<p><b>EEG-CO.3.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEF-CO.4-5.)</b></p>

<p><b>G-CO.4.</b> Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.</p> <p><b>G-CO.5.</b> Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.</p>	<p><b>EEG-CO.4-5.</b> Identify rotations (spin), reflections (flip), and translations (slides).</p>	<p><b>Level IV AA Students will:</b>  <b>EEG-CO.4-5.</b> Demonstrate what happens when a figure is transformed.  <i>Ex.</i> Show a rotation (spin) using an object.  <i>Ex.</i> Using an object, show a translation (slide).  <i>Ex.</i> Create a picture where multiple shapes may need to be rotated (spun) to produce the given picture.</p> <p><b>Level III AA Students will:</b>  <b>EEG-CO.4-5.</b> Identify rotations (spins), reflections (flips), and translations (slides).  <i>Ex.</i> Use pattern blocks or other manipulatives to produce or copy a design in which each shape is clearly identifiable.  <i>Ex.</i> Given two pictures, determine if an object is rotated (spun). (arrow up, arrow right). <i>[see images to the right]</i>  <i>Ex.</i> Given two pictures, pick the correct reflection (flip), translation (slide), or rotation (spin).</p> <p><b>Level II AA Students will:</b>  <b>EE.G-CO.4-5.</b> Recognize rotation (spin), reflection (flip), or translation (slide) (key terms, vocabulary, and movement).  <i>Ex.</i> Use your body to engage in activity to show rotation (spin) or translation (slide) (silhouette).  <i>Ex.</i> Use objects to rotate (spin), reflect (flip), or translate (slide).</p> <p><b>Level I AA Students will:</b>  <b>EEG-CO.4-5.</b> Attend to movement demonstrating rotations (spins), reflections (flips), and translations (slides).  <i>Ex.</i> Teacher slides or translates an object, and the student follows with their eyes.</p>
<p><b>Understand congruence in terms of rigid motions.</b></p> <p><b>G-CO.6.</b> Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.</p> <p><b>G-CO.7.</b> Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.</p> <p><b>G-CO.8.</b> Explain how the criteria for triangle</p>	<p><b>EEG-CO.6-8.</b> Identify corresponding congruent (the same) parts of shapes.</p>	<p><b>Level IV AA Students will:</b>  <b>EEG-CO.6-8.</b> Demonstrate why shapes are similar or congruent.  <i>Ex.</i> Communicate why two given shapes are congruent.  <i>Ex.</i> Given two non-congruent shapes, communicate why the shapes are not congruent.  <i>Ex.</i> Given two shapes that are not congruent but are similar, identify the similar parts.</p> <p><b>Level III AA Students will:</b>  <b>EEG-CO.6-8.</b> Identify corresponding congruent (the same) parts of shapes.  <i>Ex.</i> Given two congruent triangles, identify the corresponding sides.  <i>Ex.</i> Given two congruent items (stars, squares, etc.) identify the corresponding parts.</p> <p><b>Level II AA Students will:</b>  <b>EEG-CO.6-8.</b> Recognize congruent parts (angles and sides).  <i>Ex.</i> Identify the congruent parts of a rectangle.  <i>Ex.</i> Identify the congruent angles of an isosceles triangle.</p>



<p>congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.</p>		<p><b>Level I AA Students will:</b>  <b>EEG-CO.6-8.</b> Match shapes that are congruent.  <i>Ex.</i> Given a shape, match a congruent shape.  <i>Ex.</i> Given 3 shapes, pick the 2 that are congruent.</p>
<p><b>Prove geometric theorems.</b>  <b>G-CO.9-11</b></p>	<p><b>EEG-CO.9-11.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>
<p><b>Make geometric constructions.</b></p> <p><b>G-CO.12.</b> Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). <i>Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.</i></p> <p><b>G-CO.13.</b> Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.</p>	<p><b>EEG-CO.12-13.</b> Create geometric figures.</p>	<p><b>Level IV AA Students will:</b>  <b>EEG-CO.12-13.</b> Create specific geometric figures using mathematical tools (e.g., ruler, compass, protractor).  <i>Ex.</i> Create an isosceles triangle, equilateral triangle, etc...</p> <p><b>Level III AA Students will:</b>  <b>EEG-CO.12-13.</b> Create geometric figures using mathematical tools (e.g., string, ruler, compass).  <i>Ex.</i> Draw a circle.  <i>Ex.</i> Create a rectangle.</p> <p><b>Level II AA Students will:</b>  <b>EEG-CO.12-13.</b> Reproduce given geometric figures using tools.  <i>Ex.</i> Find a shape and trace it on paper.  <i>Ex.</i> Draw a shape similar to a presented shape.</p> <p><b>Level I AA Students will:</b>  <b>EEG-CO.12-13.</b> Trace geometric figures using tools.  <i>Ex.</i> Use finger to trace over a specific shape.  <i>Ex.</i> Use a pencil to trace a shape on paper.</p>
<p><b>Geometry - Similarity, Right Triangles, and Trigonometry</b></p>		
<p><b>Understand similarity in terms of similarity transformations.</b></p> <p><b>G-SRT.1.</b> Verify experimentally the properties of dilations given by a center and a scale factor:</p> <ul style="list-style-type: none"> <li>a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.</li> <li>b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.</li> </ul> <p><b>G-SRT.2.</b> Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for</p>	<p><b>EEG-SRT.1-3.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEG-CO.4-5. &amp; EEG-CO.6-8.)</b></p>

<p>triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.</p> <p><b>G-SRT.3.</b> Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.</p>		
<p><b>Prove theorems involving similarity.</b></p> <p><b>G-SRT.4.</b> Prove theorems about triangles. <i>Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.</i></p> <p><b>G-SRT.5.</b> Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.</p>	<p><b>EEG-SRT.4-5.</b> Describe the properties of regular polygons and/or symmetry.</p>	<p><b>Level IV AA Students will:</b>  <b>EEG-SRT.4-5.</b> Describe the properties of regular polygons and their lines of symmetry.  <i>Ex. Given a picture of a pentagon, find lines of symmetry and describe the resulting shapes.</i></p> <p><b>Level III AA Students will:</b>  <b>EEG-SRT.4-5.</b> Describe the properties of regular polygons and / or their lines of symmetry.  <i>Ex. Demonstrate the similarities of equilateral triangles using 2D shapes.</i>  <i>Ex. Demonstrate the similarities of equilateral squares using 2D shapes.</i></p> <p><b>Level II AA Students will:</b>  <b>EEG-SRT.4-5.</b> Identify congruence in figures.  <i>Ex. Identify which given figure is divided into halves by the line. (e.g. a rectangle with corner to corner line versus a square with a line off-center).</i>  <i>Ex. Identify the appropriate shapes to place onto a moderately difficult tangram puzzle (e.g. shapes to make a swan).</i></p> <p><b>Level I AA Students will:</b>  <b>EEG-SRT.4-5.</b> Identify right angles in the environment.  <i>Ex. Point to the corner of an object (e.g. paper, room, book, etc.).</i>  <i>Ex. Place the appropriate shape onto a given easy tangram puzzle (e.g. two triangles make a square).</i></p> 
<p><b>Define trigonometric ratios and solve problems involving right triangles.</b></p> <p><b>G-SRT.6-8.</b></p>	<p><b>EEG-SRT.6-8.</b></p> <p>Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>
<p><b>Geometry - Circles</b></p>		
<p><b>Understand and apply theorems about circles.</b></p> <p><b>G-C.1.</b> Prove that all circles are similar.</p> <p><b>G-C.2.</b> Identify and describe relationships among inscribed angles, radii, and chords. <i>Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is</i></p>	<p><b>EEG-C.1-3.</b> Understand representations of properties of circles.</p>	<p><b>Level IV AA Students will:</b>  <b>EEG-C.1-3.</b> Construct a model to demonstrate similarities in circles.  <i>Ex. Construct a circle and show that the radius is the same length at all points on its circumference.</i></p> <p><b>Level III AA Students will:</b>  <b>EEG-C.1-3.</b> Demonstrate similarities in circles.  <i>Ex. Given a circle, demonstrate that the distance from the center of a circle (radius) to any point on its circumference is the same length (e.g. given a length of string and a picture of a circle).</i></p> 

<p><i>perpendicular to the tangent where the radius intersects the circle.</i></p> <p><b>G-C.3.</b> Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.</p>		<p><b>Level II AA Students will:</b>  <b>EEG-C.1-3.</b> Select appropriate representations of properties in circles.  <i>Ex.</i> Given pictures of two circles with chords, select which chord divides the circle equally.  <i>Ex.</i> Match / identify the names of parts of a circle to a provided diagram.</p> <p><b>Level I AA Students will:</b>  <b>EEG-C.1-3.</b> Identify shapes or objects that are circular.  <i>Ex.</i> Identify shapes in the room that are circles.  <i>Ex.</i> Identify shapes / objects that have a circular base.</p>
<p><b>Find arc lengths and areas of sectors of circles.</b>  <b>G-C.5.</b></p>	<p><b>EEG-C.5.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>
<p><b>Geometry - Expressing Geometric Properties with Equations</b></p>		
<p><b>Translate between the geometric description and the equation for a conic section.</b>  <b>G-GPE.1. &amp; G-GPE.2. &amp; G-GPE.3.</b></p>	<p><b>EEG-GPE.1.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>
<p><b>Use coordinates to prove simple geometric theorems algebraically.</b>  <b>G-GPE.4.</b></p>	<p><b>EEG-GPE.4.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population.</b></p>
<p><b>G-GPE.5.</b> Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).  <b>G-GPE.6.</b> Find the point on a directed line segment between two given points that partitions the segment in a given ration.</p>	<p><b>EEG-GPE.5-6.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEG.CO.1.)</b></p>
<p><b>G-GPE.7.</b> Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.</p>	<p><b>EEG-GPE.7.</b> Calculate perimeter and area of squares and rectangles to solve real-world problems.</p>	<p><b>Level IV AA Students will:</b>  <b>EEG-GPE.7.</b> Use formulas to calculate the perimeter and area of squares and rectangles to solve real-world problems.  <i>Ex.</i> Calculate the perimeter of 3 given shapes using appropriate formulas (e.g. rectangle, triangle, circles).  <i>Ex.</i> Find the area of the classroom floor using the formula Area = length x width.</p> <p><b>Level III AA Students will:</b>  <b>EEG-GPE.7.</b> Calculate the perimeter and / or area of squares and rectangles to solve real-world problems.  <i>Ex.</i> Find the perimeter by adding the length of the sides to determine how much fence you will need to go around your garden.  <i>Ex.</i> Find the area of a room on a grid to decide how many tiles (one grid each) you will need to cover the area</p>

		<p>of your room.  <i>Ex.</i> Determine the number of one-foot squared sections needed to make a tabletop garden that is 4 feet by 4 feet square.</p> <p><b>Level II AA Students will:</b>  <b>EEG-GPE.7.</b> Find perimeter or area by counting on a grid.  <i>Ex.</i> Find the perimeter of a small room on a grid.  <i>Ex.</i> Draw a shape on a grid and find the perimeter.</p> <p><b>Level I AA Students will:</b>  <b>EEG-GPE.7.</b> Identify the inside, around, and / or the outside of a closed figure.  <i>Ex.</i> Identify the position of a dog as inside or outside the fenced yard.  <i>Ex.</i> Choose the term (inside, around, or outside) to describe position.</p>
<b>Geometry - Geometric Measurement and Dimension</b>		
<p><b>Explain volume formulas and use them to solve problems.</b></p> <p><b>G-GMD.1.</b> Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. <i>Use dissection arguments, Cavalieri's principle, and informal limit arguments.</i></p> <p><b>G-GMD.3.</b> Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.</p>	<p><b>EEG-GMD.1&amp;3.</b> Make a prediction based on knowledge of volume to identify volume of common containers (cups, pints, gallons, etc.).</p>	<p><b>Level IV AA Students will:</b>  <b>EEG-GMD.1&amp;3.</b> Apply knowledge of volume to make appropriate volumetric estimates.  <i>Ex.</i> Select the appropriate tool to fill a pitcher with water and estimate the number of proportions needed to fill a 5-gallon bucket: teaspoon, cup, bucket.  <i>Ex.</i> Select the appropriate tool to measure vanilla for a cake, teaspoon or tablespoon.  <i>Ex.</i> Do conversions for a problem, how many cups are in a pint, when given cups and a pint container filled with water.</p> <p><b>Level III AA Students will:</b>  <b>EEG-GMD.1&amp;3.</b> Make a prediction based on knowledge of volume to identify the volume of common containers (cups, pints, gallons, etc.).  <i>Ex.</i> Which will hold more than three cups, a quart or a pint? (Give measuring tools: cup, pint, quart)  <i>Ex.</i> Which is a gallon? (Give measuring tools: pint, quart, gallon) If I wanted to carry a gallon of water, would I use a bucket or a cup?</p> <p><b>Level II AA Students will:</b>  <b>EEG-GMD.1&amp;3.</b> Describe more versus less.  <i>Ex.</i> Which container can hold more water? Marbles?  <i>Ex.</i> Arrange marbles in cups from least to greatest.</p> <p><b>Level I AA Students will:</b>  <b>EEG-GMD.1&amp;3.</b> Select/match volume.  <i>Ex.</i> Point to the empty cups.  <i>Ex.</i> Point to the full containers.  <i>Ex.</i> Point to the largest/biggest container.  <i>Ex.</i> Indicate which container will hold more water (e.g., gallon or cup).</p>



<p><b>Visualize relationships between two-dimensional and three-dimensional objects.</b></p> <p><b>G-GMD.4.</b> Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.</p>	<p><b>EEG-GMD.4.</b> Distinguish between two-dimensional and three-dimensional objects to solve real-world problems.</p>	<p><b>Level IV AA Students will:</b>  <b>EEG-GMD.4.</b> Use the properties of two-dimensional and three-dimensional objects to solve real-world problems.  <i>Ex.</i> Describe the difference between a highway map and a three-dimensional (topographical) map.  <i>Ex.</i> Use the dimensions of a shelf to determine how many boxes would fit.</p> <p><b>Level III AA Students will:</b>  <b>EEG-GMD.4.</b> Distinguish between two-dimensional and three-dimensional objects to solve real-world problems.  <i>Ex.</i> Describe the differences between a map of the school and the physical school building.  <i>Ex.</i> Identify height as a dimension of three-dimensional objects (e.g. the difference between a square and a cube).</p> <p><b>Level II AA Students will:</b>  <b>EEG-GMD.4.</b> Distinguish between two-dimensional and three-dimensional items.  <i>Ex.</i> Sort two-dimensional and three-dimensional objects by their function. (e.g., Which of these can you use as a container, a box or a square?)  <i>Ex.</i> Given two examples, which is a cube and which is square?  <i>Ex.</i> Given a cylinder, a square building, and a box, determine which three-dimensional object corresponds to a drinking glass.</p> <p><b>Level I AA Students will:</b>  <b>EEG-GMD.4.</b> Identify two-dimensional versus three-dimensional shapes.  <i>Ex.</i> Have the student identify which item will hold marbles. A picture of a square or a physical box.  <i>Ex.</i> Have the student identify which item will hold liquid. A picture of a pop can or an actual pop can.</p>
<p><b>Geometry - Modeling with Geometry</b></p>		
<p><b>Apply geometric concepts in modeling situations.</b></p> <p><b>G-MG.1.</b> Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).</p> <p><b>G-MG.2.</b> Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).</p> <p><b>G-MG.3.</b> Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).</p>	<p><b>EEG-MG.1-3.</b> Apply properties of geometric shapes to describe real-life objects.</p>	<p><b>Level IV AA Students will:</b>  <b>G-MG.1-3.</b> Apply geometric methods to solve design problems.  <i>Ex.</i> Identify the two-dimensional shapes that create the three-dimensional figure (e.g., I can see 4 triangles in a pyramid; I can see 6 squares on the outside of a cube).  <i>Ex.</i> Determine the least number of tiles needed to cover the outside of a cubed figure (glue tiles onto a box).  <i>Ex.</i> Determine the amount of materials needed to wrap a present.</p> <p><b>Level III AA Students will:</b>  <b>EEG-MG.1-3.</b> Apply properties of geometric shapes to describe real-life objects.  <i>Ex.</i> Name everyday objects in terms of geometric shapes (e.g., a can of soda is a cylinder, a box of cereal is a rectangular prism).  <i>Ex.</i> Describe the sides of a box of tissues (e.g., the ends are squares, the sides are rectangles).  <i>Ex.</i> Describe / discuss the dimensions of a classroom (length, width, and height).</p> <p><b>Level II AA Students will:</b>  <b>EEG-MG.1-3.</b> Describe characteristics of geometric shapes.  <i>Ex.</i> Given a cube, describe what real-life objects have similar characteristics to a cube.</p>

		<p><b>Level I AA Students will:</b>  <b>EEG-MG.1-3.</b> Identify geometric objects.  <i>Ex.</i> Find real-life objects that have similar characteristics to a sphere.</p>
<p><b>Statistics and Probability - Interpreting Categorical and Quantitative Data</b></p>		
<p><b>Summarize, represent, and interpret data on a single count or measurement variable.</b></p> <p><b>S-ID.1.</b> Represent data with plots on the real number line (dot plots, histograms, and box plots).</p> <p><b>S-ID.2.</b> Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.</p>	<p><b>EES-ID.1-2.</b> Construct a simple graph with given data (table, line, pie, bar, or picture) and answer questions about the data.</p>	<p><b>Level IV AA Students will:</b>  <b>EES-ID.1-2.</b> Collect and organize data in simple graphs and use findings to draw conclusions from the data (mean and / or median).  <i>Ex.</i> Ask 10 people how many hours of TV they watch a day. Put the findings into a graph and determine which person watches the most and the least TV (e.g., creating graphs on wall charts, Smart Board, iPads, etc.).  <i>Ex.</i> Collect data on a given topic, organize it, and tell what conclusions can drawn from the data, such as most common weather in two cities, cheapest price of jeans, etc...</p> <p><b>Level III AA Students will:</b>  <b>EES-ID.1-2.</b> Construct a simple graph with given data (table, line, pie, bar, or picture) and answer questions about the data.  <i>Ex.</i> Given data about the cost of jeans at 3 stores, place the information on a graph (table, line, pie, bar, or picture) and answer questions about the graph.  <i>Ex.</i> Given data from student surveys (e.g., favorite sport, subject, book) presented on a bar or pie graph, answer questions about the findings (most / least).</p> <p><b>Level II AA Students will:</b>  <b>EES-ID.1-2.</b> Given a graph, answer simple questions.  <i>Ex.</i> Read data from a given graph showing the weather for one week and determine how many days it was rainy.  <i>Ex.</i> Given a simple graph, tell what it represents (graph about the weather, cell phone plans, or gas prices).</p> <p><b>Level I AA Students will:</b>  <b>EES-ID.1-2.</b> Identify any part of a simple graph.  <i>Ex.</i> Indicate part of simple graph, (such as the bar, line, title, labels on the graph).  <i>Ex.</i> Point or indicate to answer, “Which is the tallest/highest bar?”</p>
<p><b>S-ID.3.</b> Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).</p>	<p><b>EES-ID.3.</b> Indicate general trends on a graph or chart.</p>	<p><b>Level IV AA Students will:</b>  <b>EES-ID.3.</b> Evaluate a graph or chart to make a prediction.  <i>Ex.</i> Given a graph of historical rainfall data for Seattle, WA, determine if you should pack your raincoat to visit in June.  <i>Ex.</i> Shown a graph, predict which direction the line will continue and answer predictive questions. (e.g., What would have to occur to change this trend?)</p> <p><b>Level III AA Students will:</b>  <b>EES-ID.3.</b> Indicate general trends on a graph or chart.  <i>Ex.</i> Using a graph, estimate a future point when the trend of the line is clear.</p>

		<p><b>Level II AA Students will:</b>  <b>EES-ID.3.</b> Indicate increase and decrease over time.  <i>Ex.</i> Is this line (slope) increasing or decreasing?  <i>Ex.</i> When shown two graphs, determine if each graph shows increase or decrease.</p> <p><b>Level I AA Students will:</b>  <b>EES-ID.3.</b> Indicate outliers in a data set.  <i>Ex.</i> We are charting plant growth. Should I put the length of the monkey's tail on the graph?  <i>Ex.</i> We are counting apples. Do shoes belong on this graph?</p>
<p><b>S-ID.4.</b> Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.</p>	<p><b>EES-ID.4.</b> Calculate the mean of a given data set (limit data points to less than five).</p>	<p><b>Level IV AA Students will:</b>  <b>EES-ID.4.</b> Calculate the mean of a given data set (more than five data points).  <i>Ex.</i> Calculate the mean price for 5 videos in 2 different stores and compare the means.  <i>Ex.</i> Calculate the mean number of hours students spend watching TV over a week.</p> <p><b>Level III AA Students will:</b>  <b>EES-ID.4.</b> Calculate the mean of a given data set (limit data points to less than 5).  <i>Ex.</i> Given the noon temperature for 4 days, calculate the mean (average) temperature.  <i>Ex.</i> Given the price of each pair, calculate the average price of 4 pairs of shoes.</p> <p><b>Level II AA Students will:</b>  <b>EES-ID.4</b> Identify the average between 2 to 3 numbers.  <i>Ex.</i> Given 2 or 3 numbers, determine the mean value. (Determine the mean value of 2 and 4 OR 2, 3 and 4.)</p> <p><b>Level I AA Students will:</b>  <b>EES-ID.4.</b> Recognize the missing number between 2 data points.  <i>Ex.</i> Given 2 consecutive even numbers or 2 consecutive odd numbers, determine the number in the middle.</p>
<p><b>Summarize, represent, and interpret data on two categorical and quantitative variables.</b></p> <p><b>S-ID.5.</b> Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.</p> <p><b>S-ID.6.</b> Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.</p> <p><b>a.</b> Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context.</p>	<p><b>EES-ID.5-6.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEF-IF.1-3. and EEA-REI.10-12.)</b></p>

<p>Emphasize linear, quadratic, and exponential models.</p> <p><b>b.</b> Informally assess the fit of a function by plotting and analyzing residuals.</p> <p><b>c.</b> Fit a linear function for a scatter plot that suggests a linear association.</p>		
<p><b>Interpret linear models.</b></p> <p><b>S-ID.7.</b> Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.</p>	<p><b>EES-ID.7.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEF.IF.4-6.)</b></p>
<p><b>S-ID.8.</b> Compute (using technology) and interpret the correlation coefficient of a linear fit.</p> <p><b>S-ID.9.</b> Distinguish between correlation and causation.</p>	<p><b>EES-ID.8-9.</b> Determine the difference between fact and opinion.</p>	<p><b>Level IV AA Students will:</b> <b>EES-ID.8-9.</b> Explain the difference between fact and opinion. <i>Ex.</i> Tell whether a study, where 9 out of 10 dentists prefer fluoride in toothpaste, is a fact or opinion and explain your choice.</p> <p><b>Level III AA Students will:</b> <b>EES-ID.8-9.</b> Determine the difference between fact and opinion. <i>Ex.</i> Give 3-5 facts and 3-5 opinions about an object / event / place. (2 truths and a lie, about the classroom, etc.)</p> <p><b>Level II AA Students will:</b> <b>EES-ID.8-9</b> Determine if a statement is a fact or opinion. <i>Ex.</i> Given the statement ‘giraffes are tall’, tell if it is a fact or an opinion.</p> <p><b>Level I AA Students will:</b> <b>EES-ID.8-9.</b> Provide a fact about an object / event. <i>Ex.</i> Given an object / picture, ask the student to give a fact about it.</p>
<p><b>Statistics and Probability - Making Inferences and Justifying Conclusions</b></p>		
<p><b>Understand and evaluate random processes underlying statistical experiments.</b></p> <p><b>S-IC.1.</b> Understand statistics as a process for making inferences about population parameters based on a random sample from that population.</p> <p><b>S-IC.2.</b> Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. <i>For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to</i></p>	<p><b>EES-IC.1-2.</b> Predict the likelihood of an event occurring when the outcomes are equally likely to occur.</p>	<p><b>Level IV AA Students will:</b> <b>EES-IC.1-2.</b> Calculate the probability of an event occurring when the outcomes are not equally likely to occur. <i>Ex.</i> You have a bag of marbles with 5 red, 4 blue, 6 white, and 5 yellow marbles. What is the probability of choosing a white marble? <i>Ex.</i> Your drawer contains 7 pairs of white socks and 3 pairs of black socks. What is the probability of choosing 5 white socks? (Not pairs)</p> <p><b>Level III AA Students will:</b> <b>EES-IC.1-2.</b> Predict the likelihood of an event occurring when the outcomes are equally likely to occur. <i>Ex.</i> A spinner contains 4 colors: blue, red, green, and yellow. What is the probability of landing on red? <i>Ex.</i> A die is rolled. What is the probability of landing on a 4? <i>Ex.</i> You have 3 blue candies, 7 green candies, and 4 red candies in a bag. Which color are you most likely to</p>

<p><i>question the model?</i></p>		<p>draw out of the bag?</p> <p><b>Level II AA Students will:</b>  <b>EES-IC.1-2.</b> Identify the possible outcomes of an event occurring.  <i>Ex.</i> A spinner contains 4 colors (blue, red, green, and yellow). List all of the possible outcomes.  <i>Ex.</i> What are the possible outcomes of rolling a die?  <i>Ex.</i> What are the possible outcomes when flipping a coin?</p> <p><b>Level I AA Students will:</b>  <b>EES-IC.1-2.</b> Identify one possible event or outcome of an event occurring.  <i>Ex.</i> Given a spinner with 4 colors, identify 1 color as a possible outcome.  <i>Ex.</i> Given a die, is 5 a possible outcome?</p>
<p><b>Make inferences and justify conclusions from sample surveys, experiments, and observational studies.</b></p> <p><b>S-IC.3.</b> Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.</p> <p><b>S-IC.4.</b> Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.</p> <p><b>S-IC.5.</b> Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.</p> <p><b>S-IC.6.</b> Evaluate reports based on data.</p>	<p><b>EES-IC.3-6.</b> Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEF.SID.1-2.)</b></p>
<p><b>Statistics and Probability - Conditional Probability and the Rules of Probability</b></p>		
<p><b>Understand independence and conditional probability and use them to interpret data.</b></p> <p><b>S-CP.1.</b> Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).</p> <p><b>S-CP.2.</b> Understand that two events <i>A</i> and <i>B</i> are independent if the probability of <i>A</i> and <i>B</i> occurring</p>	<p><b>EES-CP.1-5.</b> Compare / identify when events are independent or dependent.</p>	<p><b>Level IV AA Students will:</b>  <b>EES-CP.1-5.</b> Find the probability of an event after another event has occurred.  <i>Ex.</i> Find the probability of the next coin flip after a succession of coin flips (e.g., If Joe flipped a coin 4 times in row and got heads each time, what is the probability of getting heads on the next flip?).  <i>Ex.</i> Find the probability of drawing a particular color after a succession of draws with replacement (e.g., If Sam had 3 die in a bag - 1 red, 1 blue, and 1 green, what is the probability of drawing a blue?).  <i>Ex.</i> Find the probability of drawing a particular color after the color has been withdrawn, without replacement (e.g., A bag contains balls: 4 blue, 3 red, 2 yellow, and 1 black. Wes randomly selects the black ball. What is the probability he will select a yellow ball next if the black ball is not replaced in the bag?).</p>

<p>together is the product of their probabilities, and use this characterization to determine if they are independent.</p> <p><b>S-CP.3.</b> Understand the conditional probability of <math>A</math> given <math>B</math> as <math>P(A \text{ and } B)/P(B)</math>, and interpret independence of <math>A</math> and <math>B</math> as saying that the conditional probability of <math>A</math> given <math>B</math> is the same as the probability of <math>A</math>, and the conditional probability of <math>B</math> given <math>A</math> is the same as the probability of <math>B</math>.</p> <p><b>S-CP.4.</b> Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. <i>For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.</i></p> <p><b>S-CP.5.</b> Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. <i>For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.</i></p>		<p><b>Level III AA Students will:</b>  <b>EES-CP.1-5.</b> Compare / identify when events are independent or dependent.  <i>Ex.</i> Given a bag with a red marble, a green marble and a blue marble, you withdraw the green marble. Explain the difference in the probability of drawing a red marble next if you replace the green marble versus if you do not replace the green marble.</p> <p><b>Level II AA Students will:</b>  <b>EES-CP.1-5.</b> Recognize the outcomes of an event.  <i>Ex.</i> When asked whether catching the bus depends upon whether you get up on time, reply yes.  <i>Ex.</i> When asked if winning the lottery depends on the weather, reply no.  <i>Ex.</i> When asked if the basketball game is likely to be canceled if it rains, reply no.  <i>Ex.</i> What could happen when an egg falls off the table?</p> <p><b>Level I AA Students will:</b>  <b>EES-CP.1-5.</b> Identify which event is most likely to occur.  <i>Ex.</i> Which is put on your foot first, socks or shoes?  <i>Ex.</i> Using a daily schedule, what activity would come next?</p>
<p><b>Use the rules of probability to compute probabilities of compound events in a uniform probability model.</b></p> <p><b>S-CP.6.</b> Find the conditional probability of <math>A</math> given <math>B</math> as the fractions of <math>B</math>'s outcomes that also belong to <math>A</math>, and interpret the answer in terms of the model.</p> <p><b>S-CP.7.</b> Apply the Addition Rule, <math>P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)</math>, and interpret the answer in terms of the model.</p>	<p><b>EES-CP.6-7.</b>  Not Applicable</p>	<p><b>***The Extended Standards Educator Committee determined there are no real-world applications for this standard that are appropriate for this population and/or they have been covered in previous standards. (See EEG-IC.1-2. &amp; EEG-CP.1-5.)</b></p>

**Advanced Level Standards that were not included in the Standards Extensions.**

<b>Standard Code(s)</b>	<b>Cluster Heading</b>
N-CN.3-6, 8-9	The Complex Number System
N-VM.1-12	Vector & Matrix Quantities
A-APR.5-7	Arithmetic with Polynomial & Rational Expressions
A-REI.8-9	Reasoning with Equalities and Inequalities
F-IF.7d	Interpreting Functions
F-BF.1c, 4b-d, 5	Building Functions
F-TF.3-4, 6-7, 9	Trigonometric Functions
G-SRT.9-11	Similarities, Right Triangles, & Trigonometry
G-C.4	Circles
G-GMD.2	Geometric Measurement & Dimension
S-CP.8-9	Conditional Probability & the Rules of Probability
S-MD.1-7	Using Probability to Make Decisions

**NOTE: (+)** designated for complex mathematics (advanced courses)

Glossary and Tables can be found on the next pages.

# Mathematics Glossary

**Addition and subtraction within 5, 10, 20, 100, or 1000.** Addition or subtraction of two whole numbers with whole number answers, and with sum or minuend in the range 0-5, 0-10, 0-20, or 0-100, respectively. Example:  $8 + 2 = 10$  is an addition within 10,  $14 - 5 = 9$  is a subtraction within 20, and  $55 - 18 = 37$  is a subtraction within 100.

**Additive inverses.** Two numbers whose sum is 0 are additive inverses of one another. Example:  $\frac{3}{4}$  and  $-\frac{3}{4}$  are additive inverses of one another because  $\frac{3}{4} + (-\frac{3}{4}) = (-\frac{3}{4}) + \frac{3}{4} = 0$ .

**Associative property of addition.** See Table 3 in this Glossary.

**Associative property of multiplication.** See Table 3 in this Glossary.

**Bivariate data.** Pairs of linked numerical observations. Example: a list of heights and weights for each player on a football team. **Box plot.** A method of visually displaying a distribution of data values by using the median, quartiles, and extremes of the data set. A box shows the middle 50% of the data.<sup>1</sup>

**Commutative property.** See Table 3 in this Glossary.

**Complex fraction.** A fraction  $A/B$  where  $A$  and/or  $B$  are fractions ( $B$  nonzero).

**Computation algorithm.** A set of predefined steps applicable to a class of problems that gives the correct result in every case when the steps are carried out correctly. See also: computation strategy.

**Computation strategy.** Purposeful manipulations that may be chosen for specific problems, may not have a fixed order, and may be aimed at converting one problem into another. See also: computation algorithm.

**Congruent.** Two plane or solid figures are congruent if one can be obtained from the other by rigid motion (a sequence of rotations, reflections, and translations).

**Counting on.** A strategy for finding the number of objects in a group without having to count every member of the group. For example, if a stack of books is known to have 8 books and 3 more books are added to the top, it is not necessary to count the stack all over again. One can find the total by counting on—pointing to the top book and saying "eight," following this with "nine, ten, eleven. There are eleven books now."

**Dot plot.** See: line plot.

**Dilation.** A transformation that moves each point along the ray through the point emanating from a fixed center, and multiplies distances from the center by a common scale factor.



**Expanded form.** A multi-digit number is expressed in expanded form when it is written as a sum of single-digit multiples of powers of ten. For example,  $643 = 600 + 40 + 3$ .

**Expected value.** For a random variable, the weighted average of its possible values, with weights given by their respective probabilities.

**First quartile.** For a data set with median  $M$ , the first quartile is the median of the data values less than  $M$ . Example: For the data set  $\{1, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$ , the first quartile is 6.<sup>2</sup> See *also*: median, third quartile, interquartile range.

**Fraction.** A number expressible in the form  $a/b$  where  $a$  is a whole number and  $b$  is a positive whole number. (The word fraction in these standards always refers to a non-negative number.) See *also*: rational number.

**Identity property of 0.** See Table 3 in this Glossary.

**Independently combined probability models.** Two probability models are said to be combined independently if the probability of each ordered pair in the combined model equals the product of the original probabilities of the two individual outcomes in the ordered pair.

**Integer.** A number expressible in the form  $a$  or  $-a$  for some whole number  $a$ .

**Interquartile Range.** A measure of variation in a set of numerical data, the interquartile range is the distance between the first and third quartiles of the data set. Example: For the data set  $\{1, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$ , the interquartile range is  $15 - 6 = 9$ . See *also*: first quartile, third quartile.

**Line plot.** A method of visually displaying a distribution of data values where each data value is shown as a dot or mark above a number line. Also known as a dot plot.<sup>3</sup>

**Mean.** A measure of center in a set of numerical data, computed by adding the values in a list and then dividing by the number of values in the list.<sup>4</sup> Example: For the data set  $\{1, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$ , the mean is 21.

**Mean absolute deviation.** A measure of variation in a set of numerical data, computed by adding the distances between each data value and the mean, then dividing by the number of data values. Example: For the data set  $\{2, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$ , the mean absolute deviation is 20.

**Median.** A measure of center in a set of numerical data. The median of a list of values is the value appearing at the center of a sorted version of the list—or the mean of the two central values, if the list contains an even number of values. Example: For the data set  $\{2, 3, 6, 7, 10, 12, 14, 15, 22, 90\}$ , the median is 11.

**Midline.** In the graph of a trigonometric function, the horizontal line halfway between its maximum and minimum values. Multiplication and division within 100. Multiplication or division of two whole numbers with whole number answers, and with product or dividend in the range 0-100. Example:  $72 \div 8 = 9$ .

**Multiplicative inverses.** Two numbers whose product is 1 are multiplicative inverses of one another. Example:  $3/4$  and  $4/3$  are multiplicative inverses of one another because  $3/4 \times 4/3 = 4/3 \times 3/4 = 1$ .

**Number line diagram.** A diagram of the number line used to represent numbers and support reasoning about them. In a number line diagram for measurement quantities, the interval from 0 to 1 on the diagram represents the unit of measure for the quantity.

**Percent rate of change.** A rate of change expressed as a percent. Example: if a population grows from 50 to 55 in a year, it grows by  $5/50 = 10\%$  per year.

**Probability distribution.** The set of possible values of a random variable with a probability assigned to each.

**Properties of operations.** See Table 3 in this Glossary.

**Properties of equality.** See Table 4 in this Glossary.

**Properties of inequality.** See Table 5 in this Glossary.

**Properties of operations.** See Table 3 in this Glossary.

**Probability.** A number between 0 and 1 used to quantify likelihood for processes that have uncertain outcomes (such as tossing a coin, selecting a person at random from a group of people, tossing a ball at a target, or testing for a medical condition).

**Probability model.** A probability model is used to assign probabilities to outcomes of a chance process by examining the nature of the process. The set of all outcomes is called the sample space, and their probabilities sum to 1. See *also*: uniform probability model.

**Random variable.** An assignment of a numerical value to each outcome in a sample space. Rational expression. A quotient of two polynomials with a non-zero denominator.

**Rational number.** A number expressible in the form  $a/b$  or  $-a/b$  for some fraction  $a/b$ . The rational numbers include the integers.

**Rectilinear figure.** A polygon all angles of which are right angles.

**Rigid motion.** A transformation of points in space consisting of a sequence of one or more translations, reflections, and/or rotations. Rigid motions are here assumed to preserve distances and angle measures.

**Repeating decimal.** The decimal form of a rational number. See *also*: terminating decimal.

**Sample space.** In a probability model for a random process, a list of the individual outcomes that are to be considered.

**Scatter plot.** A graph in the coordinate plane representing a set of bivariate data. For example, the heights and weights of a group of people could be displayed on a scatter plot.<sup>5</sup>

**Similarity transformation.** A rigid motion followed by a dilation.

**Tape diagram.** A drawing that looks like a segment of tape, used to illustrate number relationships. Also known as a strip diagram, bar model, fraction strip, or length model.

**Terminating decimal.** A decimal is called terminating if its repeating digit is 0.

**Third quartile.** For a data set with median  $M$ , the third quartile is the median of the data values greater than  $M$ . Example: For the data set {2, 3, 6, 7, 10, 12, 14, 15, 22, 120}, the third quartile is 15. See *also*: median, first quartile, interquartile range.

**Transitivity principle for indirect measurement.** If the length of object A is greater than the length of object B, and the length of object B is greater than the length of object C, then the length of object A is greater than the length of object C. This principle applies to measurement of other quantities as well.

**Uniform probability model.** A probability model which assigns equal probability to all outcomes. See *also*: probability model.

**Vector.** A quantity with magnitude and direction in the plane or in space, defined by an ordered pair or triple of real numbers.

**Visual fraction model.** A tape diagram, number line diagram, or area model.

**Whole numbers.** The numbers 0, 1, 2, 3, ...

<sup>1</sup>Adapted from Wisconsin Department of Public Instruction, <http://dpi.wi.gov/standards/mathglos.html>, accessed March 2, 2010.

<sup>2</sup>Many different methods for computing quartiles are in use. The method defined here is sometimes called the Moore and McCabe method. See Langford, E., "Quartiles in Elementary Statistics," *Journal of Statistics Education* Volume 14, Number 3 (2006).

<sup>3</sup>Adapted from Wisconsin Department of Public Instruction, *op. cit.*

<sup>4</sup>To be more precise, this defines the arithmetic mean.

<sup>5</sup>Adapted from Wisconsin Department of Public Instruction, *op. cit.*

**Table 1**  
**Common addition and subtraction.<sup>1</sup>**

	<b>RESULT UNKNOWN</b>	<b>CHANGE UNKNOWN</b>	<b>START UNKNOWN</b>
<b>ADD TO</b>	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? $2 + 3 = ?$	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? $2 + ? = 5$	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? $? + 3 = 5$
<b>TAKE FROM</b>	Five apples were on the table. I ate two apples. How many apples are on the table now? $5 - 2 = ?$	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? $5 - ? = 3$	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? $? - 2 = 3$
	<b>TOTAL UNKNOWN</b>	<b>ADDEND UNKNOWN</b>	<b>BOTH ADDENDS UNKNOWN<sup>2</sup></b>
<b>PUT TOGETHER / TAKE APART<sup>3</sup></b>	Three red apples and two green apples are on the table. How many apples are on the table? $3 + 2 = ?$	Five apples are on the table. Three are red and the rest are green. How many apples are green? $3 + ? = 5$ , $5 - 3 = ?$	Grandma has five flowers. How many can she put in the red vase and how many in her blue vase? $5 = 0 + 5$ , $5 = 0 + 5 = 1 + 4$ , $5 = 4 + 1$ , $5 = 2 + 3$ , $5 = 3 + 2$
<b>COMPARE</b>	<b>DIFFERENCE UNKNOWN</b>	<b>BIGGER UNKNOWN</b>	<b>SMALLER UNKNOWN</b>
	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? ("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? $2 + ? = 5$ , $5 - 2 = ?$	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? (Version with "fewer"): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? $5 - 3 = ?$ , $? + 3 = 5$	(Version with "more"): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? (Version with "fewer"): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? $5 - 3 = ?$ , $? + 3 = 5$

<sup>1</sup>Adapted from Box 2-4 of Mathematics Learning in Early Childhood, National Research Council (2009, pp. 32, 33).

<sup>2</sup>These take apart situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children understand that the = sign does not always mean, makes or results in but always does mean is the same number as.

<sup>3</sup>Either addend can be unknown, so there are three variations of these problem situations. Both addends Unknown is a productive extension of the basic situation, especially for small numbers less than or equal to 10.

<sup>4</sup>For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operation (the version using more for the bigger unknown and using less for the smaller unknown). The other versions are more difficult.

**Table 2**  
**Common multiplication and division situations.<sup>1</sup>**

	<b>UNKNOWN PRODUCT</b>	<b>GROUP SIZE UNKNOWN ("HOW MANY IN EACH GROUP?" DIVISION)</b>	<b>NUMBER OF GROUPS UNKNOWN ("HOW MANY GROUPS?" DIVISION)</b>
	$3 \times 6 = ?$	$3 \times ? = 18$ , and $18 \div 3 = ?$	$? \times 6 = 18$ , and $18 \div 6 = ?$
<b>EQUAL GROUPS</b>	There are 3 bags with 6 plums in each bag. How many plums are there in all? <i>Measurement example.</i> You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? <i>Measurement example.</i> You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? <i>Measurement example.</i> You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
<b>ARRAYS<sup>2</sup>, AREA<sup>3</sup></b>	There are 3 rows of apples with 6 apples in each row. How many apples are there? <i>Area example.</i> What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? <i>Area example.</i> <sup>2</sup> A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? <i>Area example.</i> A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
<b>COMPARE</b>	A blue hat costs \$6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? <i>Measurement example.</i> A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs \$18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? <i>Measurement example.</i> A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs \$18 and a blue hat costs \$6. How many times as much does the red hat cost as the blue hat? <i>Measurement example.</i> A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
<b>GENERAL</b>	$a \times b = ?$	$a \times ? = p$ and $p \div a = ?$	$? \times b = p$ , and $p \div b = ?$

<sup>1</sup>The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.

<sup>2</sup>Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.

<sup>3</sup>The first examples in each cell are examples of discrete things. These are easier for students and should be given before the measurement examples.

**Table 3**

The properties of operations. Here  $a$ ,  $b$  and  $c$  stand for arbitrary numbers in a given number system. The properties of operations apply to the rational number system, the real number system, and the complex number.

Associative property of addition	$(a + b) + c = a + (b + c)$
Commutative property of addition	$a + b = b + a$
Additive identity property of 0	$a + 0 = 0 + a = a$
Existence of additive inverses	For every $a$ there exists $-a$ so that $a + (-a) = (-a) + a = 0$
Associative property of multiplication	$(a \times b) \times c = a \times (b \times c)$
Commutative property of multiplication	$a \times b = b \times a$
Multiplicative identity property 1	$a \times 1 = 1 \times a = a$
Existence of multiplicative inverses	For every $a \neq 0$ there exists $1/a$ so that $a \times 1/a = 1/a \times a = 1$
Distributive property of multiplication over additions	$a \times (b + c) = a \times b + a \times c$

**Table 4**

The properties of equality. Here  $a$ ,  $b$  and  $c$  stand for arbitrary numbers in the rational, real, or complex number systems.

Reflexive property of equality	$a = a$ .
Symmetric property of equality	If $a = b$ , then $b = a$ .
Transitive property of equality	If $a = b$ and $b = c$ , then $a = c$ .
Addition property of equality	If $a = b$ , then $a + c = b + c$ .
Subtraction property of equality	If $a = b$ then $a - c = b - c$ .
Multiplication property of equality	If $a = b$ , then $a \times c = b \times c$ .
Division property of equality	If $a = b$ and $c \neq 0$ , then $a \div c = b \div c$ .
Substitution property of equality	If $a = b$ , then $b$ may be substituted for $a$ in any expression containing $a$ .

**Table 5**

Table 5. The properties of inequality. Here  $a$ ,  $b$ , and  $c$  stand for arbitrary numbers in the rational or real number systems.

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Exactly one of the following is true:  $a < b$ ,  $a = b$ ,  $a > b$ .

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If  $a > b$  and  $b > c$  then  $a > c$ .

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If  $a > b$ ,  $b < a$ .

---

If  $a > b$ , then  $-a < -b$ .

---

If  $a > b$ , then  $a \pm c > b \pm c$ .

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If  $a > b$  and  $c > 0$ , then  $a \times c > b \times c$ .

---

If  $a > b$  and  $c < 0$ , then  $a \times c < b \times c$ .

---

If  $a > b$  and  $c > 0$ , then  $a \div c > b \div c$ .

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If  $a > b$  and  $c < 0$ , then  $a \div c < b \div c$ .