

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

Math

Kindergarten

## Counting & Cardinality

Common Core Standard ©	AASL Learning Standard(s)
K.CC.1. Count to 100 by ones and by tens.	4.1.6 - Organize personal knowledge in a way that can be called upon easily.
K.CC.2. Count forward beginning from a given number within the known sequence (instead of having to begin at 1).	1.1.2 - Use prior and background knowledge as context for new learning.
K.CC.3. 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).	3.1.3 - Use writing and speaking skills to communicate new understandings effectively.
K.CC.4.a. Understand the relationship between numbers and quantities; connect counting to cardinality: 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.	1.1.2 - Use prior and background knowledge as context for new learning.
K.CC.4.b. Understand the relationship between numbers and quantities; connect counting to cardinality: Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
K.CC.4.c. Understand the relationship between numbers and quantities; connect counting to cardinality: Understand that each successive number name refers to a quantity that is one larger.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
K.CC.5. 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
K.CC.6. 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
K.CC.7. Compare two numbers between 1 and 10 presented as written numerals.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.  2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.

## Operations & Algebraic Thinking

Common Core Standard ©	AASL Learning Standard(s)
K.OA.1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
K.OA.2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
K.OA.3. 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., $5 = 2 + 3$ and $5 = 4 + 1$ ).	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
K.OA.4. 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
K.OA.5. Fluently add and subtract within 5.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

## Number & Operations in Base Ten

Common Core Standard	AASL Learning Standard(s)
K.NBT.1. 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., $18 = 10 + 8$ ); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

## Measurement & Data

Common Core Standard ©	AASL Learning Standard(s)
K.MD.1. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.	1.1.2 - Use prior and background knowledge as context for new learning.
K.MD.2. 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>	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
K.MD.3. Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.2 - Organize knowledge so that it is useful. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

## Geometry

Common Core Standard ©	AASL Learning Standard(s)
K.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as <i>above</i> , <i>below</i> , <i>beside</i> , <i>in front of</i> , <i>behind</i> , and <i>next to</i> .	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
K.G.2. Correctly name shapes regardless of their orientations or overall size.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
K.G.3. Identify shapes as two-dimensional (lying in a plane, “flat”) or three-dimensional (“solid”).	
K.G.4. 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).	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.  2.1.4 - Use technology and other information tools to analyze and organize information.  2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
K.G.6. 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>	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.4 - Use technology and other information tools to analyze and organize information.

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

## Math

## 1st Grade

### Operations & Algebraic Thinking

Common Core Standard ©	AASL Learning Standard(s)
1.OA.1. 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.	1.1.2 - Use prior and background knowledge as context for new learning.
1.OA.2. 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.	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
1.OA.3. Apply properties of operations as strategies to add and subtract. <i>Examples: If <math>8 + 3 = 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.)</i>	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
1.OA.4. Understand subtraction as an unknown-addend problem. <i>For example, subtract <math>10 - 8</math> by finding the number that makes 10 when added to 8. Add and subtract within 20.</i>	2.4.3 - Recognize new knowledge and understanding.
1.OA.5. Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).	1.1.2 - Use prior and background knowledge as context for new learning.
1.OA.6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$ ); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$ ); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$ , one knows $12 - 8 = 4$ ); and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12 + 1 = 13$ ).	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
1.OA.7. 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>	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
1.OA.8. 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 = \_ - 3</math>, <math>6 + 6 = \_</math>.</i>	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

## Number & Operations in Base Ten

Common Core Standard ©	AASL Learning Standard(s)
1.NBT.1. 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.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
1.NBT.2. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: <ul style="list-style-type: none"> <li>• 10 can be thought of as a bundle of ten ones - called a "ten."</li> <li>• The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.</li> <li>• 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).</li> </ul>	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
1.NBT.3. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$ , $=$ , and $<$ .	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
1.NBT.4. 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.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
1.NBT.5. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.2 - Organize knowledge so that it is useful.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

## Measurement & Data

Common Core Standard ©	AASL Learning Standard(s)
1.MD.1. Order three objects by length; compare the lengths of two objects indirectly by using a third object.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
1.MD.2. 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>	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
1.MD.3. Tell and write time in hours and half-hours using analog and digital clocks.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
1.MD.4. 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.	1.1.2 - Use prior and background knowledge as context for new learning.  1.1.3 - Develop and refine a range of questions to frame the search for new understanding.  2.1.2 - Organize knowledge so that it is useful.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

## Geometry

Common Core Standard ©	AASL Learning Standard(s)
1.G.1. 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.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
1.G.2. 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.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.2 - Organize knowledge so that it is useful.  2.1.3 - Use strategies to draw conclusions from information and apply

	<p>knowledge to curricular areas, real-world situations, and further investigations.</p> <p>2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.</p>
<p>1.G.3. 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>1.1.2 - Use prior and background knowledge as context for new learning.</p> <p>2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.</p> <p>2.1.2 - Organize knowledge so that it is useful.</p> <p>2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.</p> <p>2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.</p>

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

Math

2nd Grade

## Operations & Algebraic Thinking

Common Core Standard ©	AASL Learning Standard(s)
2.OA.1. 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.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.2 - Organize knowledge so that it is useful.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
2.OA.2. Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.	2.1.2 - Organize knowledge so that it is useful.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
2.OA.3. 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.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
2.OA.4. 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.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.2 - Organize knowledge so that it is useful.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

## Number & Operations in Base Ten

Common Core Standard ©	AASL Learning Standard(s)
2.NBT.1. 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: <ul style="list-style-type: none"> <li>• 100 can be thought of as a bundle of ten tens — called a “hundred.”</li> <li>• 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).</li> </ul>	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.2 - Organize knowledge so that it is useful.

2.NBT.2. Count within 1000; skip-count by 5s, 10s, and 100s.	1.1.2 - Use prior and background knowledge as context for new learning.
2.NBT.3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	1.1.2 - Use prior and background knowledge as context for new learning.
2.NBT.4. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using $>$ , $=$ , and $<$ symbols to record the results of comparisons.	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.2 - Organize knowledge so that it is useful. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
2.NBT.5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.2 - Organize knowledge so that it is useful. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
2.NBT.6. Add up to four two-digit numbers using strategies based on placevalue and properties of operations.	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
2.NBT.7. 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.	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.2 - Organize knowledge so that it is useful. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
2.NBT.8. Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
2.NBT.9. Explain why addition and subtraction strategies work, using place value and the properties of operations.	3.1.3 - Use writing and speaking skills to communicate new understandings effectively.

## Measurement & Data

Common Core Standard ©	AASL Learning Standard(s)
2.MD.1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.	1.1.8 - Demonstrate mastery of technology tools for accessing information and pursuing inquiry. 3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.

2.MD.2. 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.	3.1.3 - Use writing and speaking skills to communicate new understandings effectively.  2.1.2 - Organize knowledge so that it is useful.
2.MD.3. Estimate lengths using units of inches, feet, centimeters, and meters.	1.1.2 - Use prior and background knowledge as context for new learning.
2.MD.4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.	1.1.2 - Use prior and background knowledge as context for new learning.
2.MD.5. 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.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
2.MD.6. 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.	2.1.2 - Organize knowledge so that it is useful.  3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.
2.MD.7. Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.	1.1.8 - Demonstrate mastery of technology tools for accessing information and pursuing inquiry.
2.MD.8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.2 - Organize knowledge so that it is useful.
2.MD.9. 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.	2.1.2 - Organize knowledge so that it is useful.  2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
2.MD.10. 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 using information presented in a bar graph.	2.1.2 - Organize knowledge so that it is useful.  2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.

## Geometry

Common Core Standard ©	AASL Learning Standard(s)
2.G.1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.	1.1.2 - Use prior and background knowledge as context for new learning.  3.1.3 - Use writing and speaking skills to communicate new understandings effectively.
2.G.2. Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

<p>2.G.3. Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, 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>2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.</p> <p>3.1.3 - Use writing and speaking skills to communicate new understandings effectively.</p>
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# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

Math

3rd Grade

## Operations & Algebraic Thinking

Common Core Standard ©	AASL Learning Standard(s)
3.OA.1. Interpret products of whole numbers, e.g., interpret $5 \times 7$ 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>	1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.
3.OA.2. Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ 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.	1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.
3.OA.3. 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.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.
3.OA.4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
3.OA.5. Apply properties of operations as strategies to multiply and divide. <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>	1.1.2 - Use prior and background knowledge as context for new learning. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
3.OA.6. 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>	
3.OA.7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$ , one knows $40 \div 5 = 8$ ) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	4.1.6 - Organize personal knowledge in a way that can be called upon easily.
3.OA.8. 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.	1.4.3 - Monitor gathered information, and assess for gaps or weaknesses. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations. 2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
3.OA.9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. <i>For</i>	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information

<i>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>	and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.
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### Number & Operations in Base Ten

Common Core Standard ©	AASL Learning Standard(s)
3.NBT.1. Use place value understanding to round whole numbers to the nearest 10 or 100.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.
3.NBT.2. 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.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.
3.NBT.3. Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., $9 \times 80$ , $5 \times 60$ ) using strategies based on place value and properties of operations.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.

### Number & Operations—Fractions<sup>1</sup>

Common Core Standard ©	AASL Learning Standard(s)
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 $1/b$ .	1.1.6 - Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.
3.NF.2.a. Understand a fraction as a number on the number line; represent fractions on a number line diagram: Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into $b$ equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.	3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.
3.NF.2.b. Understand a fraction as a number on the number line; represent fractions on a number line diagram: Represent a fraction $a/b$ on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size $a/b$ and that its endpoint locates the number $a/b$ on the number line.	3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.
3.NF.3.a. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size: Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
3.NF.3.b. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size: Recognize and generate simple	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.

equivalent fractions, e.g., $1/2 = 2/4$ , $4/6 = 2/3$ ). Explain why the fractions are equivalent, e.g., by using a visual fraction model.	
3.NF.3.c Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size: Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
3.NF.3.d. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size: Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$ , $=$ , or $<$ , and justify the conclusions, e.g., by using a visual fraction model.	1.2.4 - Maintain a critical stance by questioning the validity and accuracy of all information.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

<sup>1</sup> Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, 8.

### Measurement & Data

Common Core Standard ©	AASL Learning Standard(s)
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.	
3.MD.2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). <sup>1</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>2</sup>	
3.MD.3. 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>	
3.MD.4. 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.	
3.MD.5.a. Recognize area as an attribute of plane figures and understand concepts of area measurement: 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.	
3.MD.5.b. Recognize area as an attribute of plane figures and understand concepts of area measurement: A plane figure which can be covered without gaps or overlaps by $n$ unit squares is said to have an area of $n$ square units.	

3.MD.6. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	
3.MD.7.a. Relate area to the operations of multiplication and addition: 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.	
3.MD.7.b. Relate area to the operations of multiplication and addition: 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.	
3.MD.7.c. Relate area to the operations of multiplication and addition: Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths $a$ and $b + c$ is the sum of $a \times b$ and $a \times c$ . Use area models to represent the distributive property in mathematical reasoning.	
3.MD.7.d. Relate area to the operations of multiplication and addition: 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.	
3.MD.8. 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.	

## Geometry

Common Core Standard ©	AASL Learning Standard(s)
3.G.1. 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.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.  2.2.2 - Use both divergent and convergent thinking to formulate alternative conclusions and test them against the evidence.
3.G.2. 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>	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

Math

4th Grade

## Operations & Algebraic Thinking

Common Core Standard ©	AASL Learning Standard(s)
4.OA.1. Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ 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.	1.2.5 - Demonstrate adaptability by changing the inquiry focus, questions, resources, or strategies when necessary to achieve success.
4.OA.2. 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
4.OA.3. 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.	1.4.3 - Monitor gathered information, and assess for gaps or weaknesses. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations. 2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
4.OA.4. 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 range 1–100 is prime or composite.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.
4.OA.5. 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.	2.2.3 - Employ a critical stance in drawing conclusions by demonstrating that the pattern of evidence leads to a decision or conclusion.

## Number & Operations in Base Ten<sup>1</sup>

Common Core Standard ©	AASL Learning Standard(s)
4.NBT.1. 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. For example, recognize that $700 \div 70 = 10$ by applying concepts of place value and division.	
4.NBT.2. 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 $>$ , $=$ , and $<$ symbols to record the results of comparisons.	

4.NBT.3. Use place value understanding to round multi-digit whole numbers to any place.	
4.NBT.4. Fluently add and subtract multi-digit whole numbers using the standard algorithm.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.
4.NBT.5. 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.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.  3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.
4.NBT.6. 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.	3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.

<sup>1</sup>Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.

### Number & Number & Operations—Fractions<sup>1</sup>

Common Core Standard ©	AASL Learning Standard(s)
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.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.  2.2.3 - Employ a critical stance in drawing conclusions by demonstrating that the pattern of evidence leads to a decision or conclusion.
4.NF.3.a. 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.	1.1.6 - Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.
4.NF.3.b. Understand a fraction $a/b$ with $a > 1$ as a sum of fractions $1/b$ : 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: $3/8 = 1/8 + 1/8 + 1/8$ ; $3/8 = 1/8 + 2/8$ ; $2 \frac{1}{8} = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$ .	2.2.3 - Employ a critical stance in drawing conclusions by demonstrating that the pattern of evidence leads to a decision or conclusion.

4.NF.3.c. Understand a fraction $a/b$ with $a > 1$ as a sum of fractions $1/b$ : 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
4.NF.3.d. Understand a fraction $a/b$ with $a > 1$ as a sum of fractions $1/b$ : 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.	1.1.6 - Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.
4.NF.4.a. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number: Understand a fraction $a/b$ as a multiple of $1/b$ . For example, use a visual fraction model to represent $5/4$ as the product $5 \times (1/4)$ , recording the conclusion by the equation $5/4 = 5 \times (1/4)$ .	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
4.NF.4.b. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number: Understand a multiple of $a/b$ as a multiple of $1/b$ , and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express $3 \times (2/5)$ as $6 \times (1/5)$ , recognizing this product as $6/5$ . (In general, $n \times (a/b) = (n \times a)/b$ .)	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
4.NF.4.c. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number: 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 $3/8$ 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?	1.1.6 - Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.
4.NF.5. 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>2</sup> For example, express $3/10$ as $30/100$ , and add $3/10 + 4/100 = 34/100$ .	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
4.NF.6. Use decimal notation for fractions with denominators 10 or 100. For example, rewrite $0.62$ as $62/100$ ; describe a length as $0.62$ meters; locate $0.62$ on a number line diagram.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
4.NF.7. 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 $>$ , $=$ , or $<$ , and justify the conclusions, e.g., by using a visual model.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

<sup>1</sup> Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, 100.

<sup>2</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.

## Measurement & Data

Common Core Standard ©	AASL Learning Standard(s)
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), ...	4.1.6 - Organize personal knowledge in a way that can be called upon easily.
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.	1.1.6 - Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
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.	1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.
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.	2.1.4 - Use technology and other information tools to analyze and organize information.
4.MD.5.a. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: 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 $\frac{1}{360}$ of a circle is called a “one-degree angle,” and can be used to measure angles.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.
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: An angle that turns through n one-degree angles is said to have an angle measure of n degrees.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.
4.MD.6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.	2.1.4 - Use technology and other information tools to analyze and organize information.
4.MD.7. 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	1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.

mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.	
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## Geometry

Common Core Standard ©	AASL Learning Standard(s)
4.G.1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
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.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
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.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

## Math

## 5th Grade

### Operations & Algebraic Thinking

Common Core Standard ©	AASL Learning Standard(s)
5.OA.1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
5.OA.2. 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>	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
5.OA.3. 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>	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.

### Number & Operations in Base Ten

Common Core Standard ©	AASL Learning Standard(s)
5.NBT.1. 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.	1.1.6 - Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.
5.NBT.2. 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.	3.1.3 - Use writing and speaking skills to communicate new understandings effectively.
5.NBT.3.a. Read, write, and compare decimals to thousandths: Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$ .	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.  3.1.3 - Use writing and speaking skills to communicate new understandings effectively.
5.NBT.3.b. Read, write, and compare decimals to thousandths: Compare two decimals to thousandths based on meanings of the digits in each place, using $>$ , $=$ , and $<$ symbols to record the results of comparisons.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

5.NBT.4. Use place value understanding to round decimals to any place.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
5.NBT.5. Fluently multiply multi-digit whole numbers using the standard algorithm.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
5.NBT.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations. 2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
5.NBT.7. 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations. 3.1.3 - Use writing and speaking skills to communicate new understandings effectively.

### Number & Operations—Fractions

Common Core Standard ©	AASL Learning Standard(s)
5.NF.1. 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>	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
5.NF.2. 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>	1.1.6 - Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.
5.NF.3. Interpret a fraction as division of the numerator by the denominator ( $a/b = a \div b$ ). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. <i>For example, interpret <math>3/4</math> as the result of dividing 3 by 4, noting that <math>3/4</math> multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size <math>3/4</math>. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?</i>	1.1.6 - Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.

<p>5.NF.4.a. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction: Interpret the product <math>(a/b) \times q</math> as a parts of a partition of <math>q</math> into <math>b</math> equal parts; equivalently, as the result of a sequence of operations <math>a \times q \div b</math>. <i>For example, use a visual fraction model to show <math>(2/3) \times 4 = 8/3</math>, and create a story context for this equation. Do the same with <math>(2/3) \times (4/5) = 8/15</math>. (In general, <math>(a/b) \times (c/d) = ac/bd</math>.)</i></p>	<p>1.1.6 - Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.</p>
<p>5.NF.4.b. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction: Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.</p>	<p>2.1.4 - Use technology and other information tools to analyze and organize information.</p>
<p>5.NF.5. Interpret multiplication as scaling (resizing), by:</p> <ul style="list-style-type: none"> <li>• Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.</li> <li>• Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence <math>a/b = (n \times a)/(n \times b)</math> to the effect of multiplying <math>a/b</math> by 1.</li> </ul>	<p>2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.</p>
<p>5.NF.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.</p>	<p>1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.</p>
<p>5.NF.7.a. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.<sup>1</sup>: Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. <i>For example, create a story context for <math>(1/3) \div 4</math>, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that <math>(1/3) \div 4 = 1/12</math> because <math>(1/12) \times 4 = 1/3</math>.</i></p>	<p>2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.</p>
<p>5.NF.7.b. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.<sup>1</sup>: Interpret division of a whole number by a unit fraction, and compute such quotients. <i>For example, create a story context for <math>4 \div (1/5)</math>, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that <math>4 \div (1/5) = 20</math> because <math>20 \times (1/5) = 4</math>.</i></p>	<p>2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.</p>

<p>5.NF.7.c. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.<sup>1</sup>:Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. <i>For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?</i></p>	<p>1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.</p>
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## Measurement & Data

Common Core Standard ©	AASL Learning Standard(s)
<p>5.MD.1. 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 in solving multi-step, real world problems.</p>	<p>1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.</p>
<p>5.MD.2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). 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>2.1.4 - Use technology and other information tools to analyze and organize information.</p>
<p>5.MD.3.a. Recognize volume as an attribute of solid figures and understand concepts of volume measurement: 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.</p>	
<p>5.MD.3.b. Recognize volume as an attribute of solid figures and understand concepts of volume measurement: A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.</p>	
<p>5.MD.4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.</p>	
<p>5.MD.5.a. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume: 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.</p>	<p>1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.</p> <p>2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.</p>
<p>5.MD.5.b. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume: 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.</p>	<p>1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.</p>

5.MD.5.c. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume: 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.	1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.
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## Geometry

Common Core Standard ©	AASL Learning Standard(s)
5.G.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
5.G.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.
5.G.3. 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>	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
5.G.4. Classify two-dimensional figures in a hierarchy based on properties.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

Math

6th Grade

## Ratios & Proportional Relationships

Common Core Standard ©	AASL Learning Standard(s)
6.RP.1. 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 three votes.”</i>	1.1.7 - Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, and point of view or bias.
6.RP.2. Understand the concept of a unit rate $a/b$ associated with a ratio $a:b$ with $b \neq 0$ , 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>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>	2.2.1 - Demonstrate flexibility in the use of resources by adapting information strategies to each specific resource and by seeking additional resources when clear conclusions cannot be drawn.
6.RP.3.a. 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: 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.	2.3.1 - Connect understanding to the real world.
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: 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>	2.3.1 - Connect understanding to the real world.
6.RP.3.c. 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: 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.	2.3.1 - Connect understanding to the real world.
6.RP.3.d. 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: Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	2.3.1 - Connect understanding to the real world.

<sup>1</sup> Expectations for unit rates in this grade are limited to non-complex fractions.

## The Number System

Common Core Standard ©	AASL Learning Standard(s)
<p>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. <i>For example, create a story context for <math>(2/3) \div (3/4)</math> and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that <math>(2/3) \div (3/4) = 8/9</math> because <math>3/4</math> of <math>8/9</math> is <math>2/3</math>. (In general, <math>(a/b) \div (c/d) = ad/bc</math>.) How much chocolate will each person get if 3 people share <math>1/2</math> lb of chocolate equally? How many <math>3/4</math>-cup servings are in <math>2/3</math> of a cup of yogurt? How wide is a rectangular strip of land with length <math>3/4</math> mi and area <math>1/2</math> square mi? Compute fluently with multi-digit numbers and find common factors and multiples.</i></p>	<p>2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.</p>
<p>6.NS.2. Fluently divide multi-digit numbers using the standard algorithm.</p>	<p>1.1.3 - Develop and refine a range of questions to frame the search for new understanding.</p>
<p>6.NS.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p>	<p>1.1.2 - Use prior and background knowledge as context for new learning.</p>
<p>6.NS.4. 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>. Apply and extend previous understandings of numbers to the system of rational numbers.</i></p>	<p>1.1.2 - Use prior and background knowledge as context for new learning.</p>
<p>6.NS.5. 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>1.1.7 - Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, and point of view or bias.</p>
<p>6.NS.6.a. 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: 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.</p>	

<p>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: 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.</p>	<p>1.1.7 - Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, and point of view or bias.</p>
<p>6.NS.6.c. 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: 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.</p>	<p>1.1.6 - Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.</p>
<p>6.NS.7.a. Understand ordering and absolute value of rational numbers: Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. <i>For example, interpret <math>-3 &gt; -7</math> as a statement that <math>-3</math> is located to the right of <math>-7</math> on a number line oriented from left to right.</i></p>	<p>1.1.2 - Use prior and background knowledge as context for new learning.</p>
<p>6.NS.7.b. Understand ordering and absolute value of rational numbers: Write, interpret, and explain statements of order for rational numbers in real-world contexts. <i>For example, write <math>-3^{\circ}\text{C} &gt; -7^{\circ}\text{C}</math> to express the fact that <math>-3^{\circ}\text{C}</math> is warmer than <math>-7^{\circ}\text{C}</math>.</i></p>	<p>1.1.6 - Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.</p>
<p>6.NS.7.c. Understand ordering and absolute value of rational numbers: Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. <i>For example, for an account balance of <math>-30</math> dollars, write <math> -30  = 30</math> to describe the size of the debt in dollars.</i></p>	<p>1.1.7 - Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, and point of view or bias.</p>
<p>6.NS.7.d. Understand ordering and absolute value of rational numbers: Distinguish comparisons of absolute value from statements about order. <i>For example, recognize that an account balance less than <math>-30</math> dollars represents a debt greater than 30 dollars.</i></p>	<p>1.1.7 - Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, and point of view or bias.</p>
<p>6.NS.8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.</p>	<p>2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.</p>

## Expressions & Equations

Common Core Standard ©	AASL Learning Standard(s)
6.EE.1. Write and evaluate numerical expressions involving whole-number exponents.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
6.EE.2.a. Write, read, and evaluate expressions in which letters stand for numbers: 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>	1.1.5 - Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.
6.EE.2.b. Write, read, and evaluate expressions in which letters stand for numbers: 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>	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
6.EE.2.c. Write, read, and evaluate expressions in which letters stand for numbers: 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 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>	2.4.2 - Reflect on systematic process, and assess for completeness of investigation.
6.EE.3. 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>	1.1.5 - Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.
6.EE.4. 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. Reason about and solve one-variable equations and inequalities.</i>	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
6.EE.5. 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
6.EE.6. 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

6.EE.7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which $p$ , $q$ and $x$ are all nonnegative rational numbers.	1.1.2 - Use prior and background knowledge as context for new learning.
6.EE.8. Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
6.EE.9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. <i>For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation <math>d = 65t</math> to represent the relationship between distance and time.</i>	1.1.2 - Use prior and background knowledge as context for new learning.

## Geometry

Common Core Standard ©	AASL Learning Standard(s)
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.	
6.G.2. 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 $V = l w h$ and $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	
6.G.3. 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.	
6.G.4. 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.	

## Statistics & Probability

Common Core Standard ©	AASL Learning Standard(s)
6.SP.1. 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>	1.1.4 - Find, evaluate, and select appropriate sources to answer questions.  2.1.2 - Organize knowledge so that it is useful.
6.SP.2. 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
6.SP.3. 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.	1.1.4 - Find, evaluate, and select appropriate sources to answer questions.  2.1.2 - Organize knowledge so that it is useful.
6.SP.4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	1.1.2 - Use prior and background knowledge as context for new learning.  2.1.2 - Organize knowledge so that it is useful.
6.SP.5.a. Summarize numerical data sets in relation to their context, such as by: Reporting the number of observations.	1.1.5 - Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
6.SP.5.b. Summarize numerical data sets in relation to their context, such as by: Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.	1.1.5 - Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
6.SP.5.c. Summarize numerical data sets in relation to their context, such as by: 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.	1.1.5 - Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
6.SP.5.d. Summarize numerical data sets in relation to their context, such as by: 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.	1.1.5 - Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.  2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

Math

7th Grade

## Ratios & Proportional Relationships

Common Core Standard ©	AASL Learning Standard(s)
7.RP.1. 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>\frac{1/2}{1/4}</math> miles per hour, equivalently 2 miles per hour.</i>	2.3.1 - Connect understanding to the real world.
7.RP.2.a. Recognize and represent proportional relationships between quantities: 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.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
7.RP.2.b. Recognize and represent proportional relationships between quantities: Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	2.1.2 - Organize knowledge so that it is useful.
7.RP.2.c. Recognize and represent proportional relationships between quantities: 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>	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
7.RP.2.d. Recognize and represent proportional relationships between quantities: Explain what a point $(x, y)$ on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where $r$ is the unit rate.	2.1.2 - Organize knowledge so that it is useful.
7.RP.3. Use proportional relationships to solve multistep ratio and percent problems.	2.1.2 - Organize knowledge so that it is useful. 2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

## The Number System

Common Core Standard ©	AASL Learning Standard(s)
7.NS.1.a. 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: Describe situations in which opposite quantities combine to make 0. <i>For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.</i>	1.1.2 - Use prior and background knowledge as context for new learning.

7.NS.1.b. 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: 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
7.NS.1.c. 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: 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
7.NS.1.d. 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: Apply properties of operations as strategies to add and subtract rational numbers.	1.1.2 - Use prior and background knowledge as context for new learning.
7.NS.2.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.	1.1.2 - Use prior and background knowledge as context for new learning.
7.NS.2.b. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers: 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.	1.1.2 - Use prior and background knowledge as context for new learning.
7.NS.2.c. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers: Apply properties of operations as strategies to multiply and divide rational numbers.	1.1.2 - Use prior and background knowledge as context for new learning.
7.NS.2.d. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers: 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.	1.1.2 - Use prior and background knowledge as context for new learning.
7.NS.3. Solve real-world and mathematical problems involving the four operations with rational numbers.	1.2.2 - Demonstrate confidence and self-direction by making independent choices in the selection of resources and information.

## Expressions & Equations

Common Core Standard ©	AASL Learning Standard(s)
7.EE.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	1.1.2 - Use prior and background knowledge as context for new learning.
7.EE.2. 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
7.EE.3. 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>	1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.
7.EE.4.a. 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 quantity: Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$ , where $p$ , $q$ , and $r$ 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 length is 6 cm. What is its width?</i>	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
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 quantity: Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$ , where $p$ , $q$ , and $r$ 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 for the number of sales you need to make, and describe the solutions.</i>	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

## Geometry

Common Core Standard ©	AASL Learning Standard(s)
7.G.1. 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.	
7.G.2. 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.	
7.G.3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	
7.G.4. 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.	
7.G.5. 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.	
7.G.6. 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.	

## Statistics & Probability

Common Core Standard ©	AASL Learning Standard(s)
7.SP.1. 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.	1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.
7.SP.2. 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>	1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.

<p>7.SP.3. 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>1.1.2 - Use prior and background knowledge as context for new learning.</p>
<p>7.SP.4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. <i>For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.</i></p>	<p>1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.</p>
<p>7.SP.5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.</p>	<p>1.1.7 - Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, and point of view or bias.</p>
<p>7.SP.6. 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>2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.</p>
<p>7.SP.7.a . Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy: Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. <i>For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.</i></p>	<p>2.1.2 - Organize knowledge so that it is useful.</p>
<p>7.SP.7.b. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy: Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. <i>For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?</i></p>	<p>2.1.2 - Organize knowledge so that it is useful.</p>
<p>7.SP.8.a. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation: Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.</p>	<p>2.2.3 - Employ a critical stance in drawing conclusions by demonstrating that the pattern of evidence leads to a decision or conclusion.</p>

<p>7.SP.8.b. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation: Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.</p>	<p>2.2.1 - Demonstrate flexibility in the use of resources by adapting information strategies to each specific resource and by seeking additional resources when clear conclusions cannot be drawn.</p>
<p>7.SP.8.c. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation: Design and use a simulation to generate frequencies for compound events. <i>For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?</i></p>	<p>2.1.4 - Use technology and other information tools to analyze and organize information.</p>

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

Math

8th Grade

## The Number System

Common Core Standard ©	AASL Learning Standard(s)
8.NS.1. 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.	1.1.2 - Use prior and background knowledge as context for new learning. 2.2.1 - Demonstrate flexibility in the use of resources by adapting information strategies to each specific resource and by seeking additional resources when clear conclusions cannot be drawn.
8.NS.2. 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., $\pi^2$ ). <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>	2.2.2 - Use both divergent and convergent thinking to formulate alternative conclusions and test them against the evidence.

## Expressions & Equations

Common Core Standard ©	AASL Learning Standard(s)
8.EE.1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$ .	1.1.2 - Use prior and background knowledge as context for new learning.
8.EE.2. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$ , where $p$ is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.	1.1.2 - Use prior and background knowledge as context for new learning.
8.EE.3. Use numbers expressed in the form of a single digit times a whole-number 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>	1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.
8.EE.4. 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

8.EE.5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.	1.1.2 - Use prior and background knowledge as context for new learning.
8.EE.6. Use similar triangles to explain why the slope $m$ is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at $b$ .	1.1.2 - Use prior and background knowledge as context for new learning.
8.EE.7.a. Solve linear equations in one variable: Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$ , $a = a$ , or $a = b$ results (where $a$ and $b$ are different numbers).	2.1.2 - Organize knowledge so that it is useful.
8.EE.7.b. Solve linear equations in one variable: Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	2.1.2 - Organize knowledge so that it is useful.
8.EE.8.a. Analyze and solve pairs of simultaneous linear equations: Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
8.EE.8.b. Analyze and solve pairs of simultaneous linear equations: Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. <i>For example, <math>3x + 2y = 5</math> and <math>3x + 2y = 6</math> have no solution because <math>3x + 2y</math> cannot simultaneously be 5 and 6.</i>	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
8.EE.8.c. Analyze and solve pairs of simultaneous linear equations: Solve real-world and mathematical problems leading to two linear equations in two variables. <i>For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.</i>	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

## Functions

Common Core Standard ©	AASL Learning Standard(s)
8.F.1. 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>	2.1.2 - Organize knowledge so that it is useful.

8.F.2. 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 linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.</i>	1.1.5 - Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.
8.F.3. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. <i>For example, the function <math>A = s^2</math> giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.</i>	1.1.5 - Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.
8.F.4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	1.1.3 - Develop and refine a range of questions to frame the search for new understanding.
8.F.5. 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.	1.1.3 - Develop and refine a range of questions to frame the search for new understanding.

## Geometry

Common Core Standard ©	AASL Learning Standard(s)
8.G.1.a. Verify experimentally the properties of rotations, reflections, and translations: Lines are taken to lines, and line segments to line segments of the same length.	
8.G.1.b. Verify experimentally the properties of rotations, reflections, and translations: Angles are taken to angles of the same measure.	
8.G.1.c. Verify experimentally the properties of rotations, reflections, and translations: Parallel lines are taken to parallel lines.	
8.G.2. 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.	
8.G.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	
8.G.4. 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.	

8.G.5. 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>	
8.G.6. Explain a proof of the Pythagorean Theorem and its converse.	
8.G.7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	
8.G.8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	
8.G.9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	

### Statistics & Probability

Common Core Standard ©	AASL Learning Standard(s)
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.	1.1.6 - Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning.
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.	1.1.5 - Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.
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. <i>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.</i>	1.1.2 - Use prior and background knowledge as context for new learning.
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. <i>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?</i>	1.1.7 - Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, and point of view or bias.

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

Math

High School: Number & Quantity

## The Real Number System

Common Core Standard ©	AASL Learning Standard(s)
N-VM.1. 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. <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>	
N-VM.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.	
N-VM.3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	

## Quantities

Common Core Standard ©	AASL Learning Standard(s)
N-Q.1. 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.	
N-Q.2. Define appropriate quantities for the purpose of descriptive modeling.	
N-Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	

## The Complex Number System

Common Core Standard ©	AASL Learning Standard(s)
N-CN.1. Know there is a complex number $i$ such that $i^2 = -1$ , and every complex number has the form $a + bi$ with $a$ and $b$ real.	
N-CN.2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	
N-CN.3. (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.	

N-CN.4. (+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.	
N-CN.5. (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. <i>For example, <math>(-1 + \sqrt{3}i)^3 = 8</math> because <math>(-1 + \sqrt{3}i)</math> has modulus 2 and argument <math>120^\circ</math>.</i>	
N-CN.6. (+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.	
N-CN.7. Solve quadratic equations with real coefficients that have complex solutions.	
N-CN.8. (+) Extend polynomial identities to the complex numbers. <i>For example, rewrite <math>x^2 + 4</math> as <math>(x + 2i)(x - 2i)</math>.</i>	
N-CN.9. (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.	

### Vector & Matrix Quantities

Common Core Standard ©	AASL Learning Standard(s)
N-VM.1. (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., $\mathbf{v}$ , $ \mathbf{v} $ , $\ \mathbf{v}\ $ , $v$ ).	
N-VM.2. (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.	
N-VM.3. (+) Solve problems involving velocity and other quantities that can be represented by vectors.	
N-VM.4.a. (+) Add and subtract vectors: Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.	
N-VM.4.b. (+) Add and subtract vectors: Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.	
N-VM.4.c. (+) Add and subtract vectors: Understand vector subtraction $\mathbf{v} - \mathbf{w}$ as $\mathbf{v} + (-\mathbf{w})$ , where $-\mathbf{w}$ is the additive inverse of $\mathbf{w}$ , with the same magnitude as $\mathbf{w}$ and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.	
N-VM.5.a. (+) Multiply a vector by a scalar: Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$ .	

N-VM.5.b. (+) Multiply a vector by a scalar: Compute the magnitude of a scalar multiple $c\mathbf{v}$ using $\ c\mathbf{v}\  =  c \mathbf{v}$ . Compute the direction of $c\mathbf{v}$ knowing that when $ c \mathbf{v} \neq 0$ , the direction of $c\mathbf{v}$ is either along $\mathbf{v}$ (for $c > 0$ ) or against $\mathbf{v}$ (for $c < 0$ ).	
N-VM.6. (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.	
N-VM.7. (+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.	
N-VM.8. (+) Add, subtract, and multiply matrices of appropriate dimensions.	
N-VM.9. (+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.	
N-VM.10. (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.	
N-VM.11. (+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.	
N-VM.12. (+) Work with $2 \times 2$ matrices as a transformations of the plane, and interpret the absolute value of the determinant in terms of area.	

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

Math

High School: Algebra

## Seeing Structure in Expressions

Common Core Standard ©	AASL Learning Standard(s)
A-SSE.1.a. Interpret expressions that represent a quantity in terms of its context: Interpret parts of an expression, such as terms, factors, and coefficients. ★	
A-SSE.1.b. Interpret expressions that represent a quantity in terms of its context: Interpret complicated expressions by viewing one or more of their parts as a single entity. <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> ★	
A-SSE.2. Use the structure of an expression to identify ways to rewrite it. <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>	
A-SSE.3.a. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression: Factor a quadratic expression to reveal the zeros of the function it defines. ★	
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: Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. ★	
A-SSE.3.c. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression: 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> ★	
A-SSE.4. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. <i>For example, calculate mortgage payments.</i> ★	

## Arithmetic with Polynomials & Rational Expressions

Common Core Standard ©	AASL Learning Standard(s)
A-APR.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	

A-APR.2. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number $a$ , the remainder on division by $x - a$ is $p(a)$ , so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$ .	
A-APR.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	
A-APR.4. Prove polynomial identities and use them to describe numerical relationships. <i>For example, the polynomial identity <math>(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2</math> can be used to generate Pythagorean triples.</i>	
A-APR.5. (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of $x$ and $y$ for a positive integer $n$ , where $x$ and $y$ are any numbers, with coefficients determined for example by Pascal's Triangle. <sup>1</sup>	
A-APR.6. Rewrite simple rational expressions in different forms; write $\frac{a(x)}{b(x)}$ in the form $q(x) + \frac{r(x)}{b(x)}$ , where $a(x)$ , $b(x)$ , $q(x)$ , and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$ , using inspection, long division, or, for the more complicated examples, a computer algebra system.	
A-APR.7. (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.	

## Creating Equations

Common Core Standard ©	AASL Learning Standard(s)
A-CED.1. 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>	
A-CED.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	
A-CED.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. <i>For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.</i>	
A-CED.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. <i>For example, rearrange Ohm's law <math>V = IR</math> to highlight resistance <math>R</math>.</i>	

## Reasoning with Equations & Inequalities

Common Core Standard ©	AASL Learning Standard(s)
A-REI.1. 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.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.  2.2.3 - Employ a critical stance in drawing conclusions by demonstrating that the pattern of evidence leads to a decision or conclusion.  3.1.3 - Use writing and speaking skills to communicate new understandings effectively.
A-REI.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	1.2.3 - Demonstrate creativity by using multiple resources and formats.  2.2.2 - Use both divergent and convergent thinking to formulate alternative conclusions and test them against the evidence.
A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	
A-REI.4.a. Solve quadratic equations in one variable: Use the method of completing the square to transform any quadratic equation in $x$ into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.	
A-REI.4.b. Solve quadratic equations in one variable: Solve quadratic equations by inspection (e.g., for $x^2 = 49$ ), 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 $a \pm bi$ for real numbers $a$ and $b$ .	
A-REI.5. 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.	
A-REI.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	
A-REI.7. 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 $y = -3x$ and the circle $x^2 + y^2 = 3$ .	
A-REI.8. (+) Represent a system of linear equations as a single matrix equation in a vector variable.	
A-REI.9. (+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension $3 \times 3$ or greater).	

A-REI.10. 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).	1.4.3 - Monitor gathered information, and assess for gaps or weaknesses.
A-REI.11. Explain why the $x$ -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$ ; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★	3.1.3 - Use writing and speaking skills to communicate new understandings effectively. 3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.
A-REI.12. 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.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings. 2.2.4 - Demonstrate personal productivity by completing products to express learning.

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

Math

High School: Functions

## Interpreting Functions

Common Core Standard ©	AASL Learning Standard(s)
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 notation, 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. <i>For example, the Fibonacci sequence is defined recursively by <math>f(0) = f(1) = 1</math>, <math>f(n+1) = f(n) + f(n-1)</math> for <math>n \geq 1</math>.</i>	
F-IF.4. 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> ★	
F-IF.5. 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> ★	3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.
F-IF.6. 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. ★	
F-IF.7.a. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases: Graph linear and quadratic functions and show intercepts, maxima, and minima. ★	3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.
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: Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. ★	3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.

F-IF.7.c. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases: Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. ★	3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.
F-IF.7.d. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases: (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. ★	3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.
F-IF.7.e. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases: Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. ★	3.1.4 - Use technology and other information tools to organize and display knowledge and understanding in ways that others can view, use, and assess.
F-IF.8.a. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function: Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
F-IF.8.b. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function: Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$ , $y = (0.97)^t$ , $y = (1.01)^{12t}$ , $y = (1.2)^{t/10}$ , and classify them as representing exponential growth or decay.	2.1.6 - Use the writing process, media and visual literacy, and technology skills to create products that express new understandings.
F-IF.9. 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>	2.2.2 - Use both divergent and convergent thinking to formulate alternative conclusions and test them against the evidence.

## Building Functions

Common Core Standard ©	AASL Learning Standard(s)
F-BF.1.a. Write a function that describes a relationship between two quantities: Determine an explicit expression, a recursive process, or steps for calculation from a context. ★	
F-BF.1.b. Write a function that describes a relationship between two quantities: 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> ★	

F-BF.1.c. Write a function that describes a relationship between two quantities: (+) Compose functions. <i>For example, if <math>T(y)</math> is the temperature in the atmosphere as a function of height, and <math>h(t)</math> is the height of a weather balloon as a function of time, then <math>T(h(t))</math> is the temperature at the location of the weather balloon as a function of time.</i> ★	
F-BF.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	
F-BF.3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$ , $k f(x)$ , $f(kx)$ , and $f(x + k)$ for specific values of $k$ (both positive and negative); find the value of $k$ given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. ★	
F-BF.4.a. Find inverse functions: Solve an equation of the form $f(x) = c$ for a simple function $f$ that has an inverse and write an expression for the inverse. <i>For example, <math>f(x) = 2x^3</math> or <math>f(x) = (x+1)/(x-1)</math> for <math>x \neq 1</math>.</i>	
F-BF.4.b. Find inverse functions: (+) Verify by composition that one function is the inverse of another.	
F-BF.4.c. Find inverse functions: (+) Read values of an inverse function from a graph or a table, given that the function has an inverse.	
F-BF.4.d. Find inverse functions: (+) Produce an invertible function from a non-invertible function by restricting the domain.	
F-BF.5. (+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	

### Linear, Quadratic, & Exponential Models

Common Core Standard ©	AASL Learning Standard(s)
F-LE.1.a. Distinguish between situations that can be modeled with linear functions and with exponential functions: Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.	
F-LE.1.b. Distinguish between situations that can be modeled with linear functions and with exponential functions: Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	
F-LE.1.c. Distinguish between situations that can be modeled with linear functions and with exponential functions: Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another	

F-LE.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	
F-LE.3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	
F-LE.4. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where $a$ , $c$ , and $d$ are numbers and the base $b$ is 2, 10, or $e$ ; evaluate the logarithm using technology.	
F-LE.5. Interpret the parameters in a linear or exponential function in terms of a context.	

### Trigonometric Functions

Common Core Standard ©	AASL Learning Standard(s)
F-TF.1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.	
F-TF.2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	
F-TF.3. (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$ , $\pi/4$ and $\pi/6$ , and use the unit circle to express the values of sine, cosines, and tangent for $x$ , $\pi + x$ , and $2\pi - x$ in terms of their values for $x$ , where $x$ is any real number.	
F-TF.4. (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.	
F-TF.5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. ★	
F-TF.6. (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.	
F-TF.7. (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context. ★	
F-TF.8. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$ , $\cos(\theta)$ , or $\tan(\theta)$ given $\sin(\theta)$ , $\cos(\theta)$ , or $\tan(\theta)$ and the quadrant of the angle.	
F-TF.9. (+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.	

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

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Math

High School: Modeling

## **From the introduction of High School: Modeling from the Common Core Math Standards:**

Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★).

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

Math

High School: Geometry

## Congruence

Common Core Standard ©	AASL Learning Standard(s)
G.CO.1. 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.	
G-CO.2. 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).	
G-CO.3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	
G-CO.4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	
G-CO.5. 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.	
G-CO.6. 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.	
G-CO.7. 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.	
G-CO.8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	
G-CO.9. Prove theorems about lines and angles. <i>Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.</i>	
G-CO.10. Prove theorems about triangles. <i>Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.</i>	

G-CO.11. Prove theorems about parallelograms. <i>Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.</i>	
G-CO.12. 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>	
G-CO.13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	

### Similarity, Right Triangles, & Trigonometry

Common Core Standard ©	AASL Learning Standard(s)
G-SRT.1.a. Verify experimentally the properties of dilations given by a center and a scale factor: 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.	
G-SRT.1.b. Verify experimentally the properties of dilations given by a center and a scale factor: The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	
G-SRT.2. 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 triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	
G-SRT.3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	
G-SRT.4. 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>	
G-SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	
G-SRT.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	
G-SRT.7. Explain and use the relationship between the sine and cosine of complementary angles.	
G-SRT.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ★	

G-SRT.9. (+) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	
G-SRT.10. (+) Prove the Laws of Sines and Cosines and use them to solve problems.	
G-SRT.11. (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).	

## Circles

Common Core Standard ©	AASL Learning Standard(s)
G-C.1. Prove that all circles are similar.	
G-C.2. 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 perpendicular to the tangent where the radius intersects the circle.</i>	
G-C.3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	
G-C.4. (+) Construct a tangent line from a point outside a given circle to the circle.	
G-C.5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	

## Expressing Geometric Properties with Equations

Common Core Standard ©	AASL Learning Standard(s)
G-GPE.1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	
G-GPE.2. Derive the equation of a parabola given a focus and directrix.	
G-GPE.3. (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.	
G-GPE.4. Use coordinates to prove simple geometric theorems algebraically. <i>For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point <math>(1, \sqrt{3})</math> lies on the circle centered at the origin and containing the point <math>(0, 2)</math>.</i>	
G-GPE.5. 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).	

G-GPE.6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	
G-GPE.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. ★	

### Geometric Measurement & Dimension

Common Core Standard ©	AASL Learning Standard(s)
G-GMD.1. 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>	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.  3.3.4 - Create products that apply to authentic, real-world contexts.
G-GMD.2. (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.  3.3.4 - Create products that apply to authentic, real-world contexts.
G-GMD.3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★	1.2.5 - Demonstrate adaptability by changing the inquiry focus, questions, resources, or strategies when necessary to achieve success.
G-GMD.4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	

### Modeling with Geometry

Common Core Standard ©	AASL Learning Standard(s)
G-MG.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). ★	
G-MG.2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★	
G-MG.3. 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). ★	

# Crosswalk of the Common Core Standards and the Standards for the 21st-Century Learner

Math

High School: Statistics

## Interpreting Categorical & Quantitative Data

Common Core Standard ©	AASL Learning Standard(s)
S-ID.1. Represent data with plots on the real number line (dot plots, histograms, and box plots).	
S-ID.2. 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.	
S-ID.3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	
S-ID.4. 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.	
S-ID.5. 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.	
S-ID.6.a. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related: 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. Emphasize linear, quadratic, and exponential models.	
S-ID.6.b. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related: Informally assess the fit of a function by plotting and analyzing residuals.	
S-ID.6.c. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related: Fit a linear function for a scatter plot that suggests a linear association.	
S-ID.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	
S-ID.8. Compute (using technology) and interpret the correlation coefficient of a linear fit.	
S-ID.9. Distinguish between correlation and causation.	

## Making Inferences & Justifying Conclusions

Common Core Standard ©	AASL Learning Standard(s)
S-IC.1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.	1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.
S-IC.2. 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 question the model?</i>	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
S-IC.3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	1.1.4 - Find, evaluate, and select appropriate sources to answer questions.
S-IC.4. 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.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
S-IC.5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
S-IC.6. Evaluate reports based on data.	1.1.5 - Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.

## Conditional Probability & the Rules of Probability

Common Core Standard ©	AASL Learning Standard(s)
S-CP.1. 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”).	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.
S-CP.2. Understand that two events $A$ and $B$ are independent if the probability of $A$ and $B$ occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
S-CP.3. Understand the conditional probability of $A$ given $B$ as $P(A \text{ and } B)/P(B)$ , and interpret independence of $A$ and $B$ as saying that the conditional probability of $A$ given $B$ is the same as the probability of $A$ , and the conditional probability of $B$ given $A$ is the same as the probability of $B$ .	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
S-CP.4. 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</i>	2.1.4 - Use technology and other information tools to analyze and organize information.

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.	
S-CP.5. 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>	1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.
S-CP.6. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
S-CP.7. Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ , and interpret the answer in terms of the model.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
S-CP.8. (+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)$ , and interpret the answer in terms of the model.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.
S-CP.9. (+) Use permutations and combinations to compute probabilities of compound events and solve problems.	2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.

### Using Probability to Make Decisions

Common Core Standard ©	AASL Learning Standard(s)
S-MD.1. (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.
S-MD.2. (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.
S-MD.3. (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. <i>For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.</i>	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.
S-MD.4. (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. <i>For example, find a current data distribution on the number of TV sets per</i>	2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and

<p><i>household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?</i></p>	<p>create new knowledge.</p>
<p>S-MD.5.a. (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values: Find the expected payoff for a game of chance. <i>For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.</i></p>	<p>1.1.1 - Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life.</p>
<p>S-MD.5.b. (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values: Evaluate and compare strategies on the basis of expected values. <i>For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.</i></p>	<p>2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.</p>
<p>S-MD.6. (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).</p>	<p>2.1.3 - Use strategies to draw conclusions from information and apply knowledge to curricular areas, real-world situations, and further investigations.</p>
<p>S-MD.7. (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).</p>	<p>2.1.1 - Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.</p>