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| **Prerequisite Skills** **(Grade 3)** | **Unit Three Standards** **Grade 4** | **Looking Ahead** **(Grade 5)** |
| Understand that shapes in different categories may share attributes and that these attributes can define a larger category.Recognize quadrilaterals and explain the attributes of quadrilaterals.  | Geometry 1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.* I can draw points, line, line segments, and rays.
* I can draw right, acute, and obtuse angles.
* I can draw perpendicular and parallel lines.
* I can identify points, line, line segments and rays in 2-D figures.
* I can identify right, acute and obtuse angles in 2-D figures.
* I can identify perpendicular and parallel lines in 2-D figures.
 | Understand that attributes belonging to a category of 2D figures also belong to all subcategories of that category. Classify 2D figures in a hierarchy based on properties. |
| Geometry 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.* I can sort shapes based on lines and angles.
* I can identify right angles.
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| Geometry 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.* I can recognize a line of symmetry as a line across a figure that when folded along creates matching parts.
* I can draw lines of symmetry for two-dimensional figures.
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| Recognize area as an attribute of plane figures and understand concepts of area measurement.Measure areas by counting unit squares. Relate area to the operations of multiplication and addition.Solve word problems involving perimeter when given the side lengths or finding an unknown side length. | Measurement and Data 3: Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular* r*oom given the area of the flooring and the length, by viewing the area* f*ormula as a multiplication equation with an unknown factor.** I can identify and apply the formula for perimeter of a rectangle: 2L + 2W or L + L + W + W.
* I can identify and apply the formula for the area of a rectangle: L x W.
* I can solve area and perimeter problems in which there is an unknown factor (n).
 | Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.6th Grade: Solve real-world and mathematical problems involving area, surface area, and volume. |
| Understand that shapes in different categories may share attributes.Attributes of quadrilaterals. | Measurement and Data 5: Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. 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 1/360 of a circle is called a“one-degree angle,” and can be used to measure angles.* I can recognize and identify that an angle is formed from 2 rays with a common endpoint.

 b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.I can explain the angle measurement in terms of degrees. | Understand that attributes belonging to a category of 2D figures also belong to all subcategories of that category. Classify 2D figures in a hierarchy based on properties |

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| **Prerequisite Skills** **(Grade 3)** | **Unit Three Standards** **Grade 4** | **Looking Ahead** **(Grade 5)** |
| Understand that shapes in different categories may share attributes.Attributes of quadrilaterals. | Measurement and Data 6: Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.* I can determine which scale on the protractor to use, based on the direction the angle is open.
* I can determine the kind of angle based on the specified measure to decide reasonableness of the sketch (ex. acute, obtuse, right, straight).
* I can measure angles in whole number degrees using a protractor.
* I can sketch angles of specified measure.
 | Understand that attributes belonging to a category of 2D figures also belong to all subcategories of that category. Classify 2D figures in a hierarchy based on properties. |
| Measurement and Data 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 mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.* I can recognize that an angle can be divided into smaller angles.
* I can solve addition and subtraction equations to find unknown angle measurements on a diagram.
* I can find an angle measure by adding the measurements of the smaller angles that make up the larger angle.
* I can find an angle measure by subtracting the measurements of the smaller angle from the larger angle.
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\*In standards that are repeated in several units, the I Can Statements represent a progression of skills to scaffold learning.

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| **Standard** | **Learner Objectives** |
| Geometry 1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. | * I can draw points, line, line segments, and rays.
* I can draw right, acute, and obtuse angles.
* I can draw perpendicular and parallel lines.
* I can identify points, line, line segments and rays in 2-D figures.
* I can identify right, acute and obtuse angles in 2-D figures.
* I can identify perpendicular and parallel lines in 2-D figures.
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| **What does this standard mean the students will know and be able to do?** |
| This standard asks students to draw two-dimensional geometric objects and to also identify them in two- dimensional figures. This is the first time that students are exposed to rays, angles, and perpendicular and parallel lines.Examples of points, line segments, lines, angles, parallelism, and perpendicularity can be seen daily. Students do not easily identify lines and rays because they are more abstract. Students can and should make geometric distinctions about angles without measuring or mentioning degrees. Angles should be classified in comparison to right angles, such as larger than, smaller than or the same size as a right angle.When introducing line of symmetry, provide examples of geometric shapes with and without lines of symmetry. Shapes can be classified by the existence of lines of symmetry in sorting activities. This can be done informally by folding paper, tracing, creating designs with tiles or investigating reflections in mirrors.Repeated experiences in comparing and contrasting shapes enable students to gain a deeper understanding about shapes and their properties. |
| **Examples:** |
| Draw two different types of quadrilaterals that have two pairs of parallel sides?  | Is it possible to have an acute right triangle? Justify your reasoning using pictures and words. | How many acute, obtuse and right angles are in this shape? | Draw and list the properties of a parallelogram. Draw and list the properties of a rectangle. How are your drawings and lists alike? How are they different?  |

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| **Lessons and Resources for Geometry 1** |

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| Unit 4 Inv 2, 3 | [Lines, Angles, Etc…](https://sharepoint.dmps.k12.ia.us/sites/divisions/curr/Public%20Curriculum%20Documents/Mathematics/Elementary%20Math%202013%20-%202014/4th%20Grade/Unit%203/Points%20Lines%20Angles%20Etc.pdf) | [Geometry Find and Measure](https://sharepoint.dmps.k12.ia.us/sites/divisions/curr/Public%20Curriculum%20Documents/Mathematics/Elementary%20Math%202013%20-%202014/4th%20Grade/Unit%203/Geometry%20Find%20and%20Measure.pdf) |

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| **Emphasized Standards for Mathematical Practice** |
| [5. Use appropriate tools strategically.](http://elementarymath.dmschools.org/5-use-appropriate-tools-strategically1.html) | [6. Attend to precision.](http://elementarymath.dmschools.org/6-attend-to-precision5.html) |

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| **Standard** | **Learner Objectives** |
| Geometry 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. | * I can sort shapes based on lines and angles.
* I can identify right angles.
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| **What does this standard mean the students will know and be able to do?** |
| Two-dimensional figures may be classified using different characteristics such as, parallel or perpendicular lines or by angle measurement. **Parallel or Perpendicular Lines:**Students should become familiar with the concept of parallel and perpendicular lines. Two lines are parallel if they never intersect and are always equidistant. Two lines are perpendicular if they intersect in right angles (90º). |
| **This standard calls for students to sort objects based on parallelism perpendicularity and angle types.** | **Example: For each of the following, sketch an example if it is possible. If it is impossible, say so, and explain why or show counter example.** | **Example: Identify which of these shapes have perpendicular or parallel sides and justify your selection.** |
| Do you agree with the label on each of the circles in the Venn diagram above? Describe why some shapes fall in the overlapping sections of the circles. | * A parallelogram with exactly one right angle.
* An isosceles right triangle.
* A rectangle that is not a parallelogram. (impossible)
* Every square is a quadrilateral.
* Every trapezoid is a parallelogram.
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| **Lessons and Resources for Geometry 2** |

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| Unit 4 Inv 2, 4 | [Property Lists for quadrilaterals](https://sharepoint.dmps.k12.ia.us/sites/divisions/curr/Public%20Curriculum%20Documents/Mathematics/Elementary%20Math%202013%20-%202014/4th%20Grade/Unit%203/Property%20Lists%20for%20Quandrilaterals.pdf) | [Triangle Sort](https://sharepoint.dmps.k12.ia.us/sites/divisions/curr/Public%20Curriculum%20Documents/Mathematics/Elementary%20Math%202013%20-%202014/4th%20Grade/Unit%203/Triangle%20Sort.pdf) |

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| **Emphasized Standards for Mathematical Practice** |
| [5. Use appropriate tools strategically.](http://elementarymath.dmschools.org/5-use-appropriate-tools-strategically1.html) | [6. Attend to precision.](http://elementarymath.dmschools.org/6-attend-to-precision5.html) |

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| **Standard** | **Learner Objectives** |
| Geometry 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. | * I can recognize a line of symmetry as a line across a figure that when folded along creates matching parts.
* I can draw lines of symmetry for two-dimensional figures.
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| **What does this standard mean the students will know and be able to do?** |
| Students need experiences with figures which are symmetrical and non-symmetrical. Figures include both regular and non-regular polygons. Folding cut-out figures will help students determine whether a figure has one or more lines of symmetry. This standard only includes line symmetry not rotational symmetry. |
| **Example:** |
| For each figure, draw all of the lines of symmetry. What pattern do you notice? How many lines of symmetry do you think there would be for regular polygons with 9 and 11 sides. Sketch each figure and check your predictions. Polygons with an odd number of sides have lines of symmetry that go from a midpoint of a side through a vertex. |

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| **Lessons and Resources for Geometry 3** |

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| Unit 4 Inv 4 | [Symmetry Detectives – Learn the Code!](https://sharepoint.dmps.k12.ia.us/sites/divisions/curr/Public%20Curriculum%20Documents/Mathematics/Elementary%20Math%202013%20-%202014/4th%20Grade/Unit%203/Symmetry%20Detectives.pdf) | [Patchwork Symmetry](https://sharepoint.dmps.k12.ia.us/sites/divisions/curr/Public%20Curriculum%20Documents/Mathematics/Elementary%20Math%202013%20-%202014/4th%20Grade/Unit%203/Patchwork%20Symmetry.pdf) |
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| **Emphasized Standards for Mathematical Practice** |
| [4. Model with mathematics.](http://elementarymath.dmschools.org/4-model-with-mathematics1.html)  | [5. Use appropriate tools strategically.](http://elementarymath.dmschools.org/5-use-appropriate-tools-strategically1.html) | [6. Attend to precision.](http://elementarymath.dmschools.org/6-attend-to-precision5.html) | [7. Look for and make use of structure.](http://elementarymath.dmschools.org/7-look-for-and-make-use-of-structure5.html) |

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| **Standard** | **Learner Objectives** |
| Measurement and Data 3: Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular* r*oom given the area of the flooring and the length, by viewing the area* f*ormula as a multiplication equation with an unknown factor.* | * I can identify and apply the formula for perimeter of a rectangle: 2L + 2W or L + L + W + W.
* I can identify and apply the formula for the area of a rectangle: L x W.
* I can solve area and perimeter problems in which there is an unknown factor (n).
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| **What does this standard mean the students will know and be able to do?** |
| Students developed understanding of area and perimeter in 3rd grade by using visual models. While students are expected to use formulas to calculate area and perimeter of rectangles, they need to understand and be able to communicate their understanding of why the formulas work. The formula for area is I x w and the answer will always be in square units. The formula for perimeter can be 2 l + 2 w or 2 (l + w) and the answer will be in linear units. This standard calls for students to generalize their understanding of area and perimeter by connecting the concepts to mathematical formulas. These formulas should be developed through experience not just memorization. |
| **Example:** |
| Mrs. Fields is covering the miniature golf course with an artificial grass. How many 1-foot squares of carpet will she need to cover the entire course? |

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| **Lessons and Resources for Measurement and Data 3** |

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| Unit 4 Inv 1, 4 | Teacher Teams need to create story problems similar to the example above for students to practice area and perimeter. |

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| **Emphasized Standards for Mathematical Practice** |
| [2. Reason abstractly and quantitatively.](http://elementarymath.dmschools.org/2-reason-abstractly-and-quantitatively2.html) | [4. Model with mathematics.](http://elementarymath.dmschools.org/4-model-with-mathematics1.html) | [5. Use appropriate tools strategically.](http://elementarymath.dmschools.org/5-use-appropriate-tools-strategically1.html) | [6. Attend to precision.](http://elementarymath.dmschools.org/6-attend-to-precision5.html) | [7. Look for and make use of structure.](http://elementarymath.dmschools.org/7-look-for-and-make-use-of-structure5.html) |

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| **Standard** | **Learner Objectives** |
| Measurement and Data 5: Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. 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 1/360 of a circle is called a“one-degree angle,” and can be used to measure angles. b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. | * I can recognize and identify that an angle is formed from 2 rays with a common endpoint.
* I can explain the angle measurement in terms of degrees.
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| **What does this standard mean the students will know and be able to do?** |
| This standard calls for students to explore the connection between angles (measure of rotation) and circular measurement (360 degrees). Students explore an angle as a series of ―one degree turns.‖ A water sprinkler rotates one degree at each interval. If the sprinkler rotates a total of 100 degrees, how many one-degree turns has the sprinkler made?Angles are geometric shapes composed of two rays that are infinite in length. Students can understand this concept by using two rulers held together near the ends. The rulers can represent the rays of an angle. As one ruler is rotated, the size of the angle is seen to get larger. Ask questions about the types of angles created. Responses may be in terms of the relationship to right angles. Introduce angles as acute (less than the measure of a right angle) and obtuse (greater than the measure of a right angle). Have students draw representations of each type of angle. They also need to be able to identify angles in two-dimensional figures. Students can also create an angle explorer (two strips of cardboard attached with a brass fastener) to learn about angles. |

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| **Lessons and Resources for Measurement and Data 5** |

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| Unit 4 Inv 2.3A, 3.4 |  |

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| **Emphasized Standards for Mathematical Practice** |
| [5. Use appropriate tools strategically.](http://elementarymath.dmschools.org/5-use-appropriate-tools-strategically1.html) | [6. Attend to precision.](http://elementarymath.dmschools.org/6-attend-to-precision5.html) | [7. Look for and make use of structure.](http://elementarymath.dmschools.org/7-look-for-and-make-use-of-structure5.html) |

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| **Standard** | **Learner Objectives** |
| Measurement and Data 6: Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. | * I can determine which scale on the protractor to use, based on the direction the angle is open.
* I can determine the kind of angle based on the specified measure to decide reasonableness of the sketch (ex. acute, obtuse, right, straight).
* I can measure angles in whole number degrees using a protractor.
* I can sketch angles of specified measure.
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| **What does this standard mean the students will know and be able to do?** |
| Before students begin measuring angles with protractors, they need to have some experiences with benchmark angles. They transfer their understanding that a 360º rotation about a point makes a complete circle to recognize and sketch angles that measure approximately 90º and 180º. They extend this understanding and recognize and sketch angles that measure approximately 45º and 30º. They use appropriate terminology (acute, right, and obtuse) to describe angles and rays (perpendicular).Students should estimate angles, measure angles and sketch angles. They need to experience measuring angles using an angle ruler as well as a protractor. (The angle ruler allows them to “see” the turns or rotations). |

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| **Lessons and Resources for Measurement and Data 6** |

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| Unit 4 Inv 3 | Using a protractor – Math is Fun |

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| **Emphasized Standards for Mathematical Practice** |
| [2. Reason abstractly and quantitatively.](http://elementarymath.dmschools.org/2-reason-abstractly-and-quantitatively2.html) | [5. Use appropriate tools strategically.](http://elementarymath.dmschools.org/5-use-appropriate-tools-strategically1.html) | [6. Attend to precision.](http://elementarymath.dmschools.org/6-attend-to-precision5.html) |

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| **Standard** | **Learner Objective** |
| Measurement and Data 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 mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure. | * I can recognize that an angle can be divided into smaller angles.
* I can solve addition and subtraction equations to find unknown angle measurements on a diagram.
* I can find an angle measure by adding the measurements of the smaller angles that make up the larger angle.
* I can find an angle measure by subtracting the measurements of the smaller angle from the larger angle.
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| **What does this standard mean the students will know and be able to do?** |
| This standard addresses the idea of decomposing (breaking apart) an angle into smaller parts. |
| **Example:**  |
| A lawn water sprinkler rotates 65 degrees and then pauses. It then rotates an additional 25 degrees. What is the total degree of the water sprinkler rotation? To cover a full 360 degrees how many times will the water sprinkler need to be moved? If the water sprinkler rotates a total of 25 degrees then pauses. How many 25 degree cycles will it go through for the rotation to reach at least 90 degrees? |
| **Example:** |
| Dan knows that when a clock’s hands are exactly on 12 and 1, the angle formed by the clock’s hands measures 30º. What is the measure of the angle formed when a clock’s hands are exactly on the 12 and 4? |
| **Example:**  | **Example:** |
| If the two rays are perpendicular, what is the value of m? | The five shapes in the diagram are the exact same size. Write an equation that will help you find the measure of the indicated angle. Find the angle measurement. |

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| **Lessons and Resources for Measurement and Data 7** |

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| Unit 4 Inv 3 | Angle 180 - Math is Fun |

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| **Emphasized Standards for Mathematical Practice** |
| [2. Reason abstractly and quantitatively.](http://elementarymath.dmschools.org/2-reason-abstractly-and-quantitatively2.html) | [4. Model with mathematics.](http://elementarymath.dmschools.org/4-model-with-mathematics1.html) | [6. Attend to precision.](http://elementarymath.dmschools.org/6-attend-to-precision5.html) |

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**Optional Whole Group Lesson Progression**

Unit Pacing: 6 weeks

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| **Resource** | **Location** | **Primary Focus** | **Standard** |
| Investigations | Unit 4* Inv 1
 | * I can identify and apply the formula for perimeter of a rectangle: 2L + 2W or L + L + W + W.
* I can identify and apply the formula for the area of a rectangle: L x W.
* I can solve area and perimeter problems in which there is an unknown factor (n).
 | 4.MD.3 |
| Investigations | Unit 4* Inv 2
 | * I can draw points, line, line segments, and rays.
* I can draw right, acute, and obtuse angles.
* I can draw perpendicular and parallel lines.
* I can identify points, line, line segments and rays in 2-D figures.
* I can identify right, acute and obtuse angles in 2-D figures.
* I can identify perpendicular and parallel lines in 2-D figures.
* I can sort shapes based on lines and angles.
* I can identify right angles.
* I can recognize and identify that an angle is formed from 2 rays with a common endpoint.
* I can explain the angle measurement in terms of degrees.
 | 4.G.14.G.24.MD.5 |
| Investigations | Unit 4* Inv 3
 | * I can recognize and identify that an angle is formed from 2 rays with a common endpoint.
* I can explain the angle measurement in terms of degrees.
* I can determine which scale on the protractor to use, based on the direction the angle is open.
* I can determine the kind of angle based on the specified measure to decide reasonableness of the sketch (ex. acute, obtuse, right, straight).
* I can measure angles in whole number degrees using a protractor.
* I can sketch angles of specified measure.
* I can recognize that an angle can be divided into smaller angles.
* I can solve addition and subtraction equations to find unknown angle measurements on a diagram.
* I can find an angle measure by adding the measurements of the smaller angles that make up the larger angle.
* I can find an angle measure by subtracting the measurements of the smaller angle from the larger angle.
 | 4.MD.64.MD.74.MD.5 |
| Investigations | Unit 4* Inv 4
 | * I can sort shapes based on lines and angles.
* I can identify right angles.
* I can recognize a line of symmetry as a line across a figure that when folded along creates matching parts.
* I can draw lines of symmetry for two-dimensional figures.
* I can identify and apply the formula for perimeter of a rectangle: 2L + 2W or L + L + W + W.
* I can identify and apply the formula for the area of a rectangle: L x W.
* I can solve area and perimeter problems in which there is an unknown factor (n).
 | 4.G.24.G.34.MD.3 |
| Websites | Hyperlinked on standards pages in the curriculum guide. | \*Use additional resources listed to supplement lessons as needed. |  |

**\*Unit pacing is approximate. Some lessons may take more than one day. Use teacher discretion based on student need when planning unit length.**