**Learning Experience:**

**Angle Values**

**When planning, include the following:**

**Models (Concrete—Semi-Concrete—Semi-Abstract—Abstract)**

**Problems/Situations**

**Questions**

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| **AKS**:***44.MD.7* model and explain angle measure as additive (e.g., 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)***47.G.2* examine and compare angles in order to classify and identify two-dimensional figures by their angles to include right triangles*48.G.2* classify two-dimensional figures based on the presence or absence of parallel or perpendicular line segments, or the presence or absence of angles of a specified size |
| **Vertical Alignment:****3rd Grade**42.G.1 identify, draw, examine, and classify quadrilaterals (including rhombuses, rectangles, squares, parallelograms, and trapezoids)43.G.1 compare and contrast the attributes of quadrilaterals, and categorize quadrilaterals based on shared attributes**6th Grade**6.G.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangle or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.**7th Grade**28.G.2 construct (freehand with ruler and protractor and with technology), geometric shapes with given conditions, including constructing triangles from three measures of angles or sides and determining with measurements produce a unique triangle, more than one triangle, or no triangle. 33.G.5 write and solve equations for an unknown angle in a figure using facts about supplementary, complementary, vertical, and adjacent angles.  |
| **Standards for Mathematical Practice**:1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to a precision.
7. Look for and make sure of structure.
8. Look for an express regularity in repeated reasoning.
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| **Materials:**

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| Pattern Blocks | Pencil |
| Math Journals | Pattern Block Paper |
| Glue Sticks |  |

\*Optional: Protractor and Ruler (Expanding & Extending the experience)Book: Sir Conference and the Great Knight of Angleland by Cindy Neuschwander |
| **Vocabulary:**

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| Interior Angle | Degree of Angle |
| Acute Angle | Obtuse Angle |
| Right Angle | Straight Angle |
| Additive | Decompose |
| Sum  | Trapezoid |
| Triangle | Rhombus |
| Hexagon | Protractor |

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| **Essential Question**: How can I find the value of an unknown angle? |
| **Activating Strategy:**Brain Pop: Angles |
| **Instructional Activity**: (Tasks can be implemented over the course of several days using the math workshop model. After small group teaching, activities can be moved to independent work centers as extensions/remedial activities.)http://www.midpac.edu/elementary/KM/images/P1030202.jpg1. Create multiple examples of hexagons using any combinations of given patterns blocks: triangles, rhombi, trapezoids, and hexagons.
2. Given that the interior angles of a hexagon equal 360°, which is equivalent to a circle, find the interior angles of each of the pattern blocks you used to create your hexagon.

(Students will determine that the equilateral triangle= 60°, rhombus= 120°, trapezoid = 180°)1. Draw your examples of hexagons on pattern block paper. Within each hexagon, label all interior angles. Glue your representations in your math journal.
2. Find the sum of each hexagon’s interior angles.

*Questioning:*1. What are the values of the equilateral triangle’s interior angles?
2. What are the values of the trapezoid’s interior angles?
3. What are the values of the rhombus’ interior angles?
4. What is the value of the obtuse angle created with the triangle and rhombus?
5. What is the sum of the angles that combine to create a straight angle?

http://1.bp.blogspot.com/-6avyAvUWufQ/Tjmj83FoXII/AAAAAAAAAJI/fDWwcYpvA7o/s1600/Pattern+Blocks+Blog+002.JPG (Example: Rhombus + Triangle = 120° + 60° = 180°)1. If you have a rhombus and a triangle, what is the sum of the interior angle? How many more degrees do we need to make 360°?
2. Given the value of one interior angle of the equilateral triangle is 60°, what is the sum of 4 equilateral angles?
3. Write an equation using a variable to show the amount needed to form a circle. Solve for the value of the variable.

**Expanding the experience:**1. Use a ruler to draw an irregular quadrilateral.
2. Identify a center point within the quadrilateral and connect this point to each corner.
3. Use a protractor to measure three interior angles within the quadrilateral and label the drawing.
4. Write an equation to show how the value of the 4th angle can be solved given that the interior angles of a quadrilateral equal 360°.

Expanding for Resource Students:1. Create large scale laminated pattern block pieces that are easily manipulated and measured by students.
2. Create and manipulate pattern blocks using technology. <http://nlvm.usu.edu/en/nav/frames_asid_171_g_3_t_2.html>

**Extending the experience:**1. Other than using the square, what other combination of pattern blocks can be used to create a 90° angle? Use an equation to prove the measure of each right angle.
2. How many variations of pattern block combinations can be used to create obtuse angles? Use an equation to prove the measure of each obtuse angle.
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| **Summarizing**: (Use a sticky note with student name on the back and 3,2,1 on the front.)3: Give three different angle measures that equal a straight angle.2: Draw two pictures of a decomposed right angle.1: What is the most important thing you learned about finding the value of unknown angles? |