LessonTitle: Regular Polygon Area	**Geo 5.2**
Utah State Core Standard and Indicators Geometry Standard 4.2 Process Standards 3-5	
Summary In this lesson, students develop a formula for finding the area of a regular polygon by constructing a hexagon, observing the triangles, and reasoning to write the formula.	
Enduring Understanding Geometry enables us to describe, analyze, and understand our physical world.	**Essential Questions** How do you measure the area of regular polygons (beyond quadrilaterals)?
Skill Focus • Develop formulas to find areas of regular polygons.	**Vocabulary Focus**
Assessment	
Materials: Graph paper, Geometer's Sketchpad, or Patty Paper	
Launch	
Explore	
Summarize	
Apply	

Directions: Students will connect areas of triangles to the formula for finding the areas of regular polygons. First have students construct a regular hexagon using compass and straight edge and create formulas for finding areas of regular polygons.

Then to prove their theories about finding areas of regular polygons, have them turn to the following activity from Exploring Geometry with Geometer's Sketchpad

- "Areas of Regular Polygons and Circles," pages 145-146

Extension activities also found in Exploring Geometry with Geometer's Sketchpad:

- New area formulas p. 147
- Pick's Theorem p. 148-149

Geo 5.2 Regular Polygon Area

1) In Module 2, we derived a formula for finding the sum of the interior angles in polygons.

# of sides in a polygon	sum of the polygon angles
3 (triangle)	180 degrees
4 (quadrilateral)	_____
5 (pentagon)	_____
6 (hexagon)	_____
7	_____

What could you do with the number of sides to figure out the total degrees of the angles for any polygon? Total degrees (d) = _____

2) Does this pattern relate to a formula for finding the areas of regular polygons?

a) To derive a formula for finding the area of regular polygons, create a regular hexagon.

1) Use a compass to draw a circle. Label the center x.
2) Use the same compass setting. Place the compass point on the circle and draw an arc. Label the point of intersection A.
3) Use the same compass setting. Place the compass point on A and draw another arc. Label the point of intersection B.
4) Continue this process, creating points C,D,E, and F.
5) Use a straight edge to connect points A, B, D, E, and F and create a hexagon.
6) Measure each interior angle. What have you proved?

   _____

7) Draw segments connecting the hexagon vertices with the hexagon center. Measure the sides of the hexagon and the inner segments. What do you observe?

   _____

   _____

b) How would you go about finding the area of the hexagon?

c) Would the process you used to find the area of a hexagon work for any polygon? Write your formula below and explain how it works.

The area of any regular polygon = _____

Explanation: