## Lesson 10.3 Areas of Regular Polygons

You can circumscribe a circle about any regular polygon. The center of a regular polygon is the center of the circumscribed circle. The radius of a regular polygon is the distance from the center to a vertex. The apothem is the perpendicular distance from the center to a side.


1 Below is a portion of a regular octagon with radii and an apothem drawn. What is the measure of $\leqslant 1$ ?


3 Below is a portion of a regular octagon with radii and an apothem drawn. What is the measure of $<3$ ?


Ex. The figure below is a regular pentagon with radii and an apothem drawn. What is the measure of each numbered angle?


2 Below is a portion of a regular octagon with radii and an apothem drawn. What is the measure of <2?


Area of a Regular Polygon: $A=1 / 2$ ap
*where $a$ is apothem and $p$ is perimeter

The area formula for a regular polygon stems from the area formula for a triangle. How so?


Ex. What is the area of the regular decagon?


If the sides of a regular polygon is reduced to half its length, how does the perimeter of the polygon change?

4 What is the area of a regular pentagon with an $8-\mathrm{cm}$ apothem and $11.6-\mathrm{cm}$ sides?

Ex. A honeycomb is made up of regular hexagonal cells. The length of a side of a cell is 3 mm . What is the area of a cell?

5 The side of a regular hexagon is 16 ft . What is the area of the hexagon? Round to the nearest square foot.

