**The Area of a Regular Polygon** 

If a polygon is regular with *n* sides, it can be subdivided into *n* congruent isosceles triangles. One way to calculate the area of a regular polygon is to multiply the area of one isosceles triangle by *n*.

To find the area of the isosceles triangle, it is helpful to first find the measure of the polygon’s central angle by dividing 360° by *n.* The height of the isosceles triangle divides the top vertex angle in half.

For example, suppose you want to find the area of a regular decagon with side length 4 units. The central angle is  = 36°. Then the top angle of the shaded right triangle at right would be 36° ÷ 2 *=* 18° .

Use right triangle trigonometry to find the measurements of the right triangle, then calculate its area. For the shaded triangle above, tan 18° =  and *h* **≈**12.311. Use the height and the base to find the area of the isosceles triangle: (8)(12.311) **≈** 49.242 sq. units. Then the area of the regular decagon is approximately 10 · 49.242 **≈** 492.42 sq. units. Use a similar approach if you are given a different length of the triangle.

8-85. Find the area of the shaded region for the regular pentagon at right if the length of each side of the pentagon is 10 units. Assume that point C is the center of the pentagon.

**8-87.** Find the measure of each interior angle of a regular 30-gon using **two different methods**.

* **8-89.** On graph paper, plot the points *A*(−3, −1) and *B*(6, 11).
	1. Find the midpoint of .
	2. Find the equation of the line that passes through points *A* and *B*.
	3. Find the distance between points *A* and *B*.



* **8-90.** **Multiple Choice:** What fraction of the circle at right is shaded? [Hints](http://www.cpm.org/students/homework/GC_Problems/GC_Ch8_Answers/GC8.3.1/GC_8_90.html)⇔[Help](http://www.cpm.org/students/homework/GC_Problems/GC_Ch8_Answers/GC8.3.1/GC_8_90m.html)
	1. A. 

B. 

C. 