

Geometry

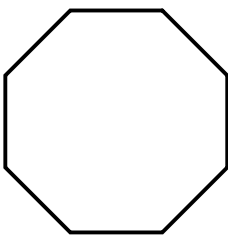
Chapter 10

Section 10-3

Review: Regular Polygons

In a regular polygon all **ANGLES** and **SIDES** are congruent.

Find the measure of all angles in the regular polygons below?

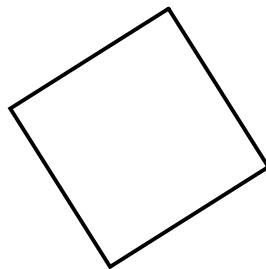


$$\frac{(n-2)180}{n}$$

$$\frac{(8-2)180}{8}$$

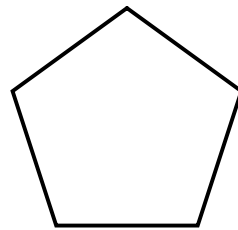
$$\frac{36 \cdot 45}{8 \cancel{10}}$$

$$135^\circ$$



$$\frac{(4-2)180}{4}$$

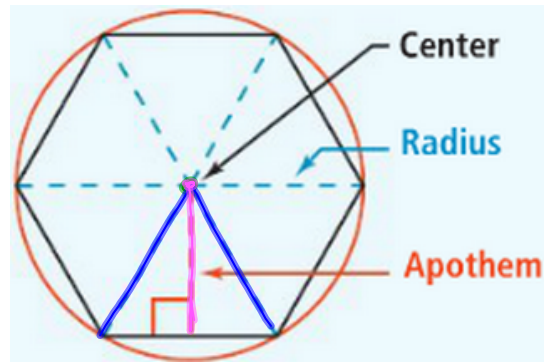
$$90$$



$$\frac{(5-2)180}{5}$$

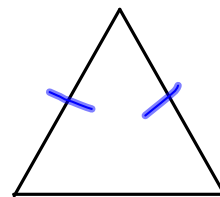
$$108$$

Concepts



Radius	Distance from the center of a regular polygon to a vertex
Apothem	The perpendicular distance from the center of a regular polygon to a side

- The figure at right is a regular hexagon.
- Draw all radius segments.
- How could you find the area of the hexagon?



$$A_{\Delta} = \frac{1}{2} b h$$

$$A_{\square} = 6 \left(\frac{1}{2} b h \right)$$

$$A_{\text{Reg}} = n \left(\frac{1}{2} s \cdot a \right)$$

Theorem 10-6 Area of a Regular Polygon

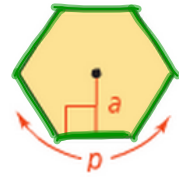
The area of a regular polygon is half the product of the apothem and the perimeter.

$$A = \frac{1}{2}ap$$

$$\rightarrow p = n \cdot s$$

$$A = n \cdot \frac{1}{2}as$$

→ triangle



A - area

a - apothem

p - perimeter

n - number of sides

s - side length

What is the area of a regular pentagon with a perimeter of 59 in. and an apothem of 10 in.?

$$A = \frac{1}{2}ap$$

$$A = \frac{1}{2}(\overset{5}{10})(59)$$

$$A = 295 \text{ in}^2$$

What is the length of one side of a regular octagon with an area of 4.8 m^2 and an apothem of 1.2 m ?

$$A = n \cdot \frac{1}{2} a s$$

$$4.8 = \frac{8}{2} (1.2) (\underline{s})$$

$$4.8 = 4.8 s$$

$$1 = s$$

$$\underline{1 \text{ m} = s}$$

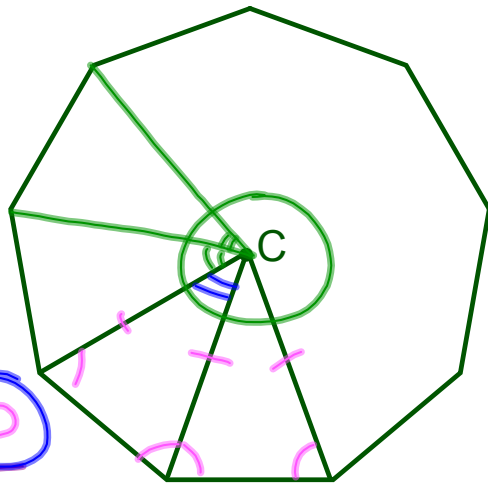
To the right is a regular nonagon.

- What is the angle between a radius and a side of the nonagon?

$$\frac{360}{9} = 40$$

$$180 - 40 = 140 \div 2 = 70$$

$$\frac{(9-2) 180}{9} = 140 \div 2 = 70$$



To the right is a regular nonagon.

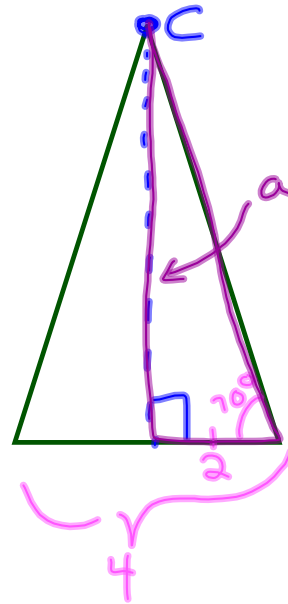
- What is the polygon's area if one side has a length of 4 cm?

$$A = n \cdot \frac{1}{2} a s$$

$$A = 9 \cdot \frac{1}{2} (5.5) (4)$$

$$A \approx 99 \text{ cm}^2$$

$$\left\{ \begin{array}{l} \tan 70 = \frac{a}{2} \\ 2 \tan 70 = a \\ 5.5 \approx a \end{array} \right.$$



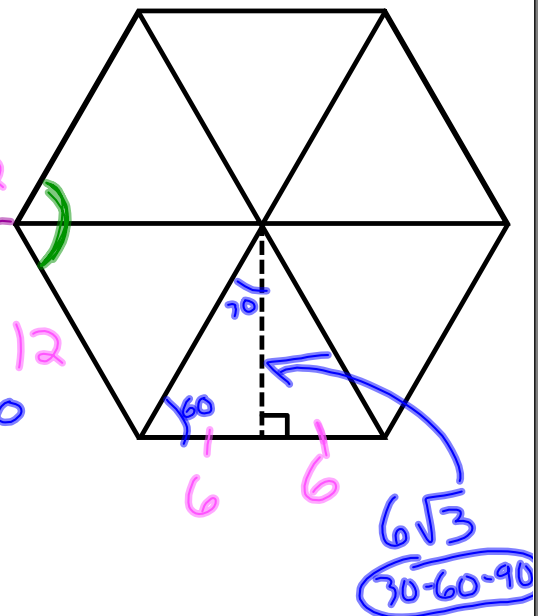
A regular hexagon has a perimeter of 72 m. What is its area?

$$A = \frac{1}{2} a p$$

$$A = \frac{1}{2} (6\sqrt{3}) (72)$$

$$A \approx 374 \text{ m}^2$$

$$\left\{ \begin{array}{l} 72 \div 6 = 12 \\ \frac{(6\sqrt{3}) 180}{6} \\ 120 \div 2 = 60 \end{array} \right.$$

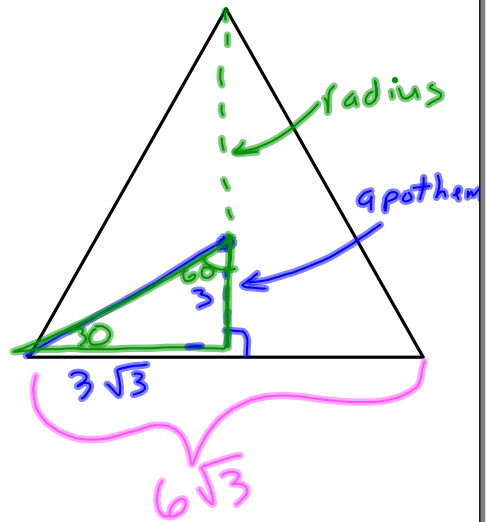


An equilateral triangle has an apothem of 3 mm. What is its area?

$$A = n \cdot \frac{1}{2} a s$$

$$A = 3 \cdot \frac{1}{2} (3) (6\sqrt{3})$$

$$A = 47 \text{ mm}^2$$



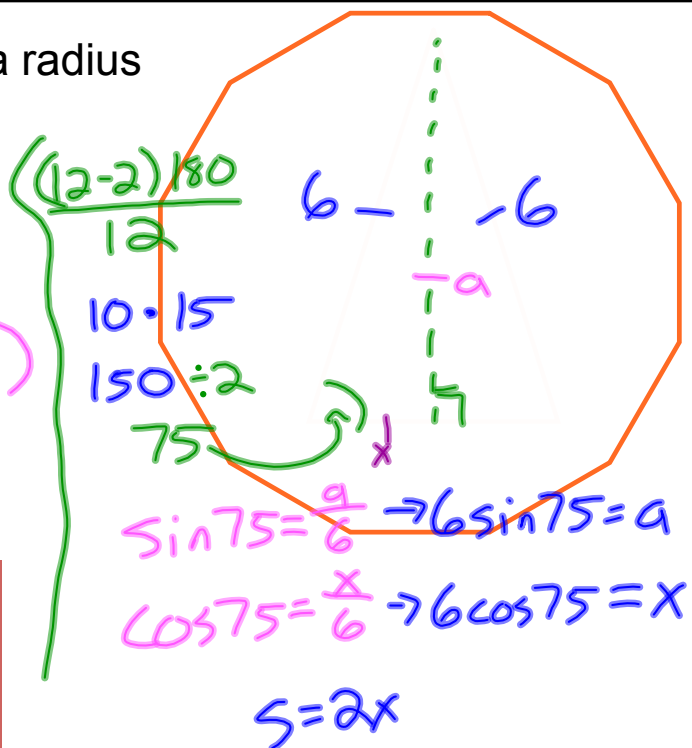
A regular dodecagon has a radius of 6 in. What is its area?

$$n = 12$$

$$A = n \cdot \frac{1}{2} a s$$

$$A = 12 \cdot \frac{1}{2} (5.8) (3.1)$$

$$A = 108 \text{ in}^2$$



$$\frac{(12-2)180}{12}$$

$$10 \cdot 15$$

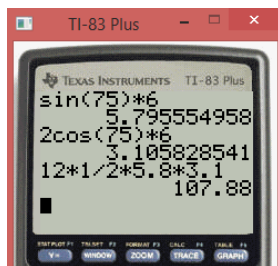
$$150 \div 2$$

$$75$$

$$\sin 75 = \frac{a}{6} \rightarrow 6 \sin 75 = a$$

$$\cos 75 = \frac{x}{6} \rightarrow 6 \cos 75 = x$$

$$s = 2x$$



Homework

Pages 632 - 633

8 - 12 all, 17 - 25 all, 33, 35