

Name:

Date:

Period: 3

Area of Regular Polygons

on Objective IWBAT find angle measures in regular polygons + find areas of regular polygons.

The diagram shows a regular polygon inscribed in a circle.

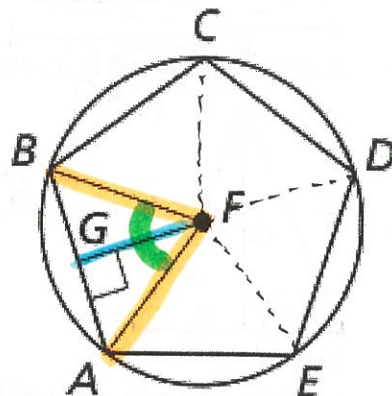
The **center of a regular polygon** is the center of the circumscribed circle.

The **radius of a regular polygon** is the radius of the circumscribed circle.

↳ from center to vertex

The distance from the center to any side of a regular polygon is called the **apothem**.

→ The apothem is the height to the base of an isosceles triangle that has two radii as legs.

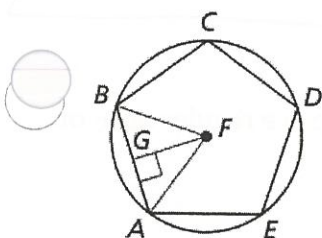


A **central angle of a regular polygon** is an angle formed by two radii drawn to two consecutive vertices of the polygon.

→ To find the measure of each central angle, divide 360° by the number of sides of the polygon. ★★

Example:

1. Use the diagram to find the following:



a. $m\angle AFB = \frac{360^\circ}{5} = \boxed{72^\circ}$

b. $m\angle AFG = \frac{72^\circ}{2} = \boxed{36^\circ}$

apothem bisects central $\angle$

c. $m\angle GAF$

$$180 - (90 + 36) = \boxed{54^\circ}$$

$$72 + x + x = 180$$

Finding Areas of Regular Polygons

You can find the area of any regular n-gon by dividing it into congruent triangles.

$$A = (\text{area of } 1 \Delta)(\# \text{ of } \Delta s)$$

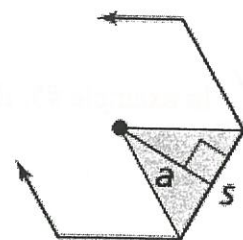
↳ also # of sides: n

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

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

$$\rightarrow A = \frac{1}{2}aP$$

* perimeter = $s + s + \dots + s$
(P) $\underbrace{\hspace{1cm}}_{n \text{ times}}$
 $= s \cdot n$



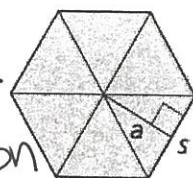
Area of a Regular Polygon

The area of a regular n-gon with side length s is:

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

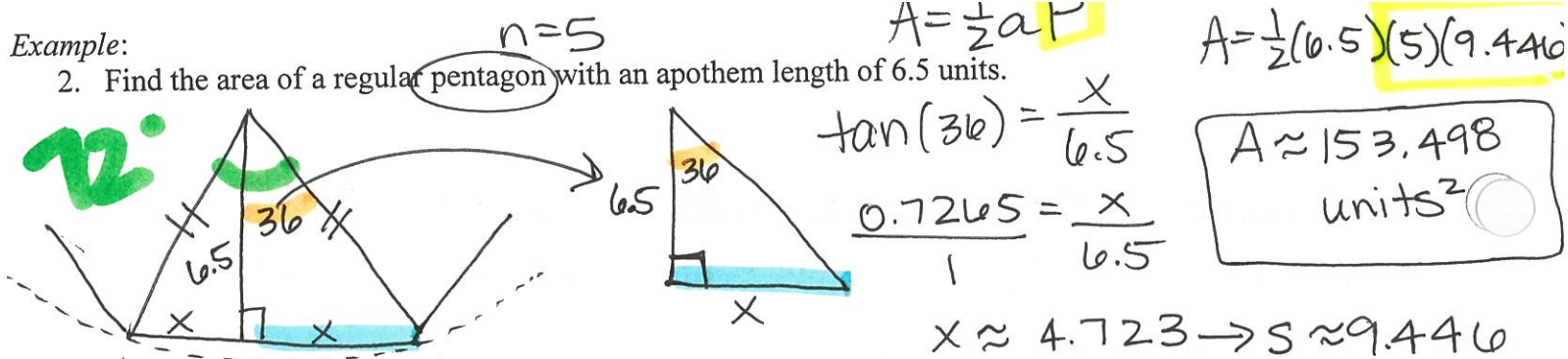
↑
apothem

← perim. of polygon

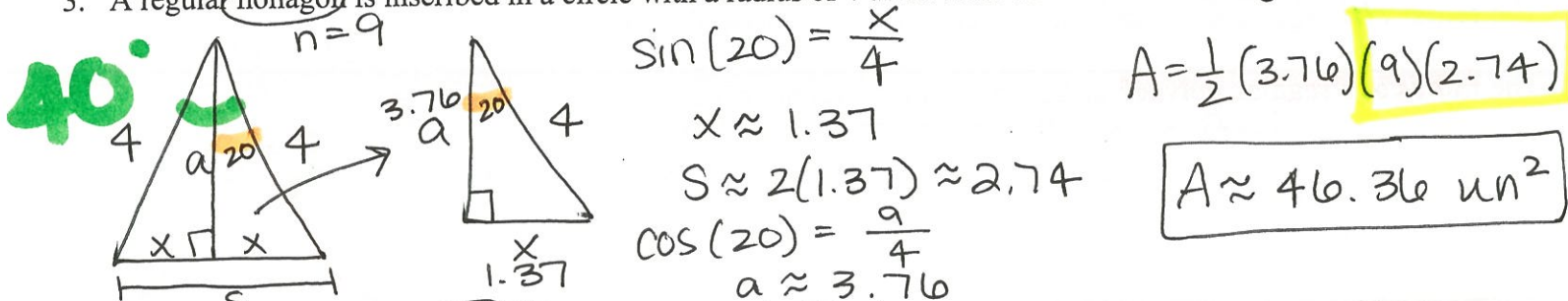


Example:

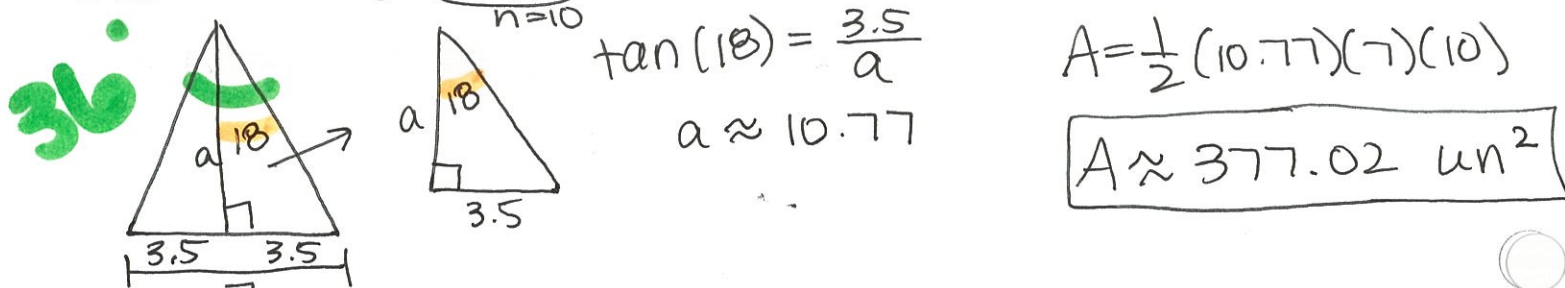
2. Find the area of a regular pentagon with an apothem length of 6.5 units.



3. A regular nonagon is inscribed in a circle with a radius of 4 units. Find the area of the nonagon.



4. Find the area of a regular decagon with a side length of 7 units.



5. You are decorating the top of a table by covering it with small ceramic tiles. The tabletop is a regular octagon with 15-inch sides and a radius of about 9.6 inches. What area are you covering?

6. In example #5, if you were using 0.5 inch x 0.5 inch tiles to cover the table, how many tiles are needed?

7. In example #5, the tiles you buy at the store come in bags of 250 tiles. How many bags would you need to purchase?