

## Area of Regular Polygons - Notes

To find the area of a regular polygon (definition of regular polygon -

a polygon w/ all sides and interior angles  $\cong$ )

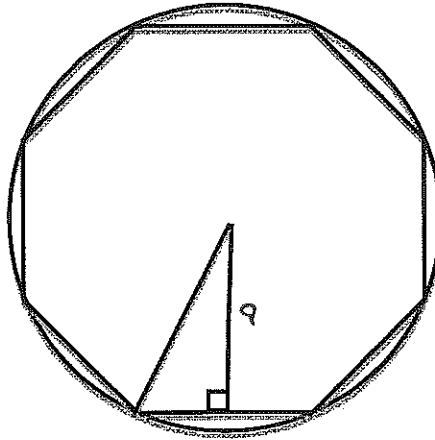
we use the formula:

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

a - apothem P - Perimeter

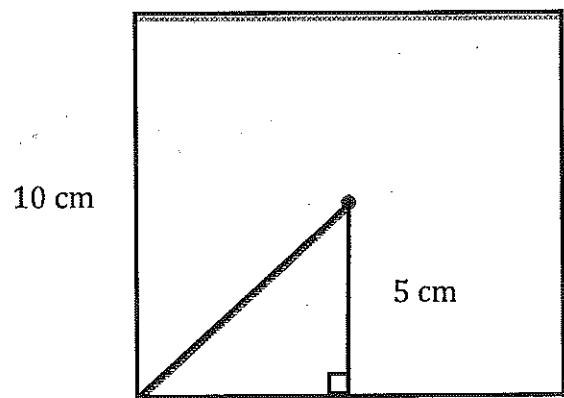
The apothem is the segment that extends from the center of a regular polygon to the midpoint of one of the sides.

Identify the apothem:



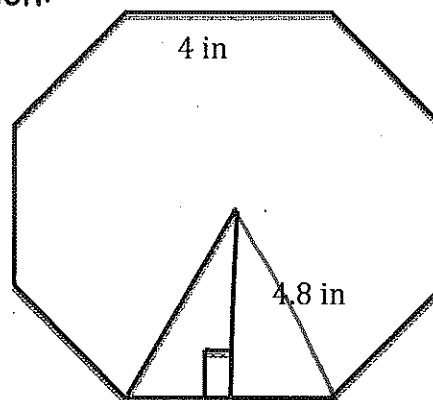
Example 1) Find the area of the following figure using  $A = \frac{1}{2} aP$

Name of polygon: <u>square</u>
apothem = <u>5</u>
Side = <u>10</u>
Perimeter = <u>40</u>
Plug in numbers $A = \frac{1}{2} \underline{5} \cdot \underline{40}$
Answer = <u><math>100 \text{ cm}^2</math></u>



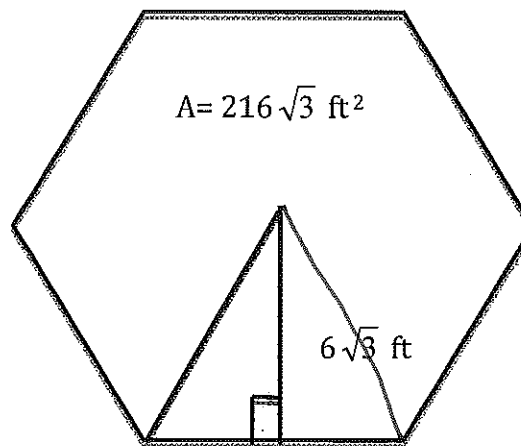
Example 2: Find the Area of the Regular Polygon:

Name of polygon = <u>octagon</u>
apothem = <u>4.8 in.</u>
Side = <u>4</u>
Perimeter = <u>32 in.</u>
Plug in numbers $A = \frac{1}{2} \underline{4.8} \cdot \underline{32}$
Answer = <u>76.8 in.<sup>2</sup></u>



Example 3: Find the side of the Regular Polygon:

Name of polygon = <u>hexagon</u>
Area = <u><math>216\sqrt{3} \text{ ft}^2</math></u>
apothem = <u><math>6\sqrt{3}</math></u>
Plug in numbers $A = \frac{1}{2} \underline{6\sqrt{3}} \cdot \underline{72}$
Perimeter = <u>72</u>
Side = $\frac{72}{6} = 12$

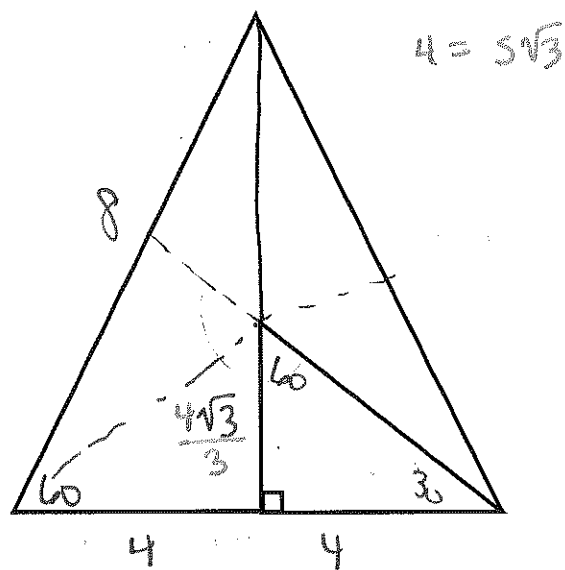


$$216\sqrt{3} = \frac{1}{2} \cdot 6\sqrt{3} \cdot p$$

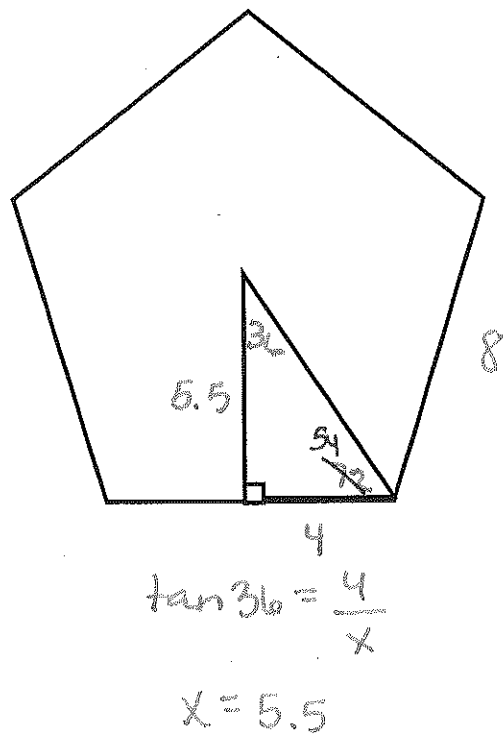
$$72 = p$$

Class practice: p. 548 #5-17 odd show all 6 steps.

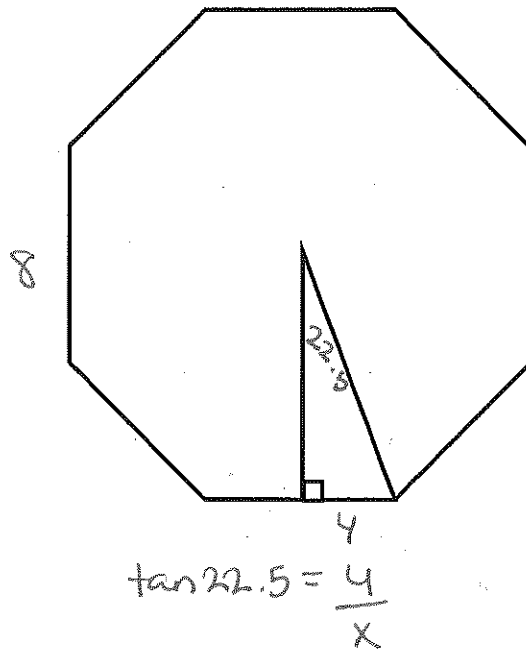
Name of polygon: <u>Triangle</u>
apothem = $\frac{4\sqrt{3}}{3}$
Side = <u>8</u>
Perimeter = <u>24</u>
Plug in numbers $A = \frac{1}{2} \frac{4\sqrt{3}}{3} \cdot \underline{24}$
Answer = <u><math>16\sqrt{3}</math></u>



Name of polygon: <u>pentagon</u>
apothem = <u>5.5</u>
Side = <u>8</u>
Perimeter = <u>40</u>
Plug in numbers $A = \frac{1}{2} \underline{5.5} \cdot \underline{40}$
Answer = <u>110.1</u>



Name of polygon: <u>octagon</u>
apothem=  9.7
Side= 8
Perimeter = 64
Plug in numbers $A = \frac{1}{2} \underline{9.7} \cdot \underline{64}$
Answer = <u>309</u>



Name of polygon: <u>decagon</u>
apothem=  12.3
Side= 8
Perimeter = 80
Plug in numbers $A = \frac{1}{2} \underline{12.3} \cdot \underline{80}$
Answer = <u>492.4</u>

