Warm Up
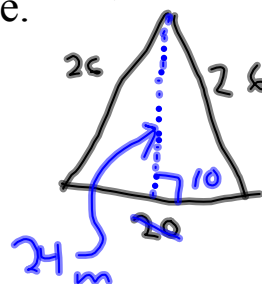
1. An isosceles triangle has side lengths 20 m, 26 m, and 26 m. Find the length of the altitude to the base.
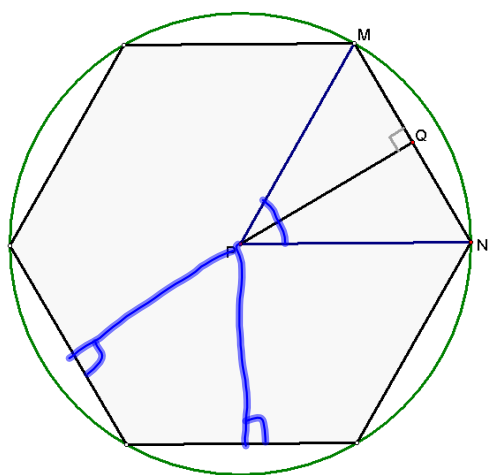
   26 /\ 26
   24 m, 10, 20

2. Solve: $2 \cdot 18 = \frac{1}{2}x \cdot 2$

   $36 = x$

3. Evaluate: $\dfrac{10}{\tan 88°} \approx .35$

11-6   Areas of Regular Polygons

Center of the polygon $= P$

Radius of the polygon $= \overline{PN}$ or $\overline{PM}$

Apothem $= \overline{PQ}$

Central Angle of the polygon $= \angle MPN$

Ex 1   *RSTUVWXY* is a regular octagon.
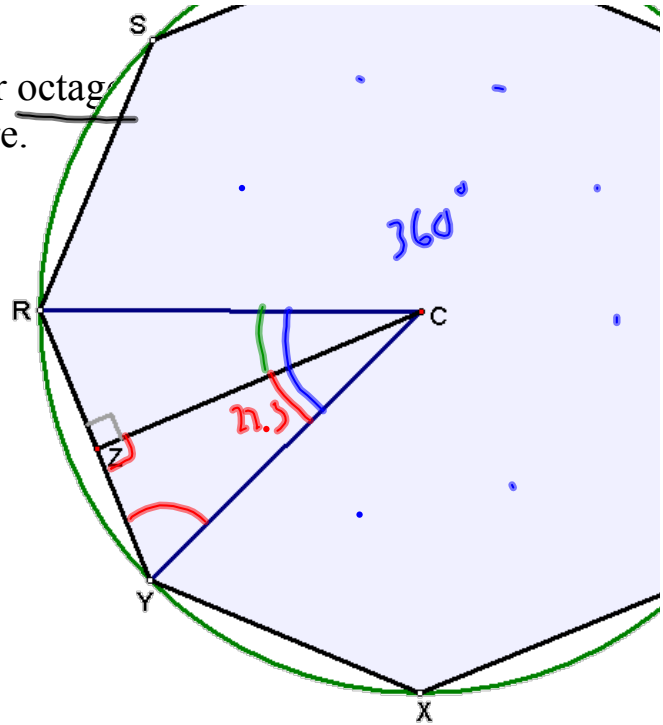Find each angle measure.

$m\angle RCY$
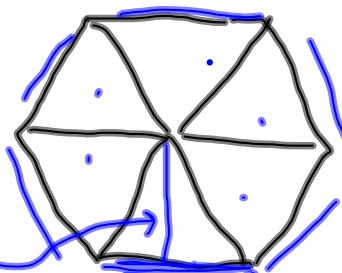
$$\frac{360°}{8} = 45°$$

360°

$m\angle RCZ$
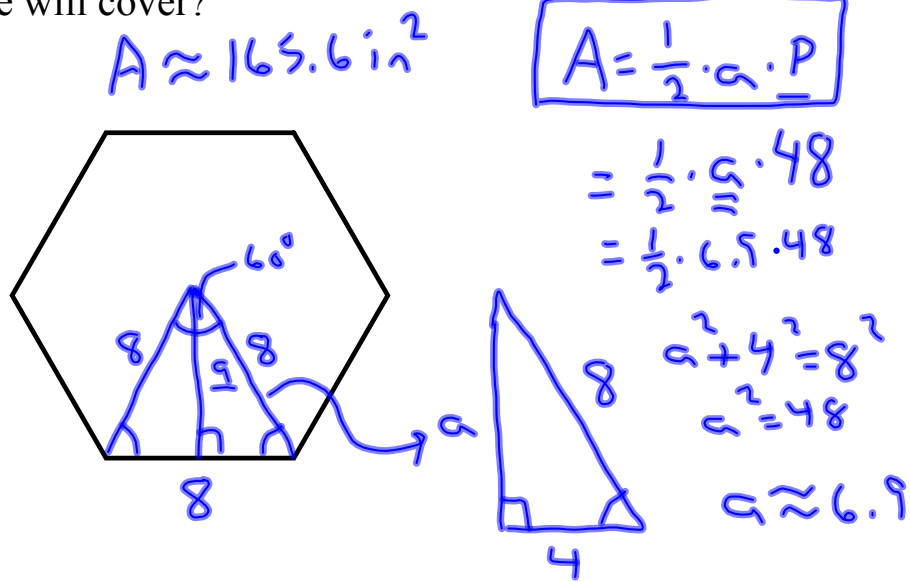
22.5°

$m\angle ZYC$ 67.5°

Area of a Regular Polygon

$$A = \tfrac{1}{2}aP$$
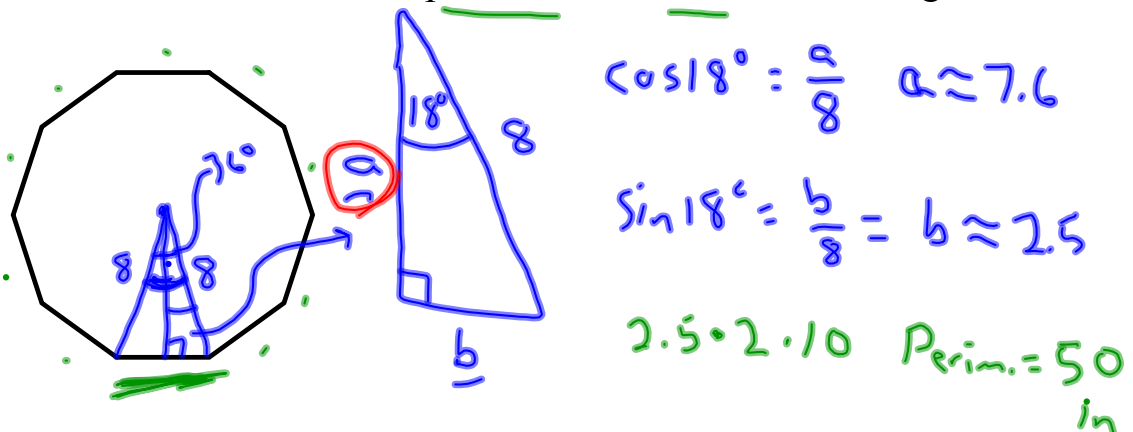
where a = length of the apothem

and P = perimeter

Ex 2   You are tiling a floor with ceramic regular hexagons
with side length 8 inches. What is the area that each
tile will cover?

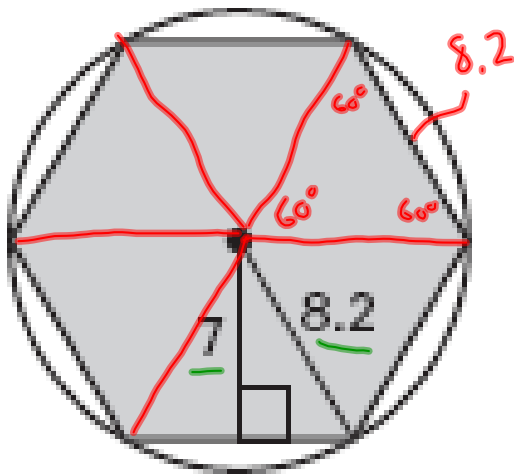$A \approx 165.6 \text{in}^2$ $\boxed{A = \frac{1}{2} \cdot a \cdot P}$

$= \frac{1}{2} \cdot a \cdot 48$

$= \frac{1}{2} \cdot 6.9 \cdot 48$

$a^2 + 4^2 = 8^2$

$a^2 = 48$

$a \approx 6.9$

Ex 3   A regular decagon is inscribed in a circle with radius
8 inches. Find the perimeter and area of the decagon.

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$\cos 18° = \frac{a}{8}$ $a \approx 7.6$

$\sin 18° = \frac{b}{8} = b \approx 2.5$

$2.5 \cdot 2 \cdot 10$ Perim. $= 50$ in

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

$\frac{1}{2} \cdot 7.6 \cdot 50 = 190 \text{in}^2$

Ex 4   Find the area and perimeter of the regular polygon.
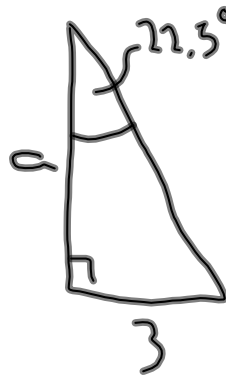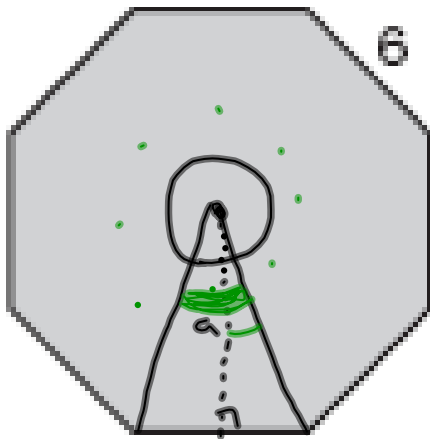

8.2

60° 60° 60° 60°

7   8.2

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

$$A = \frac{1}{2} \cdot 7 \cdot 49.2$$

$$= 172.2$$

Ex 5   Find the area and perimeter of the regular polygon. octagon

6

22.5°

a

3

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

$$= \frac{1}{2} \cdot 7.2 \cdot 48$$

$$= 172.8$$

$$a \cdot \tan 22.5° = \frac{3}{a}$$

$$a = \frac{3}{\tan 22.5} \approx 7.2$$

Ex 6   An equilateral triangle is shown inside a square inside
         a regular pentagon inside a regular hexagon. Write an
         expression for the exact area of the shaded regions in
         the figure. Then, find the approximate area of the entire
         dark green shaded regions. Round your final answer to
         nearest whole unit.

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