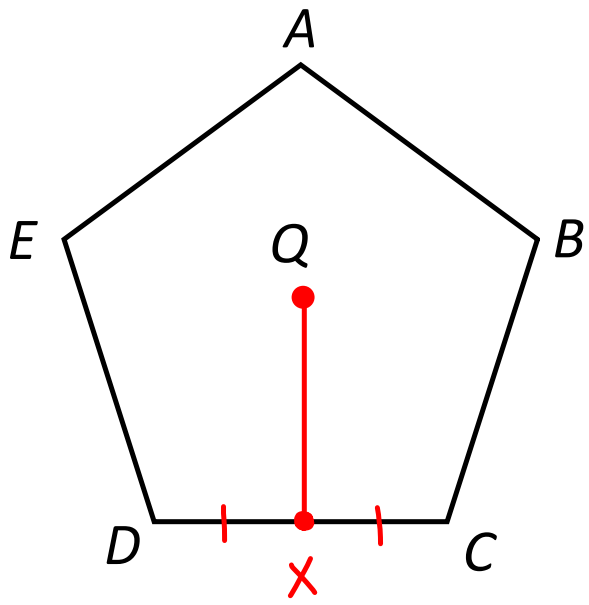
The CENTER of a regular polygon is the point in the interior that is equidistant to each vertex

The RADIUS of a regular polygon is the distance from the center to any vertex

The APOTHEM of a regular polygon is the distance from the center to the midpoint of one of its sides

The CENTRAL ANGLE of a regular polygon is any angle whose vertex is the center and whose sides are two consecutive radii

Lesson 4 - Regular Polygons Marked



Center: Q

Radius: $\overline{QA}$

Apothem: $\overline{QX}$

Central Angle:

$\angle AQB$

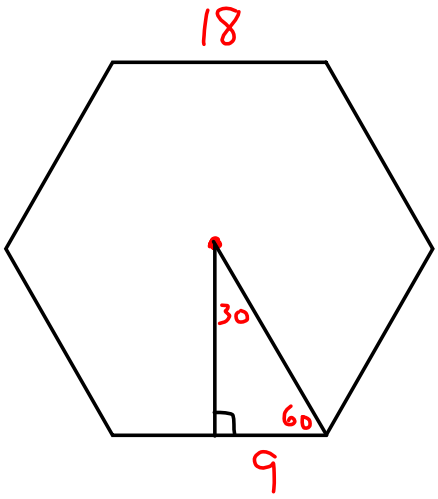
Area of a Regular Polygon

$$\text{Area} = \frac{1}{2}(\text{apothem})(\text{perimeter})$$

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

Lesson 4 - Regular Polygons Marked

Find the area of a regular hexagon with sides 18 cm



PERIMETER

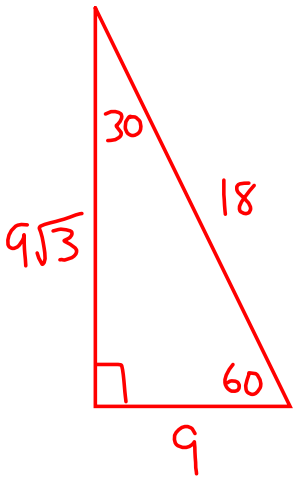
$P = 18(6) = 108$

APOTHEM

$\text{EACH INT} \angle = \frac{(n-2)180}{n} = \frac{(6-2)(180)}{6} = \frac{4(180)}{6}$

$= \frac{720}{6}$

$= 120$



APOTHEM = LL = $9\sqrt{3}$

$A_{\text{REGULAR POLYGON}} = \frac{1}{2} aP$

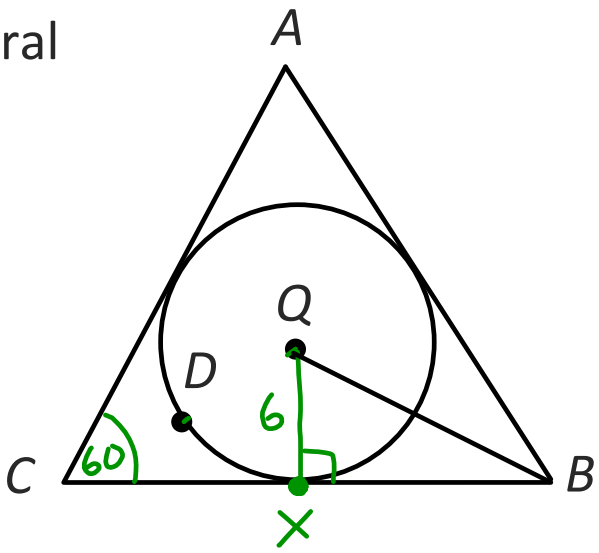
$= \frac{1}{2}(9\sqrt{3})(108)$

$= 486\sqrt{3} \text{ cm}^2$

Given: ΔABC is equilateral

$QD = 6$

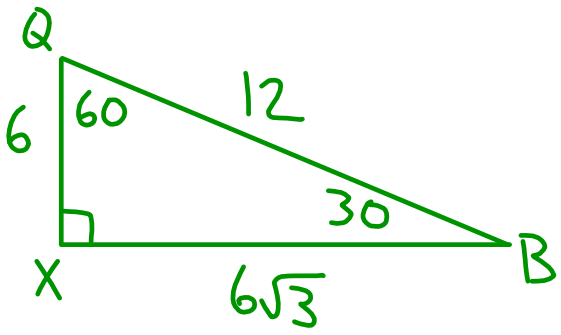
Find: Area of ΔABC



APOTHEM

$QX = QD = 6$

PERIMETER



$P = (12\sqrt{3})(3)$

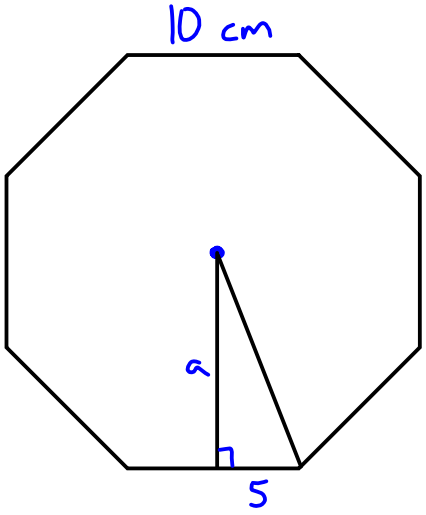
$= 36\sqrt{3}$

$A_{\text{REGULAR POLYGON}} = \frac{1}{2}aP$

$= \frac{1}{2}(6)(36\sqrt{3})$

$= 108\sqrt{3}\ u^2$

Find the area of a regular octagon with sides 10 cm

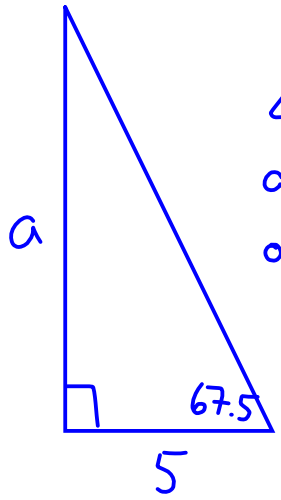


PERIMETER

$P = 8(10) = 80$

APOTHEM

EACH INT $\angle = \frac{(n-2)180}{n} = \frac{(8-2)180}{8} = 135°$



$\angle = 67.5$

$adj = 5$

$opp = a$

$\tan 67.5 = \frac{a}{5}$

$a = 5\tan 67.5$

$A_{\text{REGULAR POLYGON}} = \frac{1}{2}aP$

$= \frac{1}{2}(5\tan 67.5)(80)$

$= 200\tan 67.5$

$\approx 482.843 \text{ cm}^2$