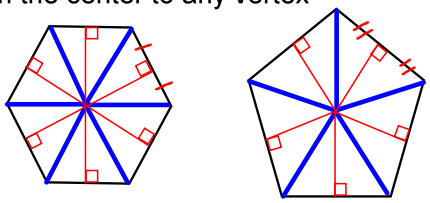
Area of Regular Polygons

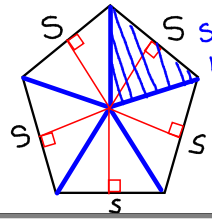
Special Segments in Regular Polygons

The **apothem** of a polygon is a line from the center to the midpoint of a side.

The **radius** of a regular polygon is a line from the center to any vertex

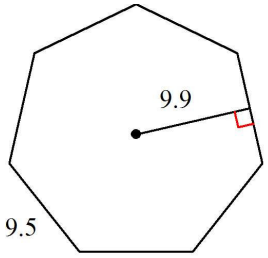


Any regular polygon can be divided into many triangles.
The area of a triangle is (1/2)(b)(h).
The sum of all the bases of the triangles formed in a polygon is the perimeter. The height of each triangle is the apothem.
The area of any regular polygon is A=(1/2)(P)(a).



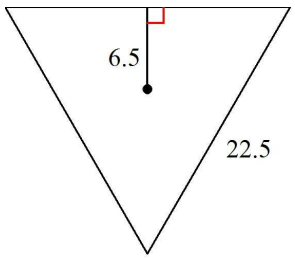
$P = sn$
s=side length
n= number of sides

Given the side and the apothem



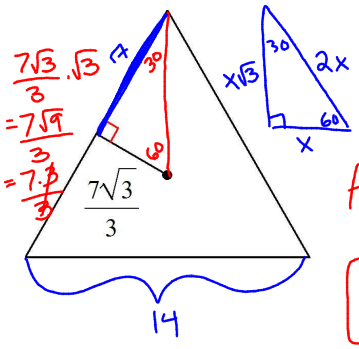
$P = 9.5 \cdot 7$
$P = 66.5$
$A = \frac{1}{2}Pa$
$A = \frac{1}{2}(66.5)(9.9)$
$A = 329.2\ u^2$

Given the side and the apothem



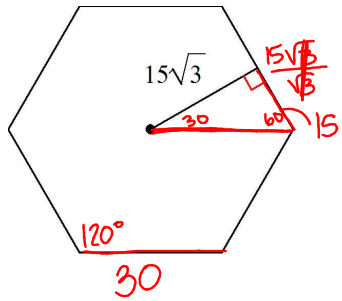
$P = 3 \cdot 22.5$
$P = 67.5$
$A = \frac{Pa}{2}$
$A = \frac{67.5 \cdot 6.5}{2}$
$A = 219.4$

Given only the apothem



$P = 14 \cdot 3$
$P = 42$
$A = \frac{1}{2} \cdot 42 \cdot \frac{7\sqrt{3}}{3}$
$A = 84.9$

Given only the apothem



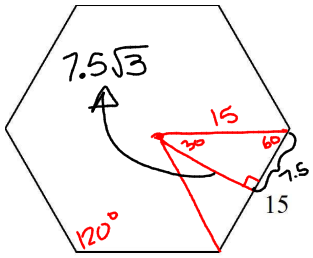
$P = 30 \cdot 6$

$P = 180$

$A = \frac{1}{2}(180)(15\sqrt{3})$

$A = 2{,}338.3$

Given only the side



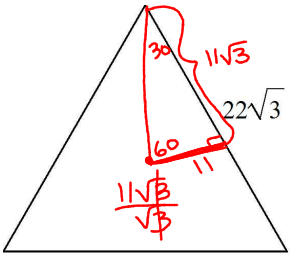
$P = 15 \cdot 6$

$P = 90$

$A = \frac{1}{2}(90)(7.5\sqrt{3})$

$A = 584.6$

Given only the side



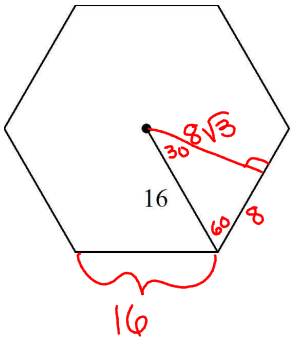
$P = 3 \cdot 22\sqrt{3}$

$P = 66\sqrt{3}$

$A = \frac{1}{2}(66\sqrt{3})(11)$

$A = 628.7\ u^2$

Given only the radius



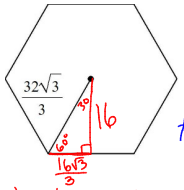
$P = 6 \cdot 16$

$P = 96$

$A = \frac{1}{2}(96)(8\sqrt{3})$

$A = 665.1$

Given only the radius



$P = \frac{2}{1} \cdot \frac{32\sqrt{3}}{1}$

$= 64\sqrt{3}$

$A = \frac{1}{2}(64\sqrt{3})(16)$

$A = 886.8\ u^2$

short

$\frac{32\sqrt{3}}{3} \cdot \frac{1}{2} = \frac{16\sqrt{3}}{3}$

$= \frac{16\sqrt{3}}{3}$

long

$\frac{16\sqrt{3}}{3} \cdot \sqrt{3} = \frac{16\sqrt{9}}{3} = \frac{16 \cdot 3}{3}$

$= 16$