Sec 11.5
pgs. 533 – 535
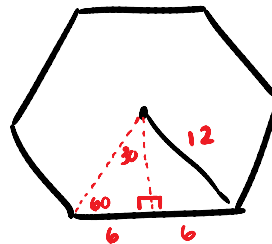#5, 10, 11, 15 – 17, 19, 20, 22

**#5** The radius of a regular hexagon is 12.
  Find: a. The length of one side $\boxed{12}$

  b. The apothem $\boxed{6\sqrt{3}}$

  c. The area $A = \frac{1}{2}(6\sqrt{3})(72)$

  $= \boxed{216\sqrt{3}}$

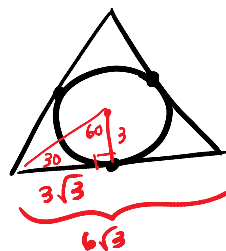**#10** Find the area of an equilateral triangle
  if the radius of its inscribed circle is 3.

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

  $= \frac{1}{2}(3)(18\sqrt{3})$

  $= \boxed{27\sqrt{3}}$

**#11** Find the area of a regular hexagon if the
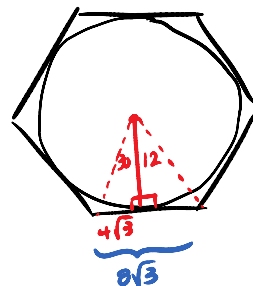  radius of its inscribed circle is 12.

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

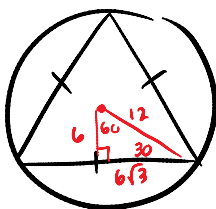  $= \frac{1}{2}(12)(48\sqrt{3})$

  $= \boxed{288\sqrt{3}}$

  $\dfrac{x\sqrt{3}}{\sqrt{3}} = \dfrac{12}{\sqrt{3}}$

  $x = 4\sqrt{3}$

**#15** A circle of radius 12 is circumscribed about each regular
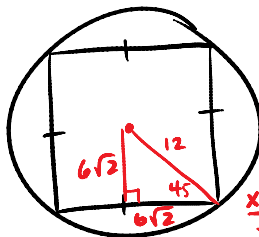  polygon below. Find the area of each polygon.

a.

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

$= \boxed{108\sqrt{3}}$

b

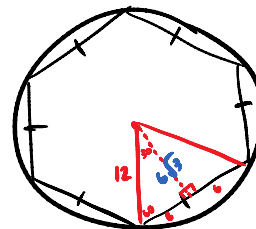$A = \frac{1}{2}(6\sqrt{2})(48\sqrt{2})$

$x = 6\sqrt{2}$

$\dfrac{x\sqrt{2}}{\sqrt{2}} = \dfrac{12}{\sqrt{2}}$

$= 3\sqrt{2}(48\sqrt{2})$

$= 144(2)$

$= \boxed{288}$

c.

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

$= \frac{1}{2}(6\sqrt{3})(72)$
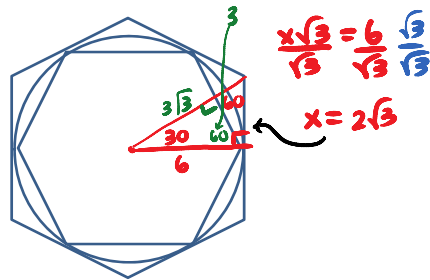
$= \boxed{216\sqrt{3}}$

**#16** A circle is inscribed in one regular hexagon and circumscribed about another. If the circle has a radius of 6, find the ratio of the area of the smaller hexagon to the area of the larger hexagon

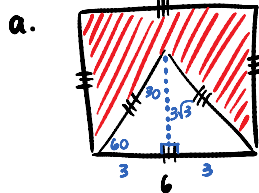$A_{Large} = \frac{1}{2}(6)(24\sqrt{3})$

$= 72\sqrt{3}$

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

$= 54\sqrt{3}$

$\frac{x\sqrt{3}}{\sqrt{3}} = \frac{6}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$x = 2\sqrt{3}$



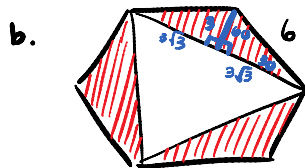Ratios · $\frac{54\sqrt{3}}{72\sqrt{3}} = \boxed{\frac{3}{4}}$

**#17** Find the area of the shaded region in each polygon.

a.



$A_{\square} = 6 \cdot 6$
$= 36$

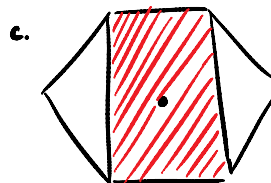$A_{\triangle} = \frac{6 \cdot 3\sqrt{3}}{2}$
$= 9\sqrt{3}$

$\boxed{A_{Shad} = 36 - 9\sqrt{3}}$

b.



$A_{\triangle} = \frac{(6\sqrt{3})^2 \sqrt{3}}{4}$

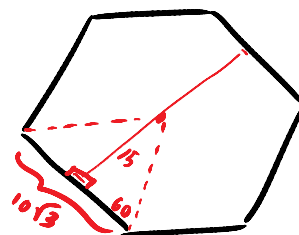$= \frac{36 \cdot 3\sqrt{3}}{4}$

$= 27\sqrt{3}$

c.



**#19** a. The span s of a regular hexagon is 30 Find the hexagon's area

$A = \frac{1}{2}(15)(60\sqrt{3})$

$\boxed{A = 450\sqrt{3}}$

$\frac{x\sqrt{3}}{\sqrt{3}} = 15 \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$x = 5\sqrt{3}$



b. Find the span of a regular hexagon with an area of $32\sqrt{3}$

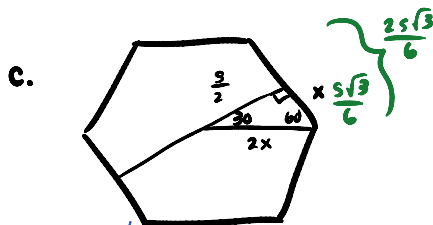$A = \frac{1}{2}aP$

$32\sqrt{3} = \frac{1}{2}(x\sqrt{3})(12x)$

$32\sqrt{3} = 6\sqrt{3}x^2$

$\frac{16}{3} = x^2$

$\frac{4}{\sqrt{3}} = x$

apothem: $\frac{4}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = 4$

$\boxed{span: 8}$

c.



$\frac{x\sqrt{3}}{\sqrt{3}} = \frac{s}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$x = \frac{s\sqrt{3}}{6}$

$A = \frac{1}{2}aP = \frac{1}{2}\left(\frac{s}{2}\right)\left(\frac{12s\sqrt{3}}{6}\right) = \frac{12s^2\sqrt{3}}{24} = \boxed{\frac{s^2\sqrt{3}}{2}}$

# #20

**a. Find the apothem of the regular octagon**

$apothem = \boxed{5 + 5\sqrt{2}}$
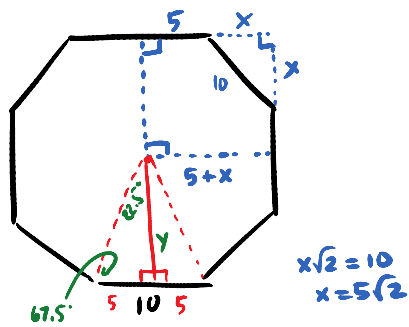
$area = \frac{1}{2}(5 + 5\sqrt{2})(80)$

$\qquad = 40(5 + 5\sqrt{2})$

$\qquad = \boxed{200 + 200\sqrt{2} \; u^2}$

or <u>**TRIG**</u>

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

$y =$



$x\sqrt{2} = 10$
$x = 5\sqrt{2}$

# #22