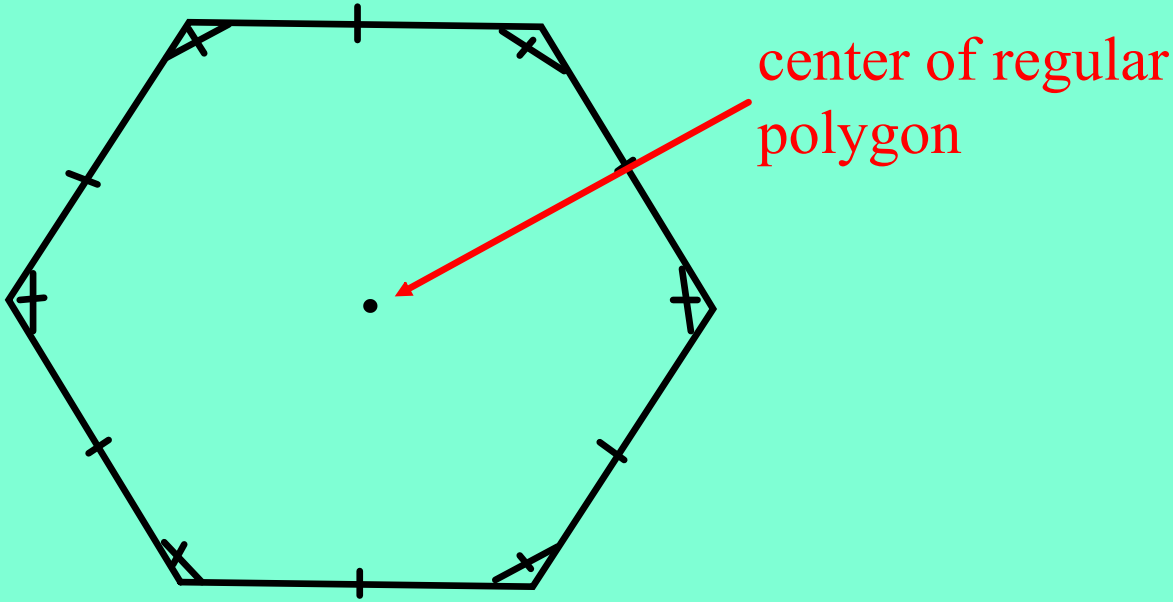
Geometry

Area of Regular Polygons

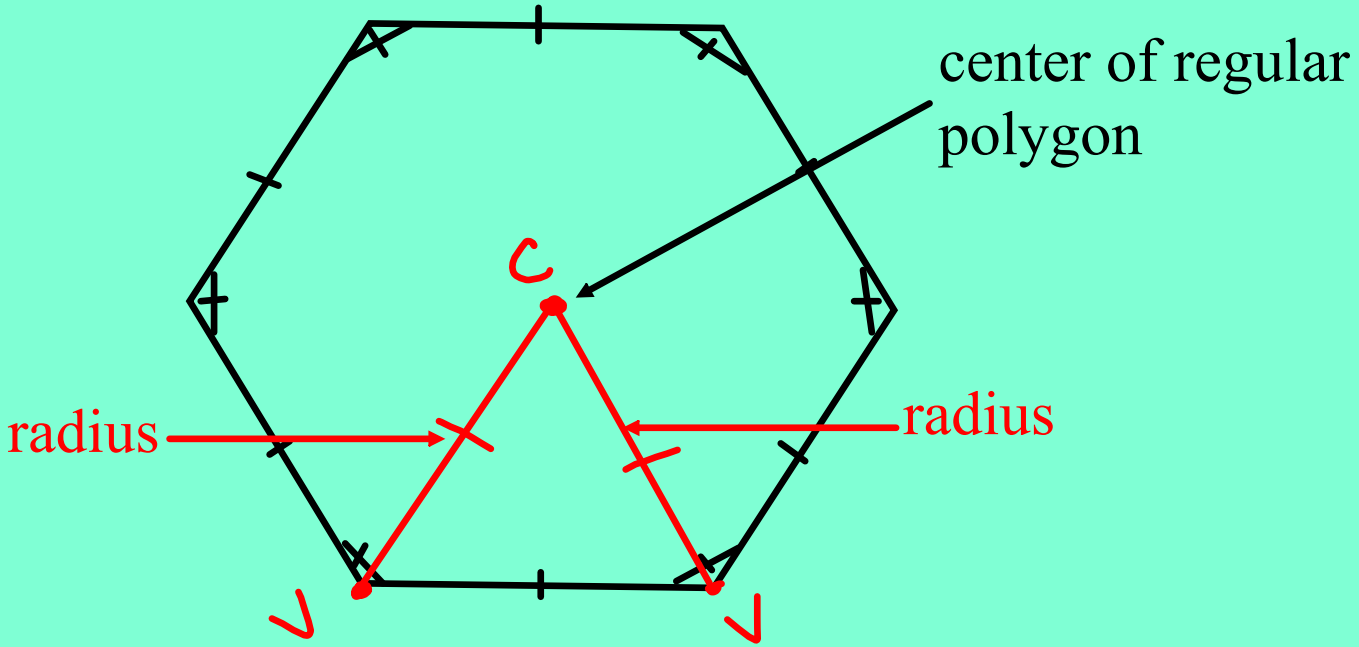
Chapter 10 Handout 10.3

Terms to know:

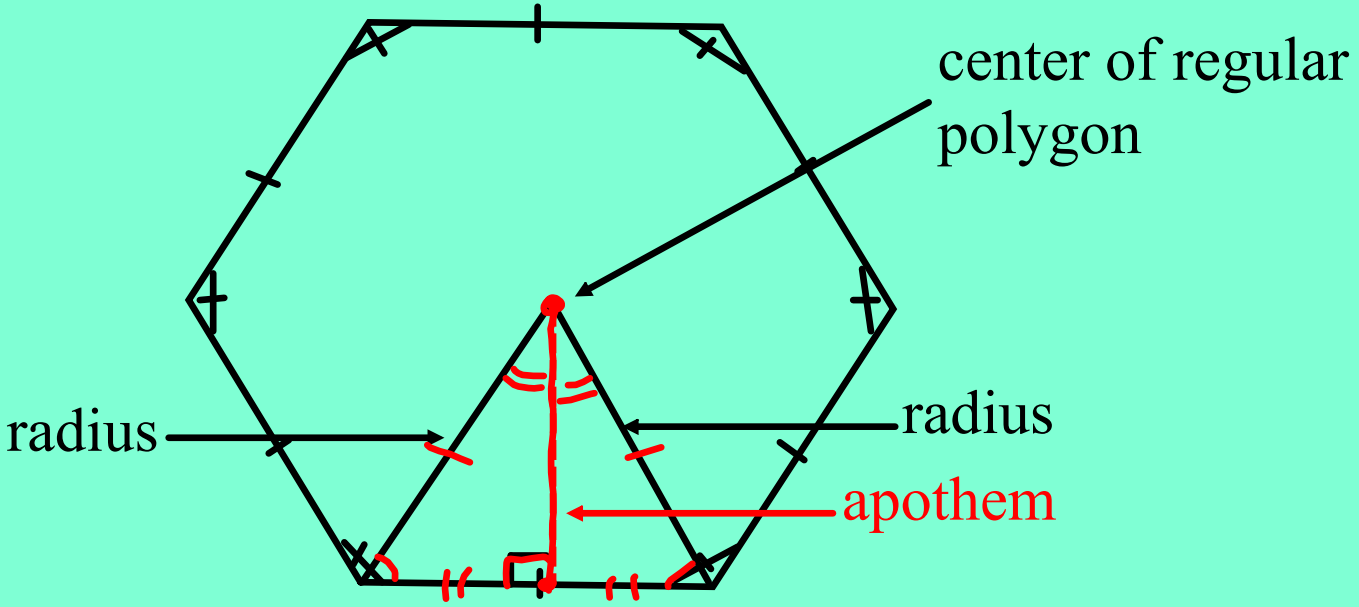
Regular Polygon

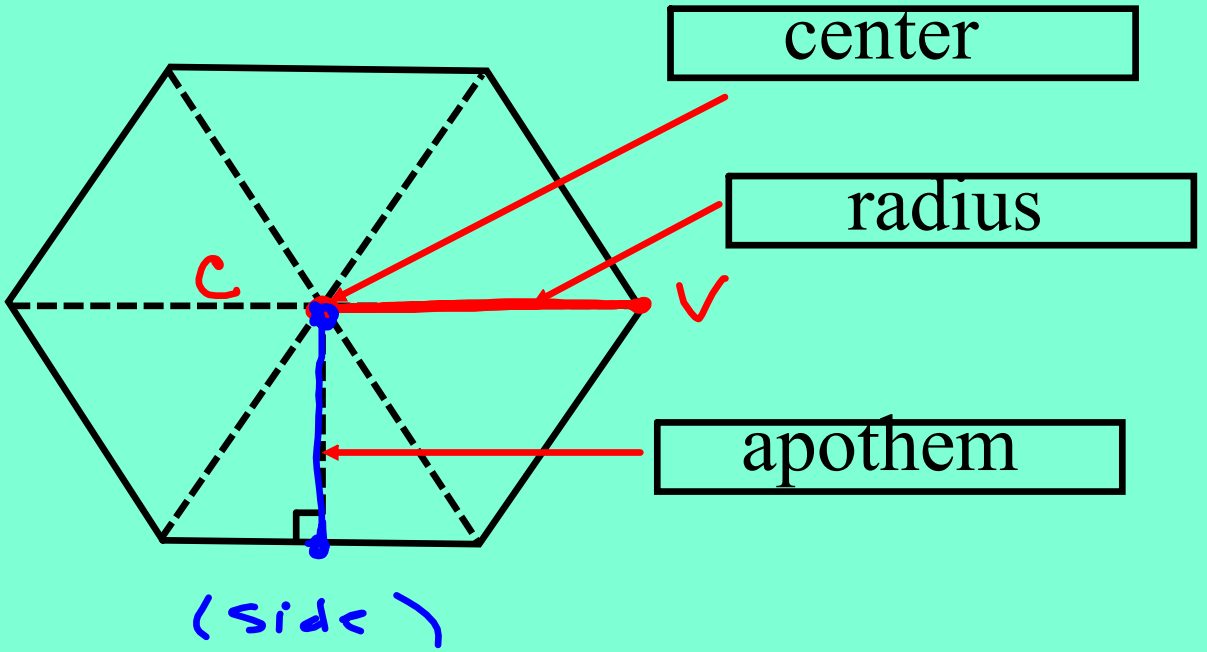


Radius of a regular polygon



Radius of a regular polygon




center
radius
apothem
C
V
(side)

How to find Central Angle of a Polygon

$$CA = \frac{360}{number\ of\ sides}$$

Area of a Regular Polygon

The area of a regular polygon is half the product of the apothem and the perimeter.

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

a = apothem

P = perimeter of polygon

1

Find the measures of angles 1, 2 and 3.

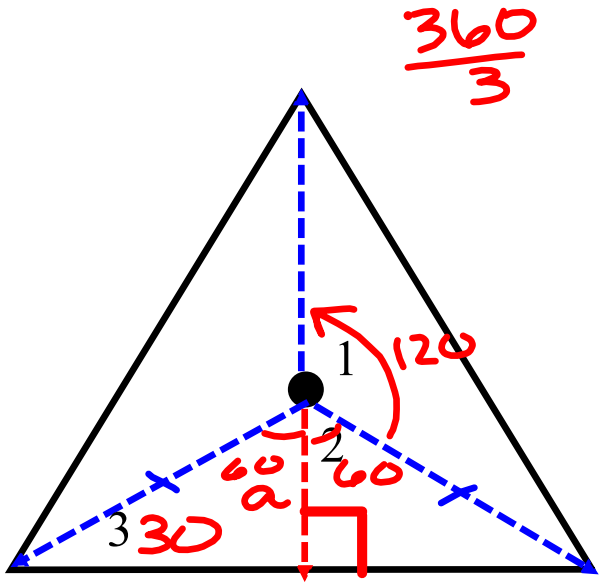
Multiple choice

A 120, 30, 60

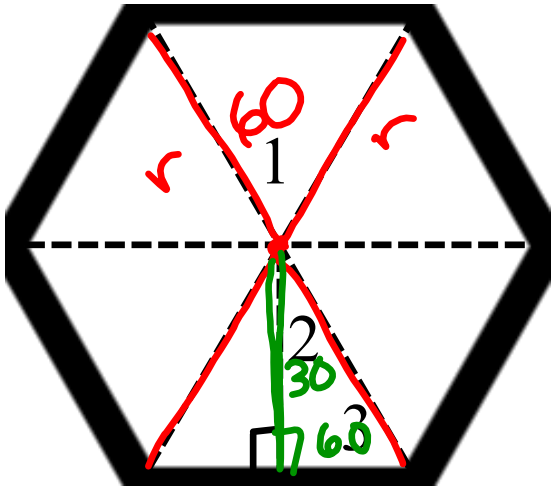
B 120, 60, 30

C 120, 90, 30

D 120, 60, 60



The figure is a regular hexagon with radii and an apothem drawn. Find the measure of each numbered angle.



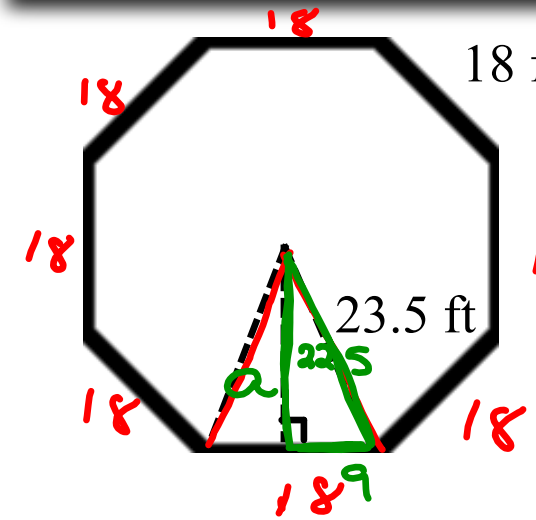
$CA = \frac{360}{6}$

$m\angle 1 = 60$

$m\angle 2 = 30$

$m\angle 3 = 60$

A library is in the shape of a regular octagon. Each side is 18 ft. The radius of the octagon is 23.5 ft. Find the area of the library.



$CA = \frac{360}{\#\text{ of sides}}$

$CA = \frac{360}{8}$

$CA = 45$

$a^2 + (9)^2 = (23.5)^2$

$a^2 = 23.5^2 - 9^2$

$\sqrt{a^2} = \sqrt{471.25}$

$a \approx 21.71$

$A_{RP} = \frac{1}{2} a P$

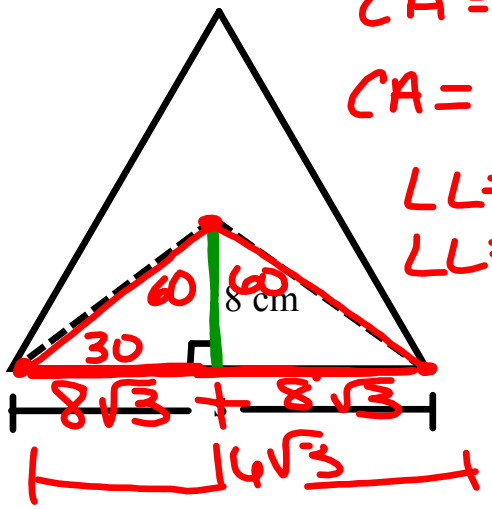
$a = 21.71$

$P = 144$ ft

$A = \frac{1}{2}(21.71)(144)$

$A = 1563.12$ ft^2

Find the area of an equilateral triangle with apothem 8 cm. Leave your answer in simplest radical form.



$CA = \frac{360}{3}$

$CA = 120$

$LL = sL\sqrt{3}$

$LL = 8\sqrt{3}$

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

$a = 8$

$P = 48\sqrt{3}$

$A = \frac{1}{2}(8)(48\sqrt{3})$

$= (4)(48\sqrt{3})$

$A = 192\sqrt{3}\ cm^2$

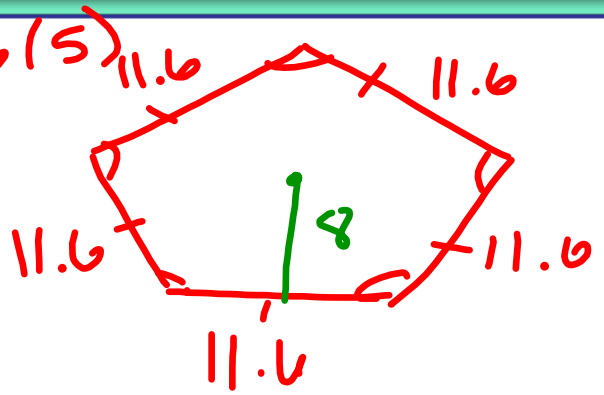
Find the area of a regular pentagon with 11.6-cm sides and an 8-cm apothem.

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

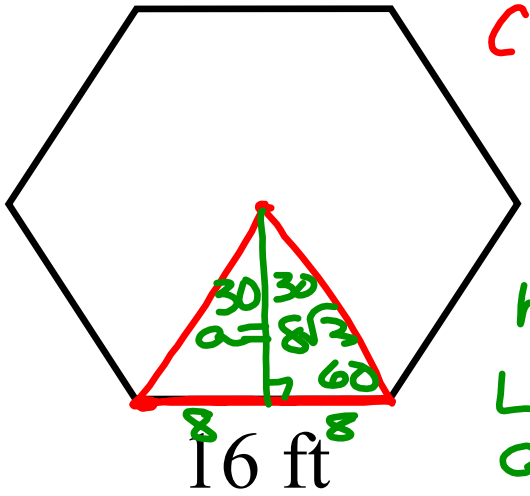
$= \frac{1}{2}(8)(58)$

$A = 232\ cm^2$

$P = 11.6(5)$



The side of a regular hexagon is 16 ft. Find the area of the hexagon.



$CA = \frac{360}{6} = 60$

hyp = SL · 2

LL = SL√3

$a = 8\sqrt{3}$

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

$a = 8\sqrt{3}$

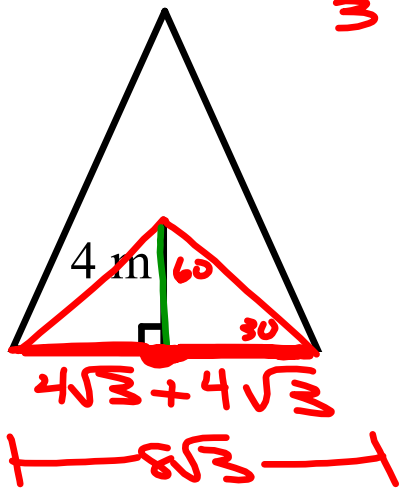
$P = 6(16) = 96$

$A = \frac{1}{2}(4\sqrt{3})(96)$

$A = 384\sqrt{3}\ ft^2$

Find the area of each regular polygon. Leave your answer in simplest radical form.

$\frac{360}{3} = 120$



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

$a = 4$

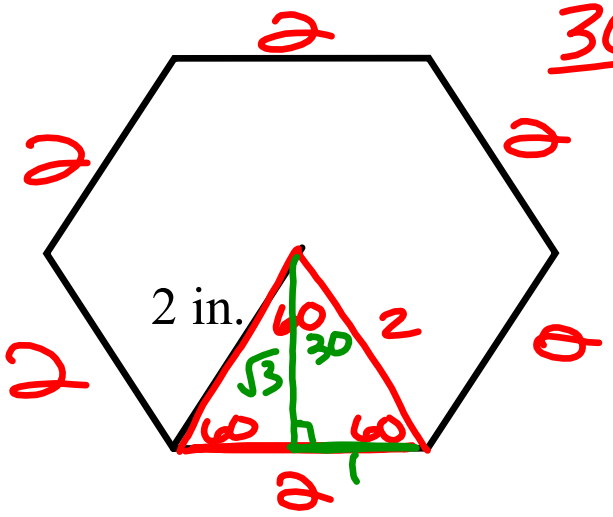
$P = 24\sqrt{3}$

$A = \frac{1}{2}(4)(24\sqrt{3})$

$2(24\sqrt{3})$

$A = 48\sqrt{3}\ m^2$

Find the area of each regular polygon. Leave your answer in simplest radical form.



$\frac{360}{6}$

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

$a = \sqrt{3}$

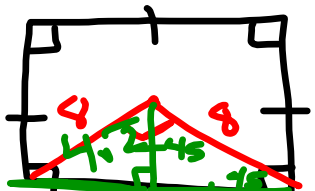
$P = 12$

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

$A = 6\sqrt{3}\ in^2$

Find the area of a regular dodecagon with an apothem of 16.1 and sides of 4, to the nearest tenth.

Find the area of a regular quadrilateral with a radius of 8 cm.



$4\sqrt{2}+4\sqrt{2}=8\sqrt{2}$

$\frac{8}{\sqrt{2}}=\frac{leg\sqrt{2}}{\sqrt{2}}$

$leg=\frac{8\sqrt{2}}{\sqrt{2}\sqrt{2}}=\frac{8\sqrt{2}}{2}=4\sqrt{2}$

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

$a=4\sqrt{2}$

$P=32\sqrt{2}$

$A=\frac{1}{2}(4\sqrt{2})(32\sqrt{2})$

$=64\sqrt{4}=64\cdot 2$

$A=128\ cm^2$

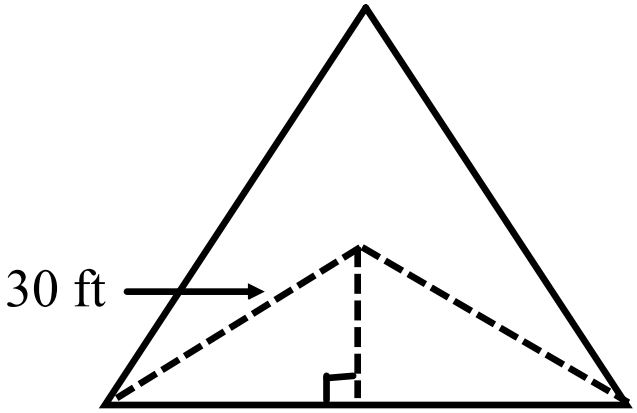
2 Find the area of a regular triangle with a radius of 30 ft.

A $675\sqrt{3}$ ft^2

B $225\sqrt{3}$ ft^2

C $675\sqrt{2}$ ft^2

D $225\sqrt{2}$ ft^2



Assignment:

Day 1: Pgs 548-550 1-23 odds,29,31,33