Friday, March 1, 2013

Agenda:

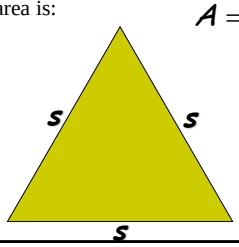
- No TISK & No MM
- Calculate the area of an equilateral triangle.
- Calculate the area of a regular polygon.
- Homework: Complete Ch10 Packet

Homework Check

23) 169
24) 96
25) 60
26) 165
27) 36
28) $18\sqrt{10}$
29) 192
30) 182
31) 21
32) $x = 4\sqrt{5}$
33) $x = 12$
34) $x = 4$
35) 96
36) 72
37) 120

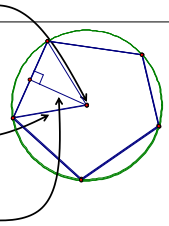
§10.5 Areas of Regular Polygons

- **Area of an Equilateral Triangle Theorem**
  - If the side of an equilateral triangle has length, *s*, then the area is: $A = \frac{1}{4}s^2\sqrt{3}$



Definitions

- Center of a Polygon
  - The center of the circle that circumscribes the polygon.
- Radius of a Polygon
  - The radius of the circle that circumscribes the polygon
- Apothem of a Polygon
  - Height of the triangle between the center and two consecutive vertices of a polygon



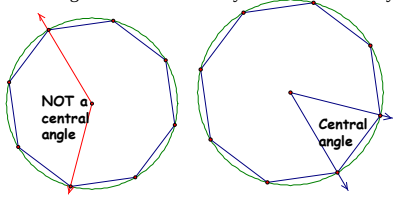
Area of a Regular Polygon Theorem

The area of a regular *n*-gon with side length *s*, apothem *a*, and perimeter *P* is:

$A = \frac{1}{2}aP$ or $A = \frac{1}{2}a(ns)$

Definition

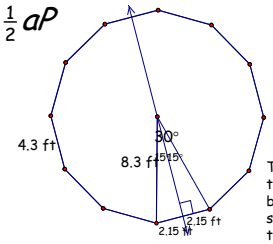
- Central Angle of a Regular Polygon
  - An angle whose vertex is the center and whose sides contain two consecutive vertices of the polygon.
  - The angle measure will always be 360° divided by *n*.



Example.

- Find the area of the regular dodecagon with radius of 8.3 feet and side length of 4.3 feet.

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



A dodecagon has 12 sides, so $P = 4.3(12)$

$P = 51.6$

To find the apothem, set up a triangle and draw in its height.

Find the central angle

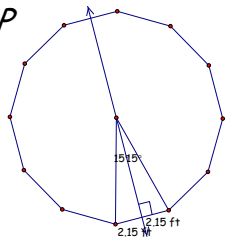
$360 \div 12 = 30°$

The apothem is adjacent to the 15° angle, and the base is opposite the angle, so use the tangent to find the apothem.

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

$P = 51.6$

$\frac{2.15}{\tan 15} = a$



$\tan 15 = \frac{2.15}{a}$

$\frac{2.15}{\tan 15} = a$

$$A \approx \frac{1}{2}\left(\frac{2.15}{\tan 15°}\right)(51.6)$$

$$A \approx 207.02 \text{ ft}^2$$

YES!

- You will need a calculator with the ability to calculate trig ratios for many of these.
- You will use a calculator on the test for this chapter!