Geometry- Today's Agenda

- Warm-Up
- Finding Surface Area
- Finding Area of Regular polygons
- Practice/Questions

Warm-Up

A ***polyhedron*** is a solid that is made up of polygons, which are called f_____. The segments where the faces meet are called e_____; and the points where the edges meet are the v_____.

- Two common types of polyhedrons are:
- p_____ and p_____
- Three other common solids are:
- s_____, c_____, cy_____

Warm Up

- A polyhedron is a solid that is made up of polygons, which are called _**faces**_. The segments where the faces meet are called _**edges**_; and the points where the edges meet are the _**vertices**__.
- Two common types of polyhedra are:

  prisms and **pyramids**

Three other common solids are:

- **spheres , cones , cylinders**

Find the Distance

- Point A $\left(\frac{-2}{5}, 1\right)$ Point B $\left(\frac{-3}{5}, \frac{6}{7}\right)$

Surface Area

Complete #7

- Lateral Area = area of all side faces (all faces, less the bases)

  Face: bh = 7*7 = 49 sq km

  4 side faces = 4*49 = 196 sq km

- S.A = lateral area + area of the bases

  196 + 98 = 294 sq km

Vocabulary

Nets – 2-D pattern that can be folded into a 3-D solid

-Nets are used to design and manufacture items such as boxes and labels.

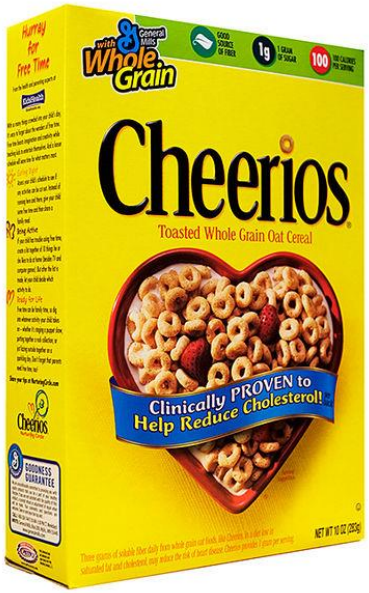
Surface Area

-The sum of the areas of all the surfaces, or faces, of a 3-dimensional solid.

-When you find the surface area of a three-dimensional figure, the units are square units, not linear or cubic units.

Rectangular Prism

When you cut along the edges of a cereal box, you create the shape's net.



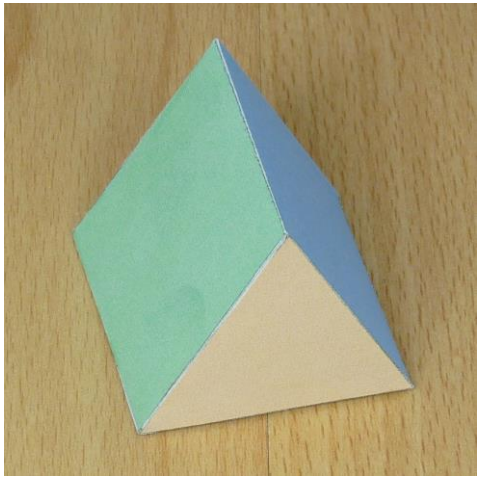
What do you notice about the front and back faces, the top and bottom faces, and the left and right faces?

- They are congruent.

A rectangular prism is made up of 6 parallelograms.

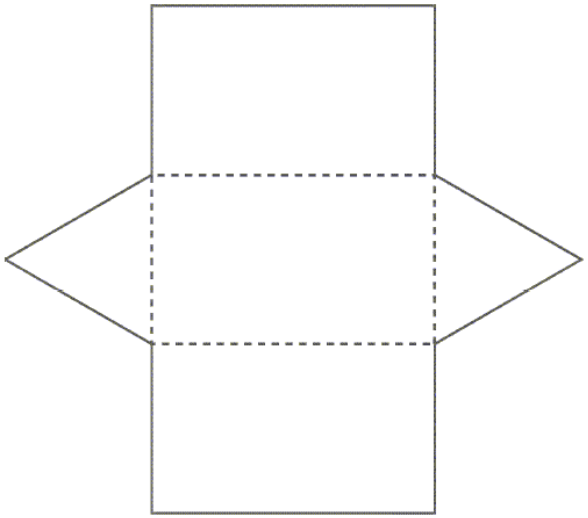
Triangular Prism

A triangular prism is made up of two triangles and three parallelograms.



What is true about the triangles?

-They are congruent.



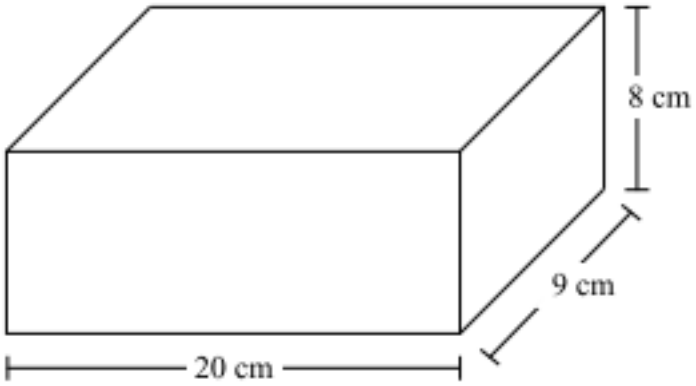
Rectangular Prism

The surface area S.A. of a rectangular prism with base l, width w, and height h is the sum of the areas of its faces.

$$S.A. = 2lh + 2lw + 2hw$$

Practice Problem 1

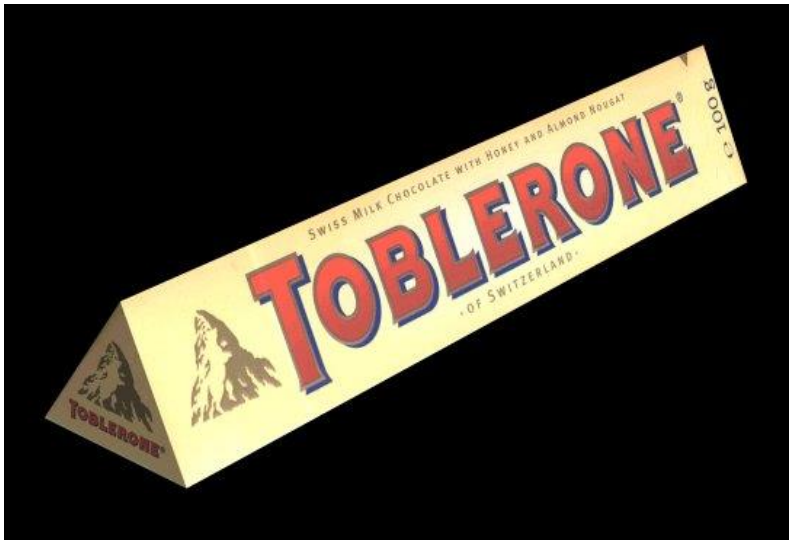
- Find the surface area of the rectangular prism shown to the right.



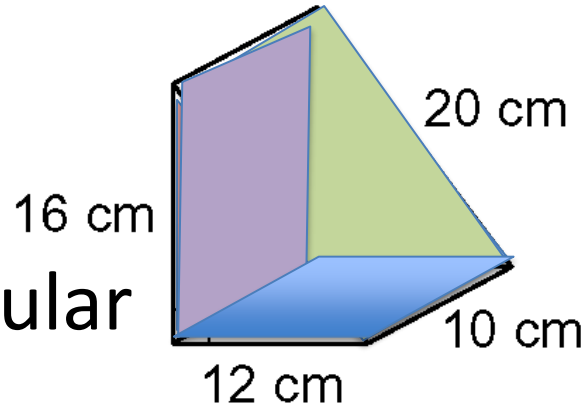
$$S.A. = 2lw + 2lh + 2hw$$
$$S.A. = 2(20)(9) + 2(20)(8) + 2(8)(9)$$
$$S.A. = 360 + 320 + 144$$
$$S.A. = 824cm^2$$

Triangular Prism

- To find the surface area of a triangular prism, it is more efficient to find the area of each face and calculate the sum of all of the faces rather than using a formula.



Practice Problem 2



- Find the surface area of the triangular prism shown to the right.
- Find the area of each shape and add.

Area of each triangle

$$A=\frac{bh}{2}$$

$$A=\frac{12(16)}{2}$$

$$A=\frac{192}{2}$$

$$A=96cm^2$$

Area of rectangle 1

$$A=bh$$
$$A=20(10)$$
$$A=200cm^2$$

Area of rectangle 2

$$A=bh$$
$$A=16(10)$$
$$A=160cm^2$$

Area of rectangle 3

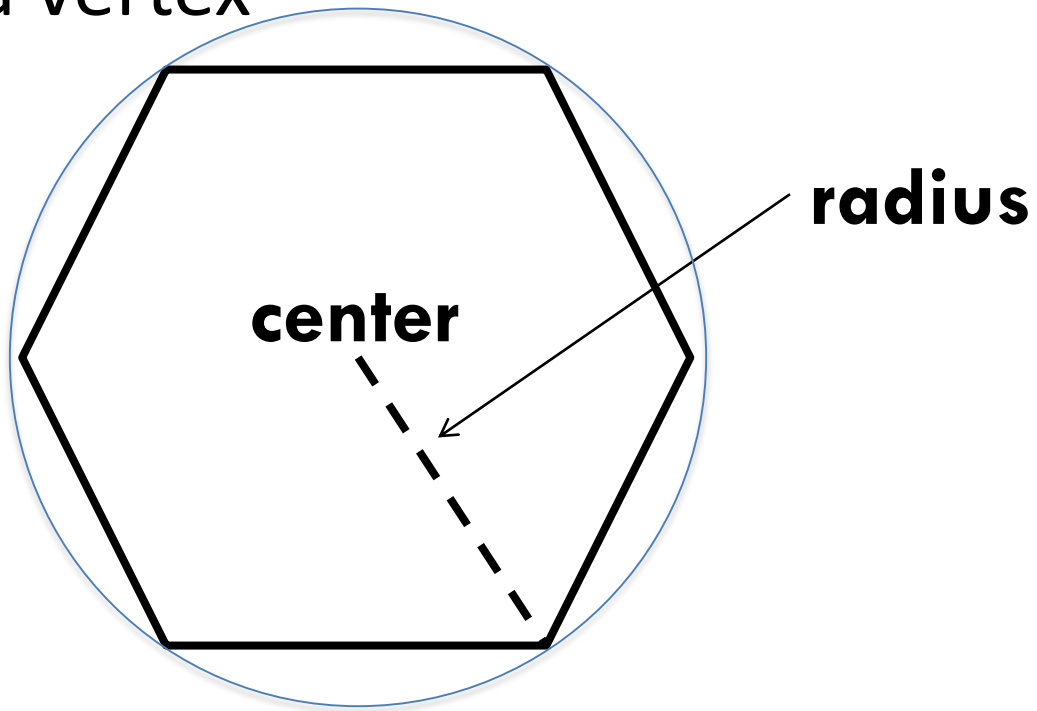
$$A=bh$$
$$A=12(10)$$
$$A=120cm^2$$

$$S.A. = 96+96+200+160+120 = 672cm^2$$

or 672 sq. cm

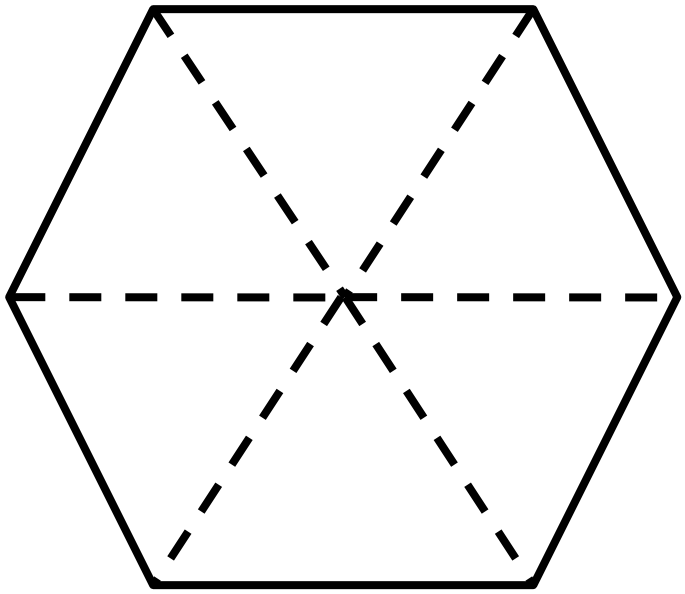
Area of Regular Polygons

- A regular polygon has equal sides and equal angles
- The radius of the polygon is the distance from the center to a vertex



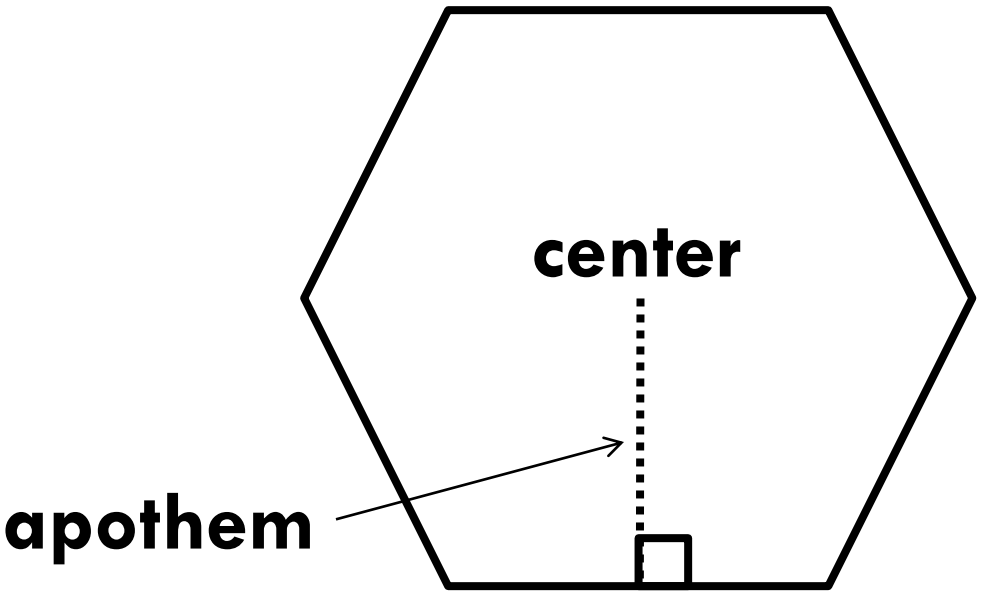
Area of Regular Polygons

- Drawing all of the radii will create several congruent, isosceles triangles.



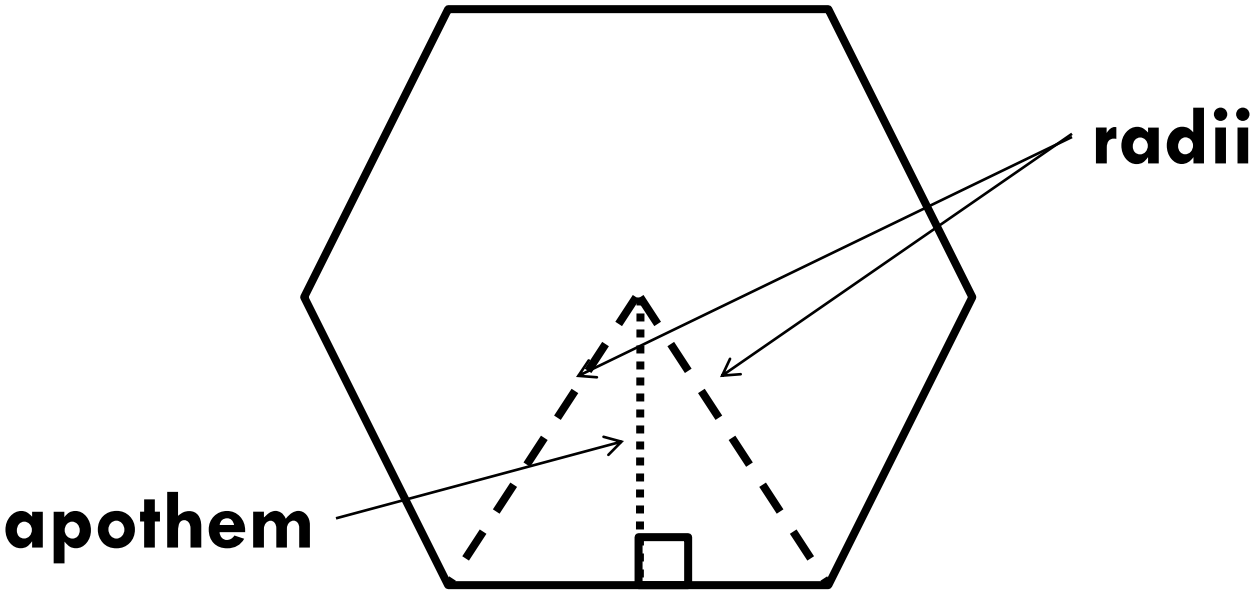
Area of Regular Polygons

- The apothem is the perpendicular distance from the center to the midpoint of one of the sides.



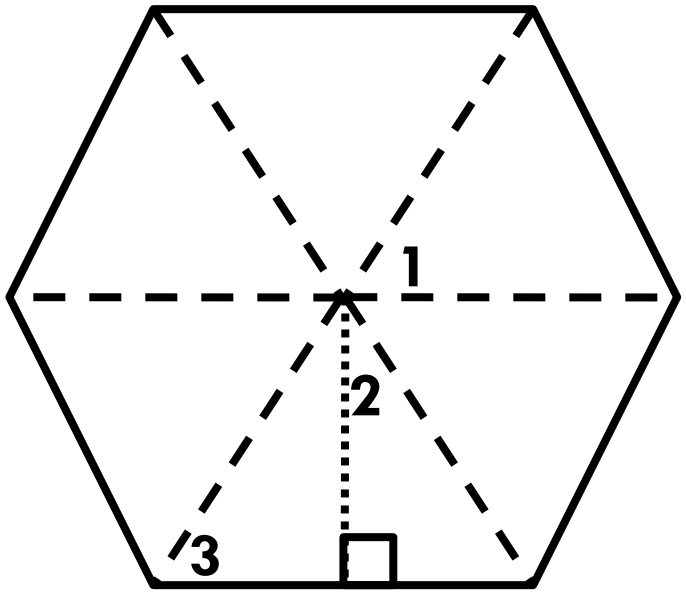
Area of Regular Polygons

- An apothem bisects one of the angles created by two radii, creating another pair of congruent triangles



Area of Regular Polygons

- Example: Find the measure of each numbered angle



$m\angle 1 = 360/6 = 60^\circ$

$m\angle 2 = 60/2 = 30^\circ$

$m\angle 3 = 90 - 30 = 60^\circ$

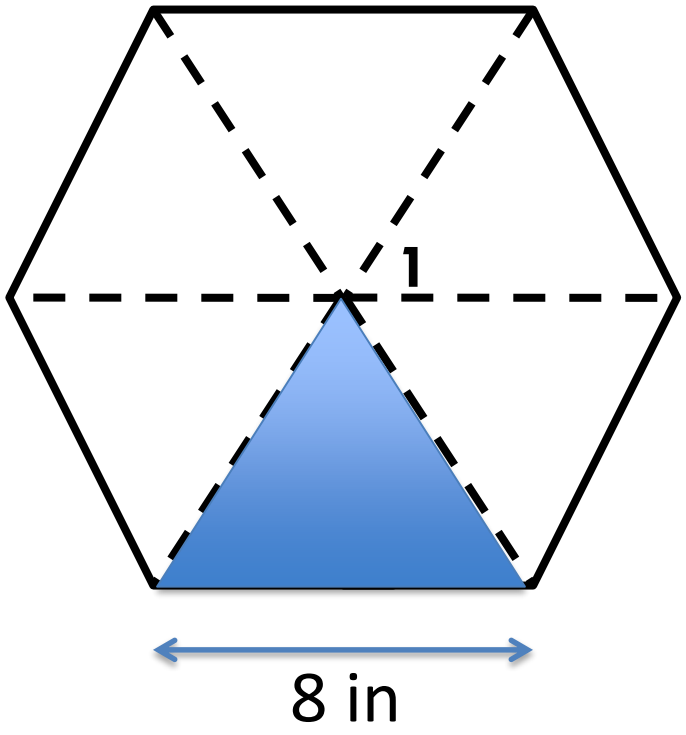
Today's AGENDA

- Warm-Up: Work Quietly on HW (20 min)
- Review the Schedule
- Review Area of Regular polygons
- Work on CPM (Chapt 9): Ratios of similarities

  #9-45 to 9-53

Area of Regular Polygons

- Type equation here.Example: Find the measure of each numbered angle



$m\angle 1 = 60$

$m\angle 2 = 30$

$m\angle 3 = 60$

$Short\ Leg = 4\ in\ (half\ of\ 8)$

Long $Leg = 4\sqrt{3}\ in$

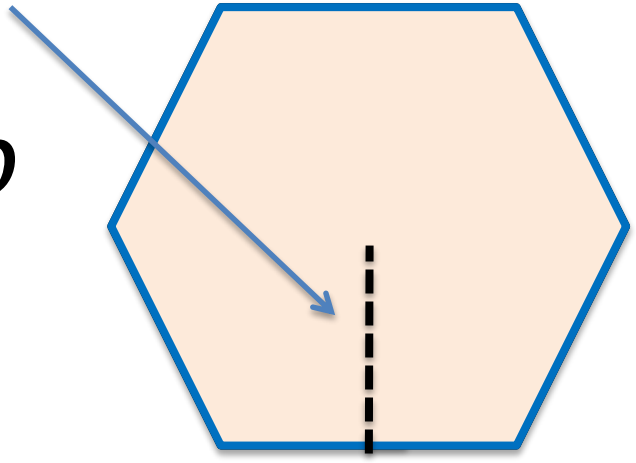
$$Area_{\Delta} = \frac{1}{2} \cdot bh = \frac{1}{2} \cdot 8 \cdot 4\sqrt{3}$$

$$Area_{\Delta} = 16\sqrt{3} \approx 27.7\ sq.in$$

Area of Regular Polygons

- The area of a regular polygon equals one half the product of the **apothem** and the *perimeter*

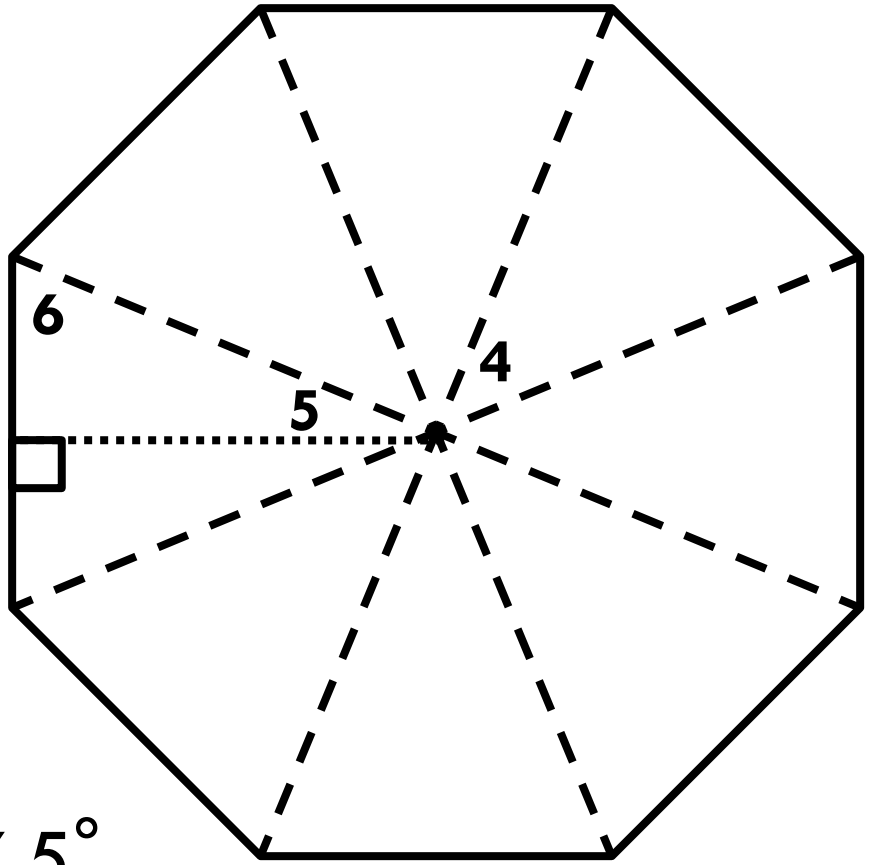
$$A = \frac{1}{2} \cdot a \cdot p$$



- (Perimeter equals the side length times the number of sides, by the way)

Area of Regular Polygons

- Example: Find the measure of each numbered angle



$m\angle 4 = 360/8 = 45^\circ$

$m\angle 5 = 45/2 = 22.5^\circ$

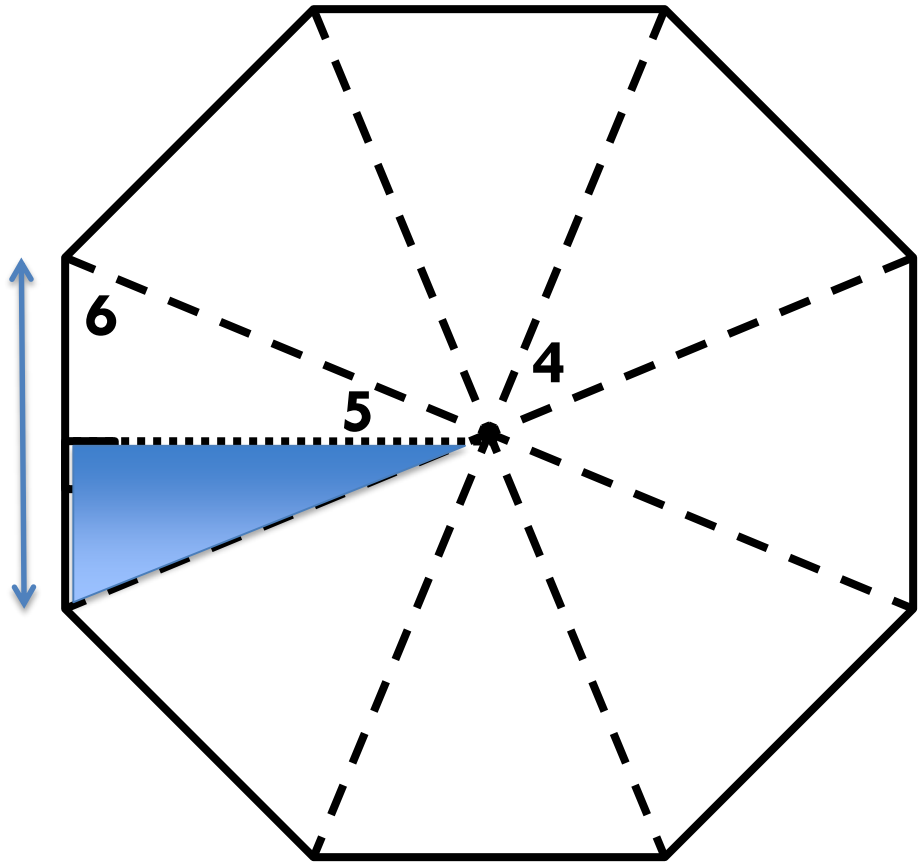
$m\angle 6 = 90 - 22.5 = 67.5^\circ$

Area of a Regular Octagon

$m\angle 4 = 45^\circ$

$m\angle 5 = 22.5^\circ$

$m\angle 6 = 67.5^\circ$



a = ?

3

(***use trig ratios***!)

$$\tan\theta = \frac{opp.leg}{adj.leg}$$

$$\tan(22.5) = \frac{3}{\boldsymbol{a}} \rightarrow \boldsymbol{a} = \frac{3}{\tan(22.5)}$$

$\boldsymbol{a} = 7.24264\ldots$

so the is

apothem ≈ 7.24

Area of a regular octagon

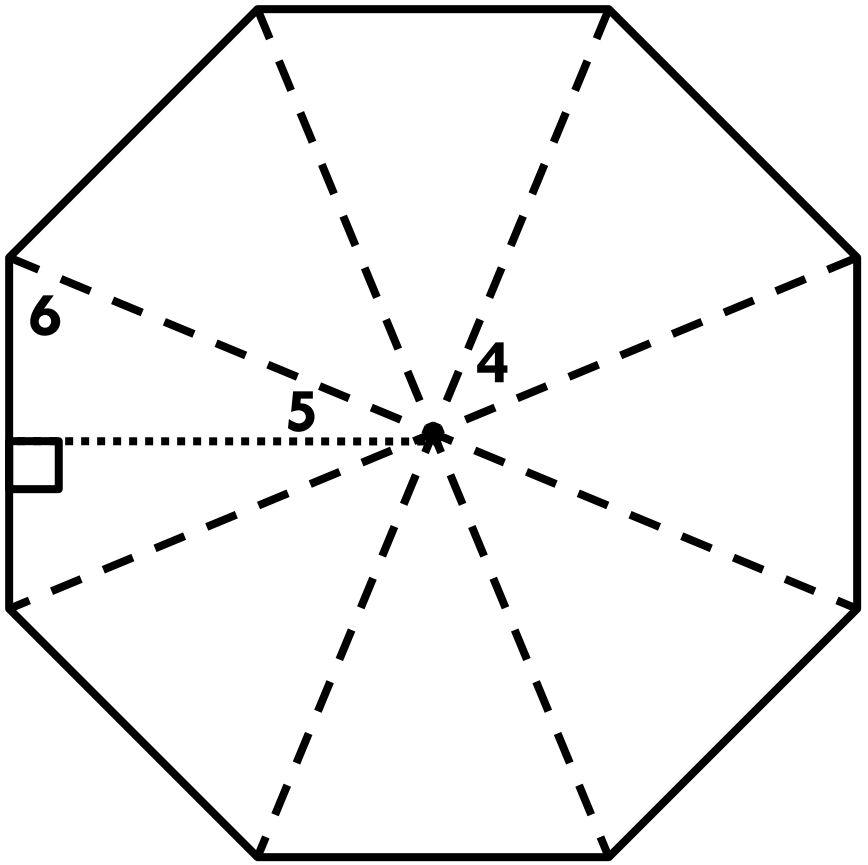
- Apothem = 7.24
- Perimeter

$= 8\ sides\ @\ 6$ ft.

$= 8 \cdot 6 = 48$ ft.

Area = $\frac{1}{2} \cdot \boldsymbol{a} \cdot \boldsymbol{p}$

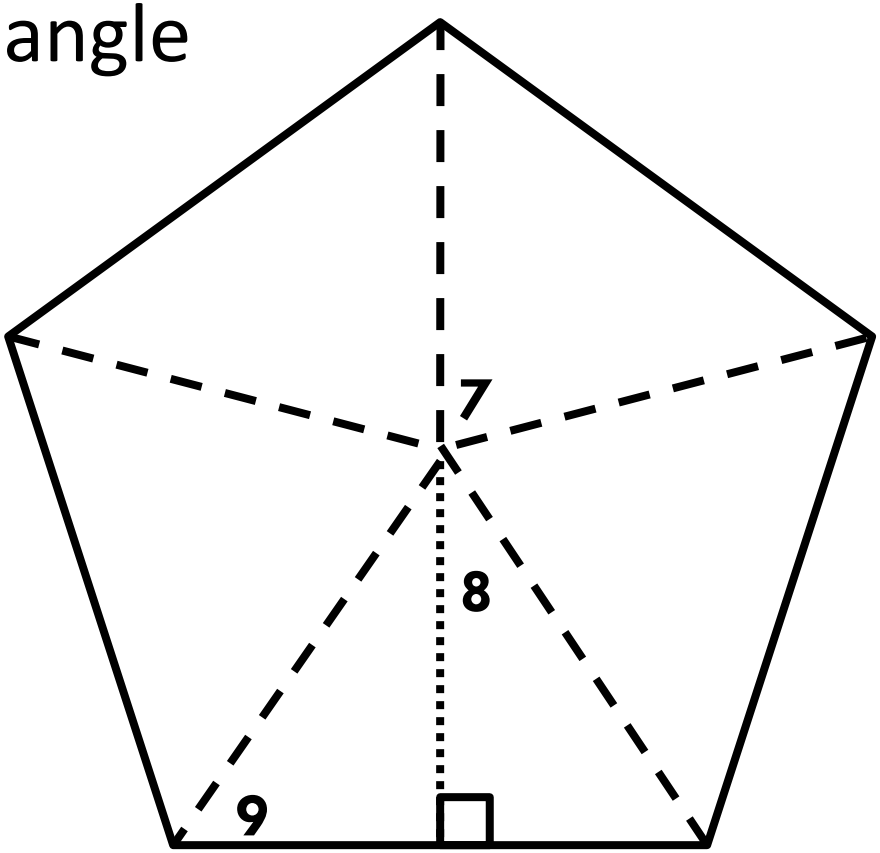
Area = $\frac{1}{2} \cdot 7.24 \cdot 48$



Area of octogon $\approx$ **173.76** sq. ft.

Area of Regular Polygons

- Example: Find the measure of each numbered angle



$m\angle 7 = 360/5 = 72^\circ$

$m\angle 8 = 72/2 = 36^\circ$

$m\angle 9 = 90 - 36 = 54^\circ$

Area of Regular Polygons

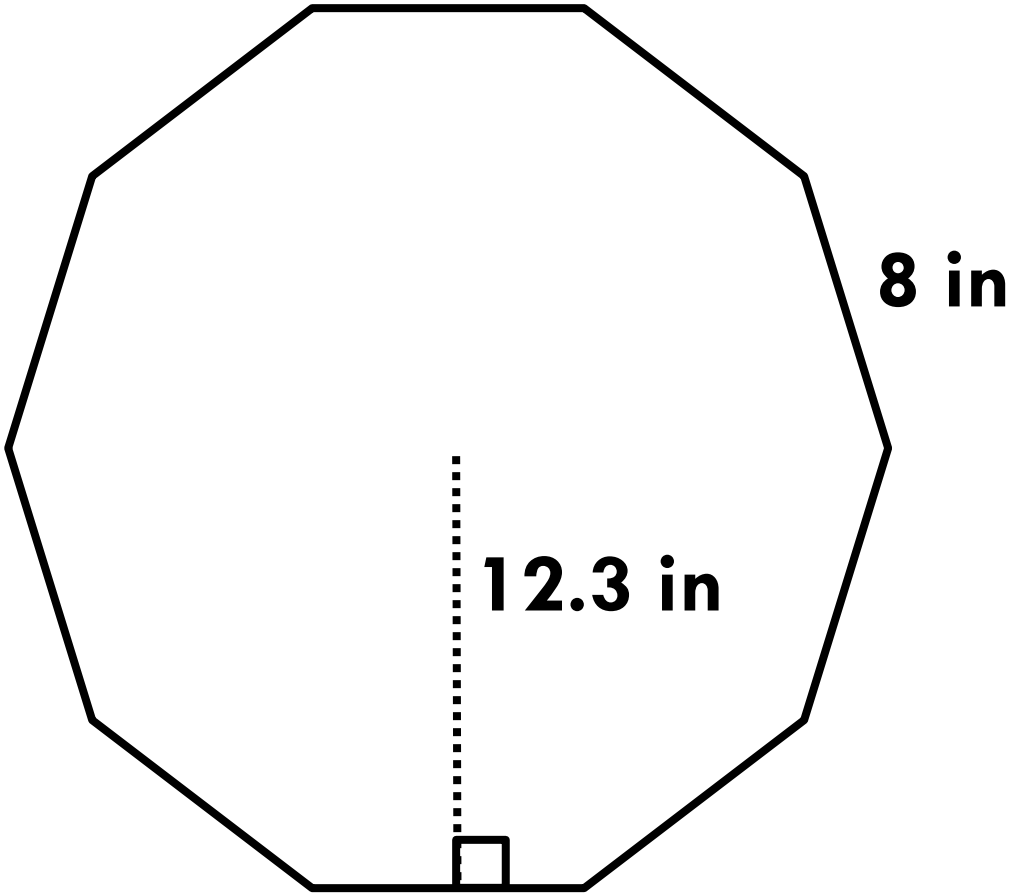
- The area of a regular polygon equals one half the product of the apothem and the perimeter

$$A = \frac{1}{2} \cdot a \cdot p$$

- (Perimeter equals the side length times the number of sides, by the way)

Area of Regular Polygons

- Example: Find the area of the regular polygon



$$A = \frac{1}{2} \cdot a \cdot p$$

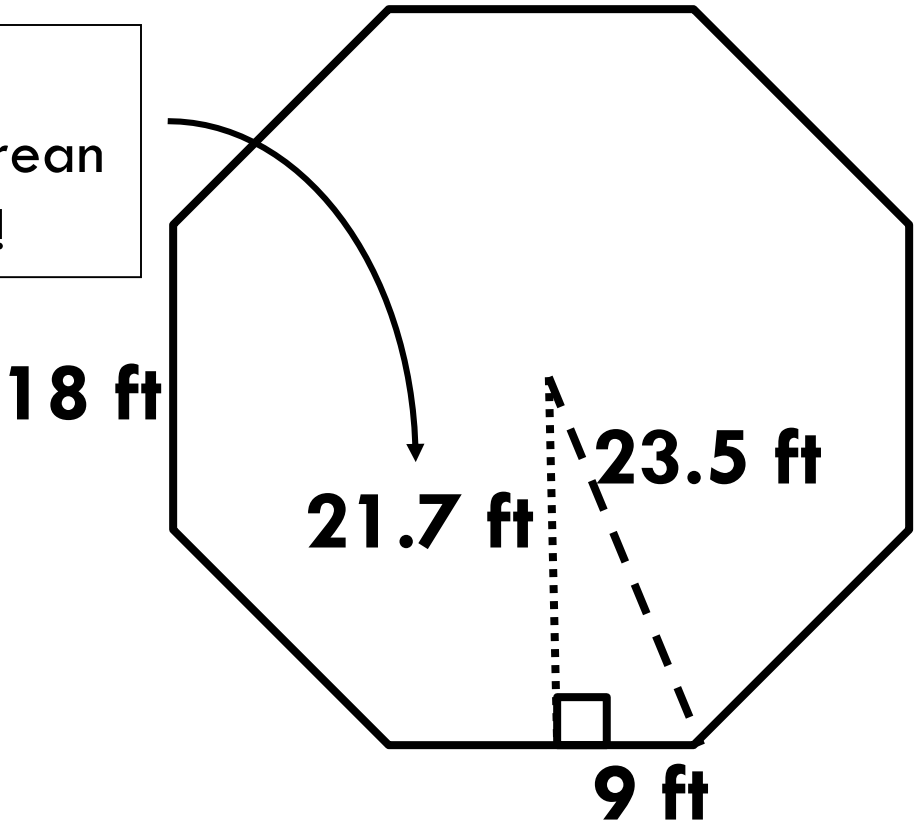
$$A = \frac{1}{2} \cdot 12.3 \cdot 80$$

$$A = 492 \text{ in}^2$$

Area of Regular Polygons

- Example: Find the area of the regular polygon

Use Pythagorean Theorem!



$$A = \frac{1}{2} \cdot a \cdot p$$

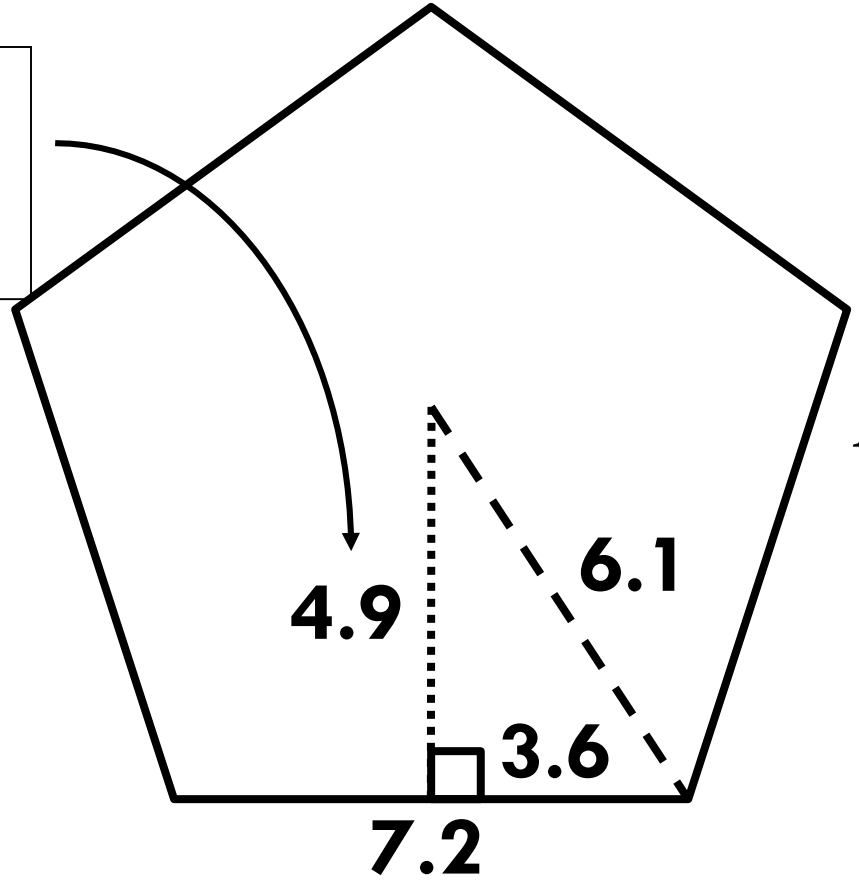
$$A = \frac{1}{2} \cdot 21.7 \cdot 144$$

$$A = 1662.4 \text{ ft}^2$$

Area of Regular Polygons

- Example: Find the area of the regular polygon

Use Pythagorean Theorem!



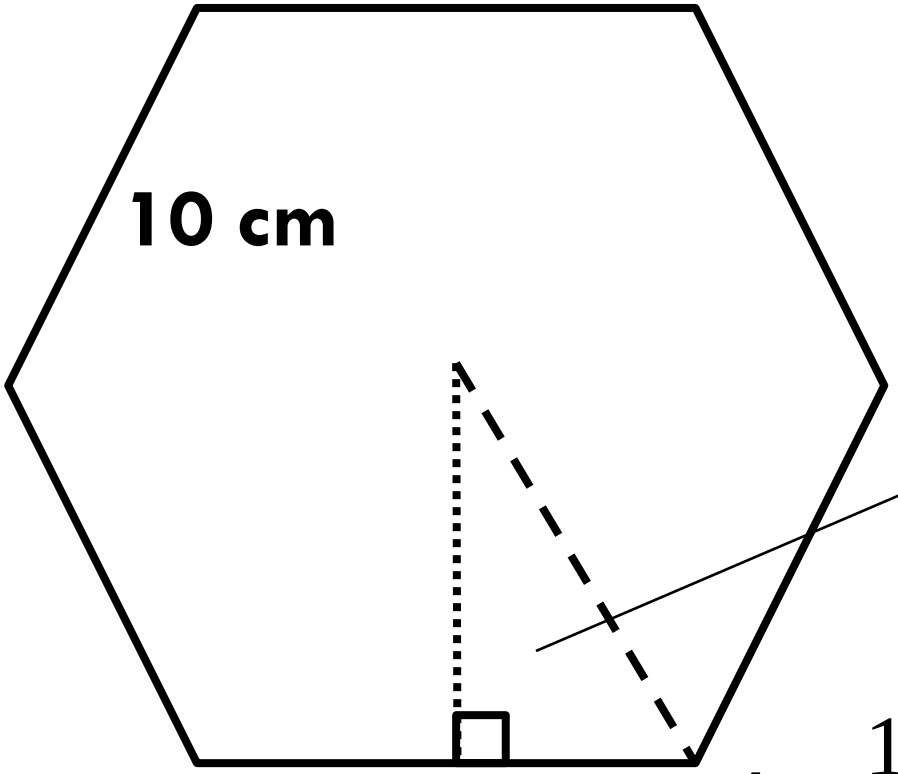
$$A = \frac{1}{2} \cdot a \cdot p$$

$$A = \frac{1}{2} \cdot 21.7 \cdot 144$$

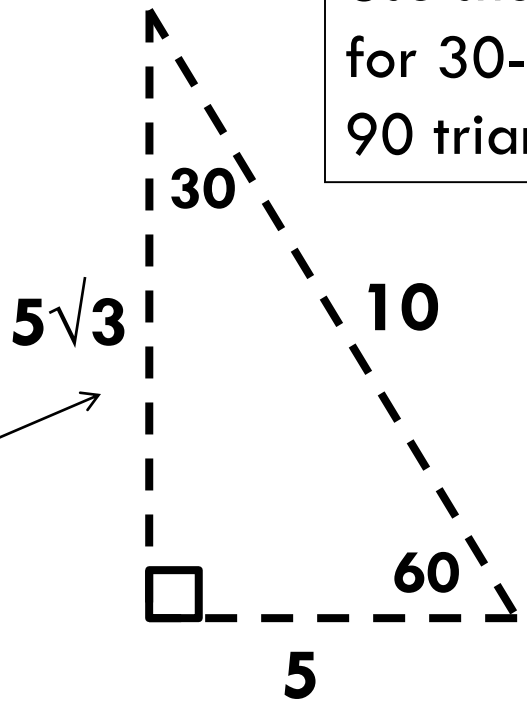
$$A = 1662.4 \text{ ft}^2$$

Area of Regular Polygons

- Example: Find the area of the regular polygon



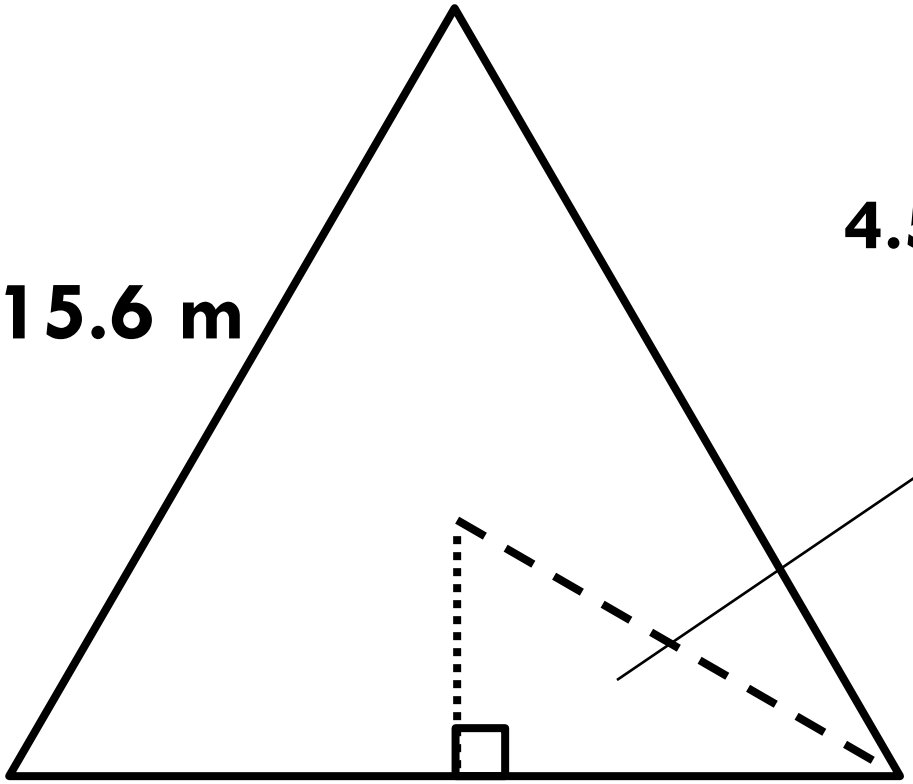
Use shortcut for 30-60-90 triangle!

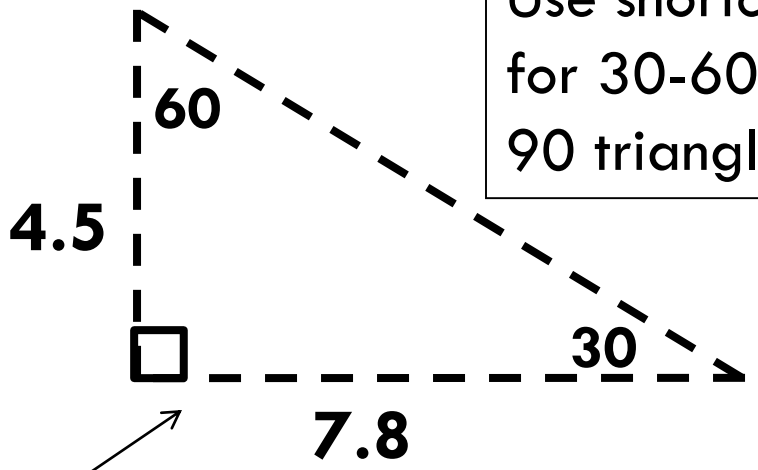


$$A = \frac{1}{2} \cdot 5\sqrt{3} \cdot 60 = 2598.1\,\text{cm}^2$$

Area of Regular Polygons

- Example: Find the area of the regular polygon





Use shortcut for 30-60-90 triangle!

$$A = \frac{1}{2} \cdot 4.5 \cdot 46.8$$

$$= 105.3\,\text{m}^2$$

Area of Regular Polygons

- Questions??

*Thanks to: www.norris260.org/math/.../**Powerpoint**s/..*