

## Chapter 10: Things To Know

### Section 10.1 Angle Measures of Polygons and Regular Polygon Tessellations

#### Objectives

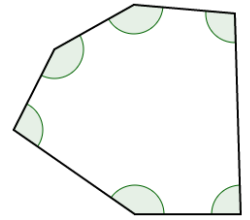
1. Find the Measures of Interior Angles of Polygons.
2. Find the Measures of Exterior Angles of Polygons.
3. Determine Whether a Tessellation of Regular Polygons is Formed.

#### Vocabulary

- exterior angles of the polygon
- tessellation

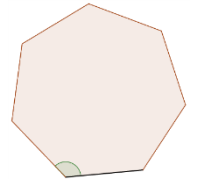
#### Theorem Polygon Interior-Angle Sum Theorem

The sum of the measures of the interior angles of a convex  $n$ -gon is:



#### Corollary Regular Polygon Interior Angle Corollary

The measure of each interior angle of a regular  $n$ -gon is

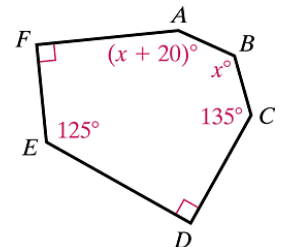


#### Example Finding the Sum of the Measures of the Angles of a Polygon

Find the sum of the measures of the interior angles of a convex octagon.

#### Example Finding the Measure of an Interior Angle

Find the value of  $x$  in the figure. Then use  $x$  to find  $m\angle A$  and  $m\angle B$ .



**Example** Using the Regular Polygon Interior-Angle Corollary

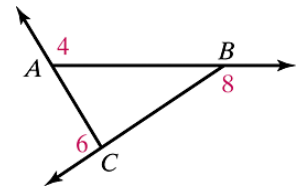
The Sino-Steel Tower is a hexagonal, honey comb-looking “green” building, in Tianjin, China, designed by MAD Studios architects. Find the measure of each interior angle of one regular hexagon.



**Example** Finding the Number of Sides of a Regular Polygon

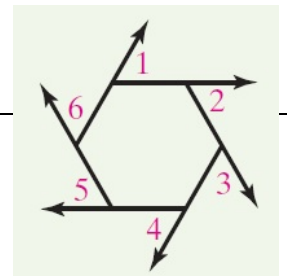
The measure of an interior angle of a regular polygon is  $144^\circ$ . Find the number of sides of this polygon.

The angles that are adjacent to the interior angles of a convex polygon are the \_\_\_\_\_ of the polygon.



**Theorem** Polygon Exterior Angle-Sum Theorem

The sum of the measures of the exterior angles of a convex polygon, one exterior angle at each vertex, is:

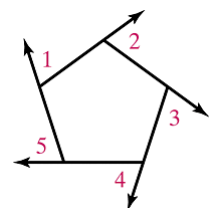


**Corollary** Regular Polygon Exterior Angle Corollary

The measure of each exterior angle of a regular  $n$ -gon is:

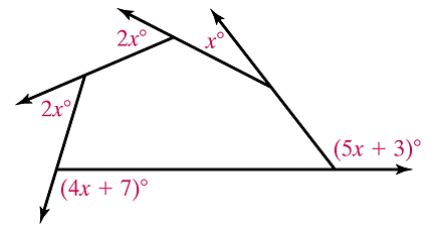
**Example** Finding the Measures of Exterior Angles

Find the measure of each exterior angle of a regular pentagon.



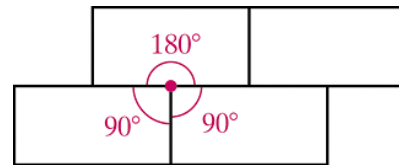
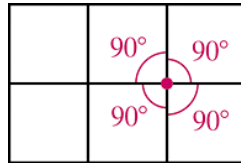
**Example** Finding the Measures of Exterior Angles

Find the value of  $x$ . Then find each exterior angle measure.



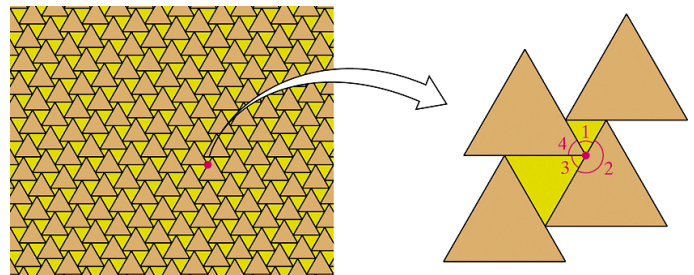
**Tessellation of Regular Polygons**

To form a tiling pattern with no gaps or overlaps, we make sure that the sum of the angles where the polygons meet is \_\_\_\_\_.



**Example** Tessellations

Check to see whether this is a tessellation by finding the sum of the numbered angles in the equilateral triangles.



**Section 10.2 Areas of Triangles and Quadrilaterals with a Review of Perimeter**

<p><b>Objectives</b></p>	<p><b>Vocabulary</b></p>
<ol style="list-style-type: none"> <li>Find Areas of Squares, Rectangles, Parallelograms, and Triangles.</li> <li>Find Areas of Trapezoids, Rhombuses, and Kites.</li> </ol>	<ul style="list-style-type: none"> <li>base of a parallelogram</li> <li>height of a parallelogram</li> <li>base of a triangle</li> <li>height of a triangle</li> <li>height of a trapezoid</li> </ul>

**Postulate** Area Congruence Postulate

If...

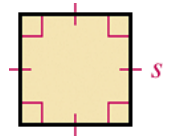
Then...

**Postulate** Area Addition Postulate

The area of a region is \_\_\_\_\_.

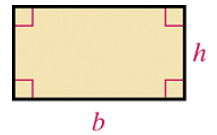
**Postulate** Area of a Square

The area of a square is



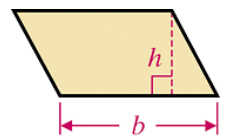
**Theorem** Area of a Rectangle

The area of a rectangle is



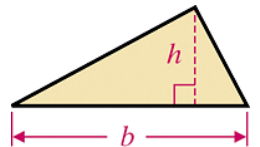
**Theorem** Area of a Parallelogram

The area of a parallelogram is



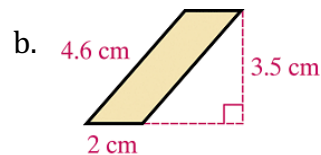
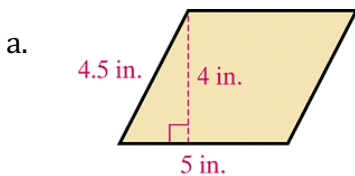
**Theorem** Area of a triangle

The area of a triangle is



**Example** Finding the Area of a Parallelogram

What is the area of each parallelogram?



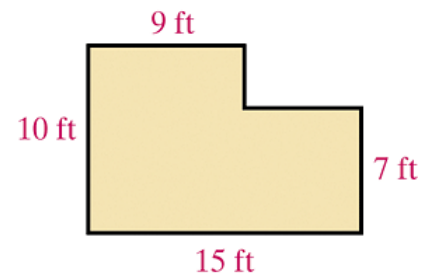
**Example** Finding the Area of a Triangle

To make two triangular sails like the ones shown, how many square feet of material are needed?



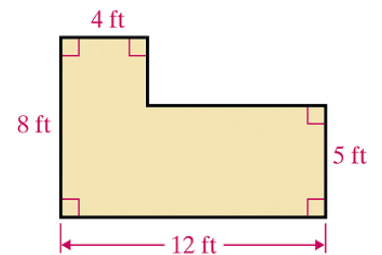
**Example** Finding the Perimeter of an Irregular Room

Find the perimeter of the room.



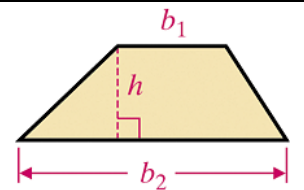
**Example** Finding the Area of an Irregular Room

Find the area.



**Theorem** Area of a Trapezoid

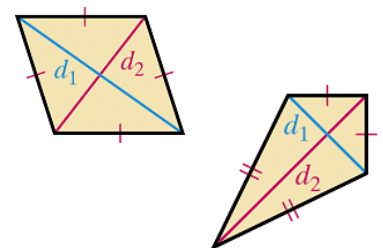
The area of a trapezoid is



(In this theorem, the height of the trapezoid is the \_\_\_\_\_ )

**Theorem** Area of a Rhombus or a Kite

The area of a rhombus or a kite is



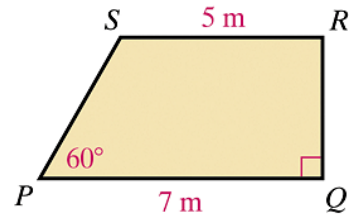
**Example** Area of a Trapezoid

What is the approximate area of the state of Nevada? Round to the nearest hundred square miles.

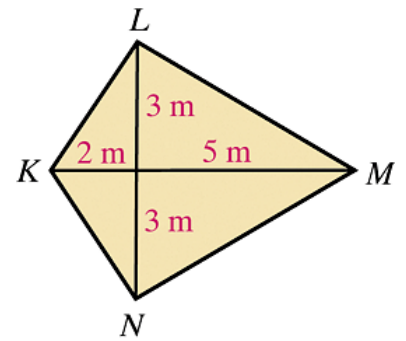


**Example** Finding the Area Using a Right Triangle

Find the area of the trapezoid  $PQRS$ .



**Example** Finding the Area of a Kite



**Section 10.3 Areas of Regular Polygons**

**Objectives**

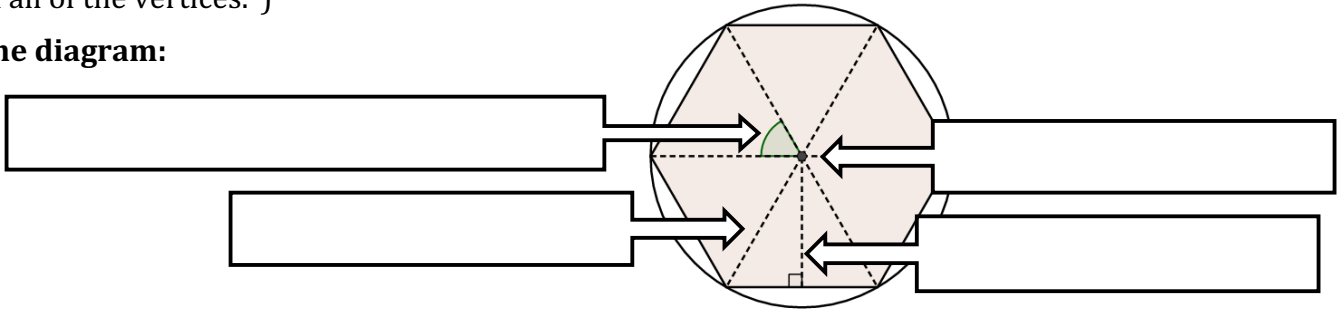
1. Find the Area of a Regular Polygon.

**Vocabulary**

- center of a regular polygon
- radius of a regular polygon
- apothem
- central angle of a regular polygon

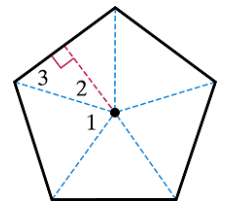
We can circumscribe a circle about any regular polygon. (Remember, “circumscribe” means “draw a circle through all of the vertices.”)

**Label the diagram:**



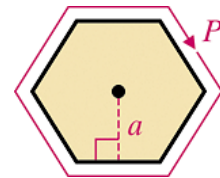
**Example Finding Angle Measures**

The figure at the right is a regular pentagon with radii and an apothem drawn. What is the measure of each numbered angle?



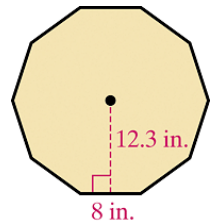
**Theorem Area of a Regular Polygon**

The area of a regular polygon is



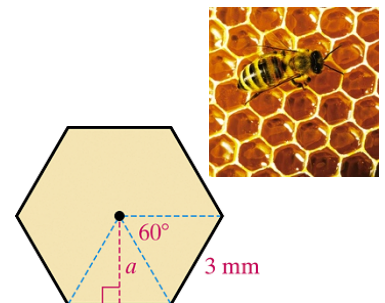
**Example Finding the Area of a Regular Polygon**

What is the area of the regular decagon?



**Example Using Special Triangles to Find the Area of a Regular Polygon**

A honeycomb is made up of regular hexagonal cells. The length of a side of a cell is 3 mm. What is the area of a cell? Round to the nearest square mm.



**Section 10.4 Perimeters and Areas of Similar Figures**

**Objectives**

1. Find the Perimeters and Areas of Similar Figures.

**Vocabulary**

- scale factor

**Theorem** Perimeters and Areas of Similar Figures

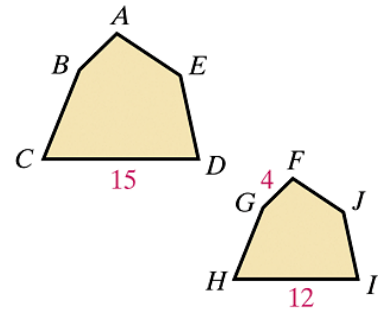
If the scale factor of two similar figures is  $\frac{a}{b}$ , then

1. the ratio of their perimeters is
2. the ratio of their areas is

**Example** Finding Scale Factor, Side Lengths, and Ratios of Similar Polygons

Figure  $ABCDE \sim$  figure  $FGHIJ$ .

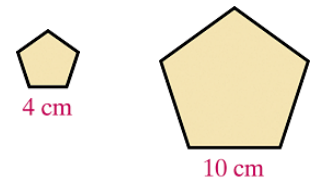
- Find the scale factor of the larger figure to the smaller figure.
- Given the scale factor, find  $AB$ .
- Find the ratio of the perimeters of the large figure to the smaller figure.
- Find the ratio of the areas of the larger figure to the smaller figure.



**Example** Finding Areas Using Similar Figures

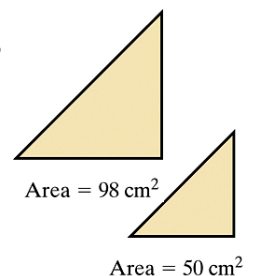
**Multiple Choice** The area of the smaller regular pentagon is about  $27.5 \text{ cm}^2$ . Choose the best approximation for the area of the larger regular pentagon.

- $11 \text{ cm}^2$
- $69 \text{ cm}^2$
- $172 \text{ cm}^2$
- $275 \text{ cm}^2$



**Example** Finding Perimeter Ratios

The triangles are similar. What is the scale factor? What is the ratio of their perimeters?





**Section 10.6 Areas of Circles and Sectors****Objectives**

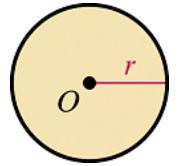
1. Find the Areas of Circles, Sectors, and Segments of Circles.

**Vocabulary**

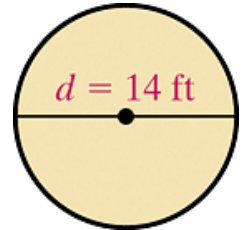
- sector of a circle
- segment of a circle

**Theorem** Area of a Circle

The area of a circle is

**Example** Using the Area of a Circle Formula

- a. Find the exact area, and then a two decimal-place approximation.



- b. Find the exact radius, and then a two decimal-place approximation.

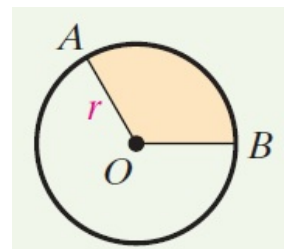
**Example** Going from Circumference of a Circle to Its Area

An artist has been commissioned to construct a circular table from a “slice” of a tree. The customer would like the table surface to be about 400 square inches in area. The artist found a tree with a nice circular girth (circumference) of 72 inches. Before the tree is cut down, let’s find the area of a slice of this tree, rounded to two decimal places.

A \_\_\_\_\_ of a circle is a region bounded by an arc of the circle and the two radii to the arc’s endpoints. We name a sector using one arc endpoint, the center of the circle, and other arc endpoint.

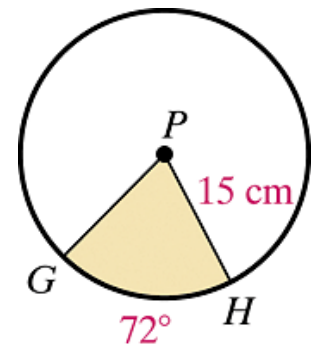
**Theorem** Area of a Sector of a Circle

The area of a sector of a circle is



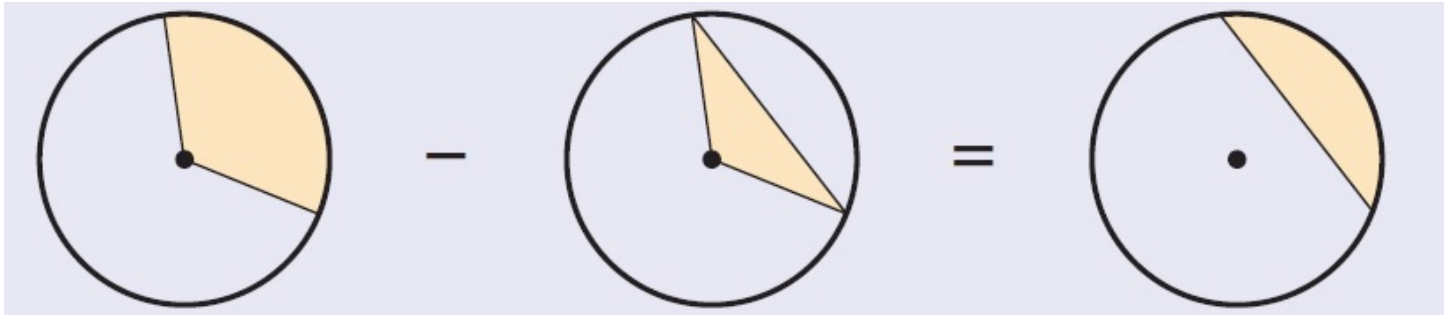
**Example** Finding the Area of a Sector of a Circle

Find the exact area of sector  $GPH$ . Then give a two decimal-place approximation.



A part of a circle bounded by an arc and the segment of joining its endpoints is a \_\_\_\_\_ of the circle.

To find the area of a segment, compute:



**Example** Finding the Area of a Segment of a Circle

Find the area of the shaded segment shown at the right. Round your answer to the nearest tenth.

