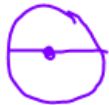




# Area of a Circle

diameter: distance across a circle through the center



$$\pi = 3.1415$$

Goal: Find the area of a circle.

### Area of a Circle

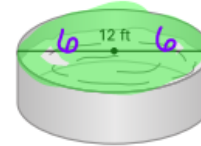
Words Area =  $(\pi) \cdot (\text{radius})^2$

Algebra  $A = \pi r^2$



### EXAMPLE 1 Finding the Area of a Circle

**Swimming Pool** A cover is being made for the top of the swimming pool shown. How many square feet of material is needed to cover the pool?



#### Solution

To answer the question, find the area of a circle with a diameter of 12 feet. Round to the nearest square foot.

Because the diameter is 12 feet, the radius is  $12 \div 2 = 6$  feet.

$$A = \pi r^2$$

Write the formula for the area of a circle.

$$\approx (3.14) \cdot (6)^2$$

Substitute 3.14 for  $\pi$  and 6 for  $r$ .

$$= 113.04$$

Simplify.

**Answer:** You will need about 113 square feet of material to cover the top of the pool.

$$A = \pi \cdot r^2$$


$$= \pi \cdot 6^2$$

$$= \pi \cdot 6 \cdot 6$$

$$= \pi \cdot 36$$

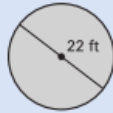


$$= 113.1 \text{ ft}^2$$

radius: starts in the center & extends to one side



### Your turn now Find the area of the circle.

$$\pi = 3.14$$

<p>1. </p> $A = \pi \cdot r^2$ $= \pi \cdot 11^2$ $= 380.13 \text{ ft}^2$	<p>2. </p> $A = \pi \cdot r^2$ $= \pi \cdot 9^2$ $= 254.47 \text{ cm}^2$	<p>3. </p> $A = \pi \cdot r^2$ $= \pi \cdot 5^2$ $= 78.54 \text{ m}^2$
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**EXAMPLE 2 Finding the Area of Combined Figures**

**Window** Find the area of the window to the nearest square inch.

**Solution**

- Find the area of each shape.

**Rectangle**

$$A = l \cdot w$$

$$= 54 \cdot 30$$

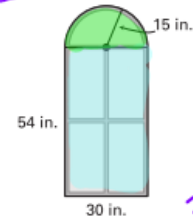
$$= 1620 \text{ in}^2$$

**Half-circle**

$$A = \frac{1}{2} \cdot \pi \cdot r^2$$

$$\approx \frac{1}{2} (\pi) (15)^2$$

$$= 353 \text{ in}^2$$



15

353.429

- Add the areas to find the total area:  $1620 + 353 = 1973$

**Answer:** The area of the window is about  $1973$  square inches.

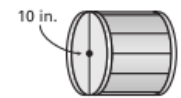
**EXAMPLE 3 Comparing Areas**

**Drums** How many times as great as the area of the top of a drum with a 10-inch diameter is the area of the top of a drum with a 14-inch diameter?

**Solution**

- Find the area of the top of each drum.

**10-inch diameter**

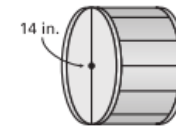


$$A = \pi r^2$$

$$\approx (\pi) (5)^2$$

$$\approx 78.5 \text{ in}^2$$

**14-inch diameter**



$$A = \pi r^2$$

$$\approx (\pi) (7)^2$$

$$= 153.9 \text{ in}^2$$

- Divide the area of the top of the drum with a 14-inch diameter by the area of the top of the drum with the 10-inch diameter.

$$\frac{153.9}{78.5} = \square$$

**Answer:** The area of the top of the drum with a 14-inch diameter is about  $\square$  times the area of the top of the drum with a 10-inch diameter.

**WATCH OUT!**

Be sure to read diagrams carefully. The diagrams in Example 3 give the diameters of the drums. To find the area of the top of each drum, you must first find its radius.

$\approx$   $\rightarrow$  approximately

1,973 in<sup>2</sup>  
much bigger is

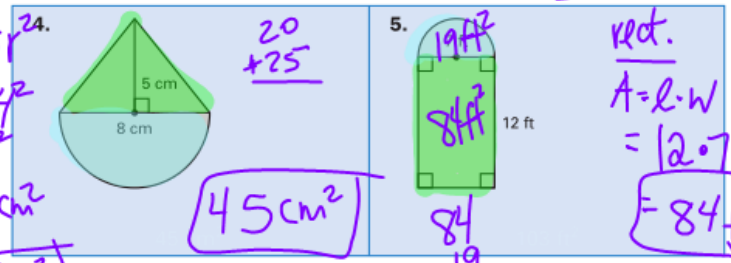
153.93

14  
153.9  
- 78.5  
-----  
75.4 in<sup>2</sup>  
larger

triangle  
 $A = \frac{1}{2}bh$   
 $= \frac{1}{2} \cdot 8 \cdot 5$   
 $= \frac{1}{2} \cdot 40$   
 $= 20 \text{ cm}^2$

circle  
 $A = \pi \cdot r^2$   
 $A = \pi \cdot 4^2$   
 $A = 50 \text{ cm}^2$   
 $\div 2$   
 $= 25 \text{ cm}^2$

**Your turn now** Find the area of the figure to the nearest whole unit.



$20 + 25 = 45 \text{ cm}^2$

rect.  
 $A = l \cdot w$   
 $= 12 \cdot 7$   
 $= 84 \text{ ft}^2$

$84 + 19 = 103 \text{ ft}^2$

half-circle  
 $A = \pi \cdot r^2$   
 $= \pi \cdot 3.5^2$   
 $\approx 38 \text{ ft}^2 \div 2$   
 $= 19 \text{ ft}^2$

**EXAMPLE 4 Making a Circle Graph**

**Arts Fair** The table shows what fraction of the booths at an arts fair contain paintings, pottery, and clothing. Make a circle graph to represent the data.

Booth Contents	Paintings	Pottery	Clothing
Fraction of Booths	$\frac{3}{5}$	$\frac{1}{4}$	$\frac{3}{20}$

**Solution**

- Find the angle measure of each sector. Each sector's angle measure is a fraction of  $360^\circ$ . Multiply each fraction in the table by  $360^\circ$  to get the angle measure for each sector.

**Paintings**

$\frac{3}{5} (360) = 216$

**Pottery**

$\frac{1}{4} (360) = 90$

**Clothing**

$\frac{3}{20} (360) = 54$

Need help with reading and interpreting circle graphs? See page 88 of your textbook.

- Draw the circle graph.
  - Use a compass to draw a circle.
  - Use a protractor to draw the angle for each sector.
  - Label each sector and give your graph a title.

