

**LESSON**  
**12.5****Study Guide**

For use with pages 828–837

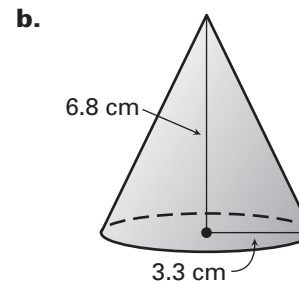
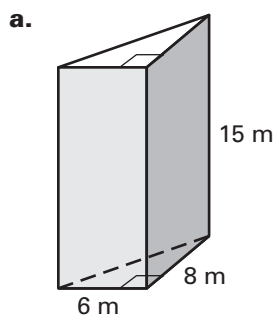
**GOAL** Volumes of pyramids and cones.**Vocabulary**

**Theorem 12.9 Volume of a Pyramid:** The volume  $V$  of a pyramid is  $V = \frac{1}{3}Bh$  where  $B$  is the area of the base and  $h$  is the height.

**Theorem 12.10 Volume of a Cone:** The volume  $V$  of a cone is  $V = \frac{1}{3}Bh = \frac{1}{3}\pi r^2h$ , where  $B$  is the area of the base,  $h$  is the height, and  $r$  is the radius of the base.

**EXAMPLE 1** Find the volume of a solid

Find the volume of a solid.

**Solution**

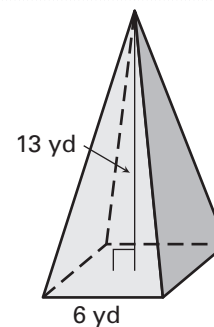
$$\text{a. } V = \frac{1}{3}Bh = \frac{1}{3}\left(\frac{1}{2} \cdot 6 \cdot 8\right)(15) = 120 \text{ m}^3$$

$$\text{b. } V = \frac{1}{3}Bh = \frac{1}{3}(\pi r^2)(h) = \frac{1}{3}(\pi \cdot 3.3^2)(6.8)$$

$$V = 24.684\pi \approx 77.55 \text{ cm}^3$$

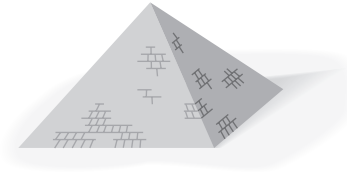
**Exercise for Example 1**

- Find the volume of the pyramid. Round your answer to two decimal places.



**LESSON**  
**12.5****Study Guide** *continued*  
*For use with pages 828–837***EXAMPLE 2** Use volume of a pyramid

The pyramid has a height of 177 meters and volume of 3,465,825 cubic meters. Find the side length of the square base.

**Solution**

$$V = \frac{1}{3}Bh \quad \text{Write formula.}$$

$$3,465,825 = \frac{1}{3}(x^2)(177) \quad \text{Substitute.}$$

$$10,397,475 = 177x^2 \quad \text{Multiply each side by 3.}$$

$$58,743 \approx x^2 \quad \text{Divide each side by 177.}$$

$$242 \approx x \quad \text{Find the positive square root.}$$

The side length of the base is about 242 meters.

**EXAMPLE 3** Use trigonometry to find the volume of a cone

Find the volume of the right cone.

**Solution**

To find the radius  $r$  of the base use trigonometry.

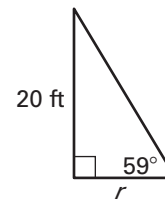
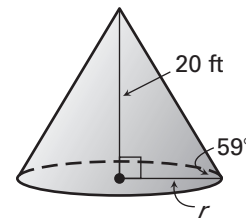
$$\tan 59^\circ = \frac{\text{opp.}}{\text{adj.}} \quad \text{Write ratio.}$$

$$\tan 59^\circ = \frac{20}{r} \quad \text{Substitute.}$$

$$r = \frac{20}{\tan 59^\circ} \approx 12.02 \quad \text{Solve for } r.$$

Use the formula for the volume of a cone.

$$V = \frac{1}{3}Bh = \frac{1}{3}(\pi r^2)(h) = \frac{1}{3}\pi(12.02^2)(20) \approx 3025.99 \text{ ft}^3$$

**Exercises for Examples 2 and 3**

- The volume of a right cone is  $1275\pi$  cubic meters and the radius is 15 meters. Find the height of the cone. Round your answer to two decimal places.
- Find the volume of the cone at the right. Round your answer to two decimal places.

