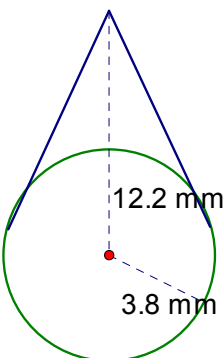


✚ **homework check:** FM10 p. 386 # 1, 4, 5, 10, 11

✚ **note:** Volume of Cones and Spheres

The volume of cones and spheres can be related to the volume of a cylinder with the same radius and height. For this reason, the volume of a cone is $V = \frac{\pi r^2 h}{3}$ and the volume of a sphere is $V = \frac{4\pi r^3}{3}$. For example, determine the volume of each of the following three dimensional shapes.

a)



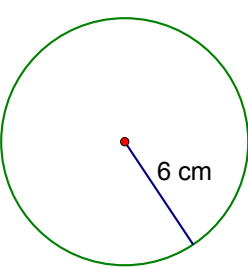
The diagram shows a cone with a dashed vertical line representing its height, labeled 12.2 mm. A dashed horizontal line from the center of the circular base to the edge represents the radius, labeled 3.8 mm. The base is a green circle, and the cone's surface is outlined in blue.

$$V = \frac{\pi r^2 h}{3}$$

$$V = \frac{\pi (3.8)^2 (12.2)}{3}$$

$$V = 184.48 \text{ mm}^3$$

b)



The diagram shows a green circle representing a sphere. A blue line segment from the center to the edge represents the radius, labeled 6 cm.

$$V = \frac{4\pi r^3}{3}$$

$$V = \frac{4\pi (6)^3}{3}$$

$$V = 904.78 \text{ cm}^3$$

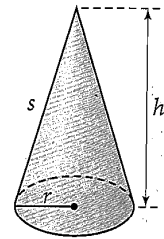
✚ **homework assignment:** FM10 p. 394 # 1, 2, a,c,e of each #3, 6, 10

Key Concepts

- The volume of a cone is one third the volume of a cylinder with the same base and height.
- The volume of a cone is given by the formula $V = \frac{1}{3}\pi r^2 h$.
- The volume of a sphere is given by the formula $V = \frac{4}{3}\pi r^3$ or $V = \frac{1}{6}\pi d^3$.

Discuss the Concepts

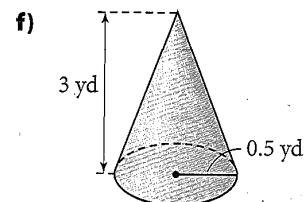
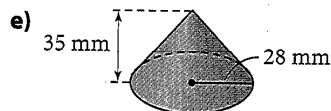
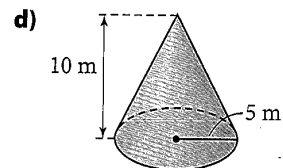
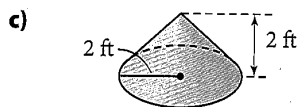
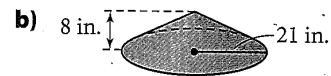
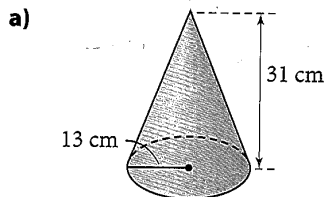
- D1.** The height of a cone is the vertical distance from the vertex to the base. The slant height is the distance from the vertex to the edge of the base. Suppose you know the slant height and radius of a cone. How would you calculate the height of the cone?
- D2.** Explain why two formulas were given for the volume of a sphere. How are the formulas the same? How are they different?



Practise the Concepts A

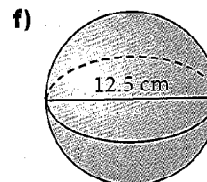
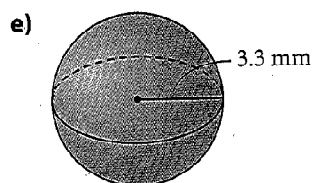
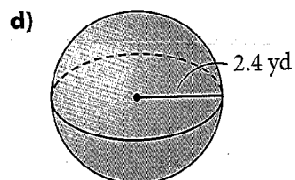
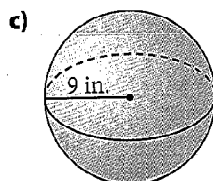
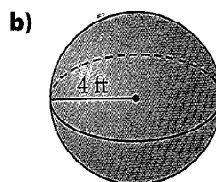
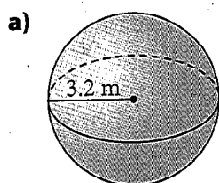
For help with question 1, refer to Example 1.

1. Find the volume of each cone. Round your answers to the nearest tenth of a unit.



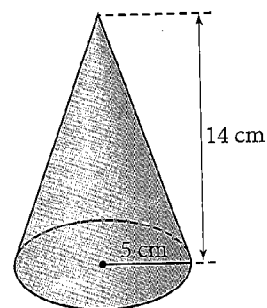
For help with question 2, refer to Example 2.

2. Find the volume of each sphere.



For help with questions 3 and 4, refer to Example 3.

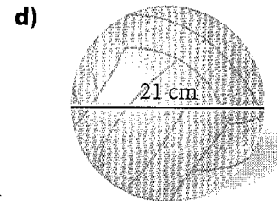
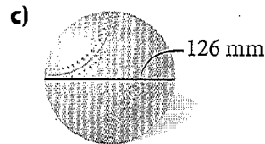
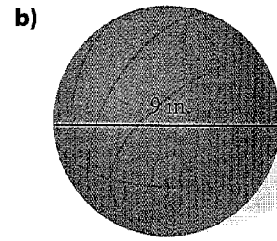
3. a) Find the volume of this cone.
b) The volume of a sphere is one quarter the volume of this cone. Find the radius of the sphere.



Apply the Concepts **B**

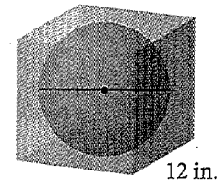
4. The radius of a sphere is 14 cm. The radius of a smaller sphere is 14 mm.
a) Find the volume of each sphere.
b) How many times larger is the volume of the larger sphere?

5. Find the volume of each ball.



6. A foam cube with side length 12" is to be shaped into the largest possible sphere.

- Find the volume of the cube.
- What is the diameter of the largest possible sphere that can be made from this cube?
- Find the volume of the sphere.
- How much foam will be removed from the cube to form the sphere?



Literacy Connect

7. Most round objects such as tennis balls and Ping-Pong balls are packaged in cylinders, rather than in spherical containers. Give some reasons as to why manufacturers do this.

Chapter Problem

8. Vanessa has decided to market her winter gloves in a plastic container that looks like a spherical snow globe. One tenth of the volume of the sphere will be removed to allow for flat upper and lower surfaces so the containers can be stacked on a shelf. The gloves have a volume of 860 cm^3 . Find the radius of the sphere.

Hint: 80% of $V = 860$

$$V = \frac{860}{0.80}$$

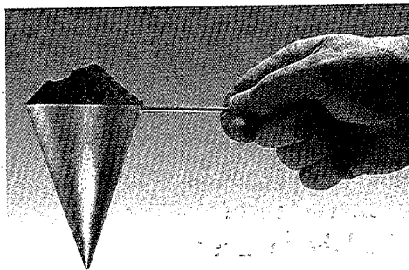
9. Measures for different cones are given in the table. Copy and complete the table. Show your work.

	Volume	Radius	Height
a)	227 cm ³	27 mm	
b)	775 in. ³		3 ft
c)	188 yd ³	9 ft	
d)	56 m ³		126 cm

Math Connect

In the 1500s, Istanbul had such a great love for coffee that Turkish law permitted a wife to divorce her husband for failing to keep the family *ibrik*, or pot, filled. Coffee is a big business worldwide today and Brazil is the leader, responsible for about 33% of all coffee production.

10. A coffee scoop is in the shape of a cone with diameter 2.0 cm and height 2.5 cm. This scoop will be used to fill a coffee filter that is also in the shape of a cone. The filter has diameter 7.0 cm and height 12.2 cm. How many full scoops are needed to fill the coffee filter to 60% of its volume?



11. A glass jar in the shape of a cylinder with height 10 cm and radius 6 cm is to hold olives. Assuming that the olives are spheres with diameter 2 cm and that the jar is to hold 45 olives, how much liquid must be poured into each jar so that it is 95% full of olives and liquid?
12. Given each volume, find the radius of the sphere with this volume, to one decimal place.
- 125 cm³
 - 2.2 yd³
 - 2664 in.³
 - 122 563 mm³