6.5 Exercises

Concept Check

Fill-in-the-Blank. Complete each sentence using information found in this section.

1. The measure of the space enclosed by a three-dimensional figure is its _____.
2. Volume is measured in _____ units.
3. The measure of the area of the outside surface of a geometric solid is the solid's _____ _____.
4. Surface area is measured in _____ units.
5. $SA = 2\pi r^2 + 2\pi rh$ is the formula for the surface area of a/an _____ _____ _____.
6. $SA = 4\pi r^2$ is the formula for the surface area of a/an _____.

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

7. To find the volume of a can of corn, the formula $V = \pi r^2 h$ would be used.
8. $V = lwh$ is the formula for the surface area of a rectangular solid.
9. The area of the paper label on a can of peaches is an example of surface area.
10. To find the volume of a rectangular solid, the areas of each surface are added together.

Match each formula for volume to its corresponding geometric figure.

11.
   a. Rectangular solid — **A.** $V = \frac{4}{3}\pi r^3$
   b. Rectangular pyramid — **B.** $V = \frac{1}{3}\pi r^2 h$
   c. Right circular cylinder — **C.** $V = lwh$
   d. Right circular cone — **D.** $V = \pi r^2 h$
   e. Sphere — **E.** $V = \frac{1}{3}lwh$

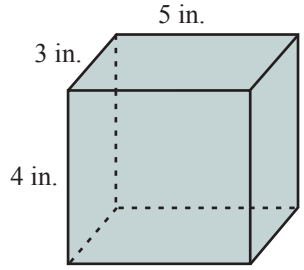
Practice

Calculate the volume of each solid. See Examples 1 through 5. Use $\pi \approx 3.14$.

1. A rectangular solid with length 5 in., width 2 in., and height 7 in.
2. A right circular cylinder 15 in. high and 1 ft in diameter.
3. A sphere with radius 4.5 cm.
4. A sphere with diameter 12 ft.
5. A right circular cone 3 mm high with a 2 mm radius.
6. A rectangular pyramid with length 8 cm, width 1 cm, and height 30 cm.

Calculate the volume of each solid. See Examples 1 through 5. Use $\pi \approx 3.14$.

7.



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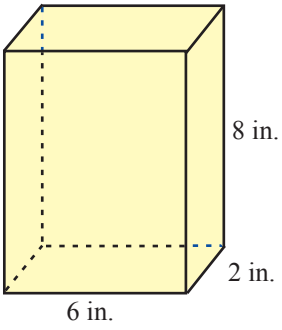

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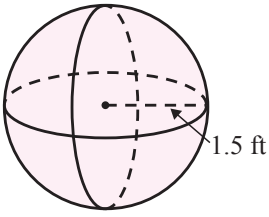

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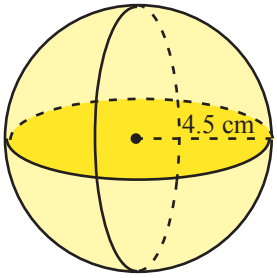

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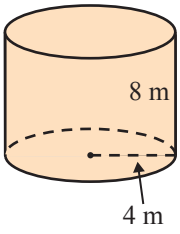

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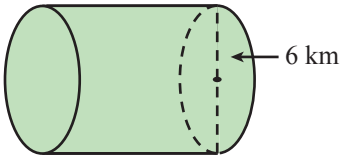

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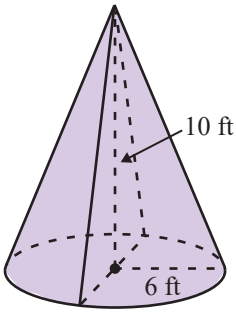

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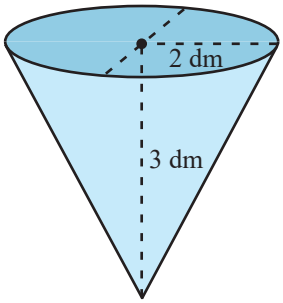

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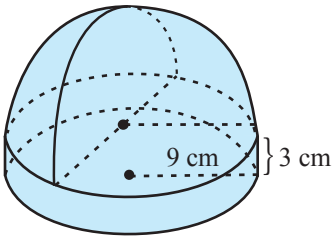

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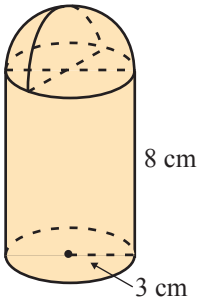

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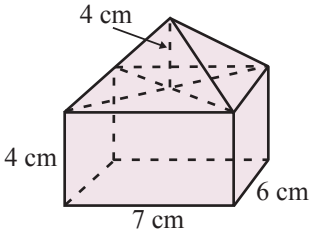

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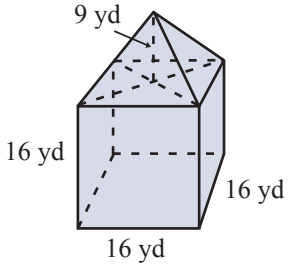

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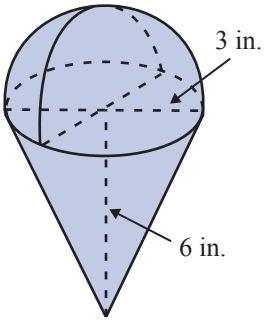

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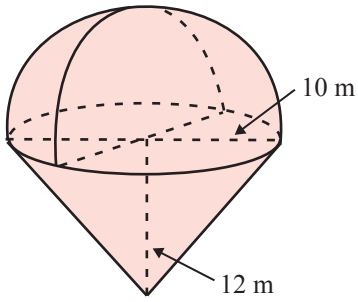

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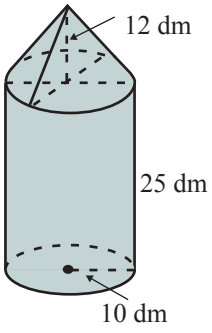

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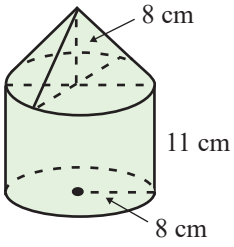

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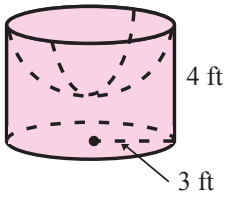

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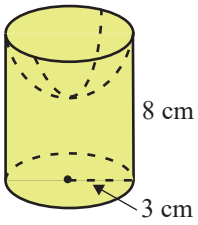

Calculate the surface area of each solid. See Examples 6 and 7. Use $\pi \approx 3.14$.

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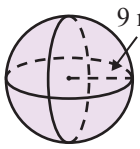

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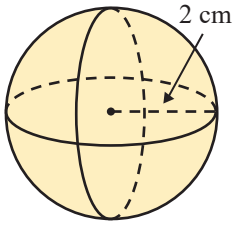

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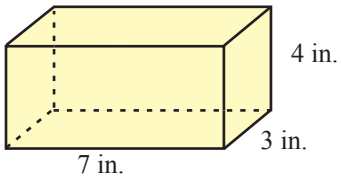

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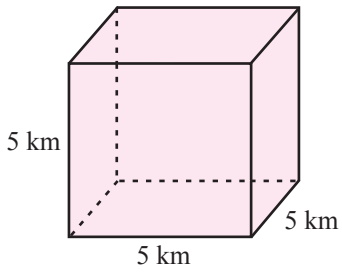

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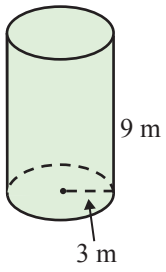

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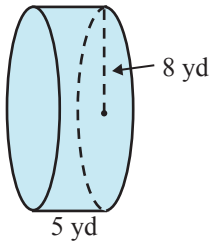


Solve. Use $\pi \approx 3.14$.

31. Find the volume of a rectangular solid with length 5 in., width 2 in., and height 7 in., in both cubic inches and cubic centimeters.

32. Find the volume of right circular cylinder 1.5 ft in height and 1 ft in diameter, in both cubic feet and cubic meters.

33. Find the volume of a right circular cone 3 dm high with a 2 dm radius, in both cubic decimeters and cubic meters.

34. Find the volume of a rectangular pyramid with length 18 cm, width 10 cm, and altitude 3 cm, in both cubic centimeters and cubic millimeters.

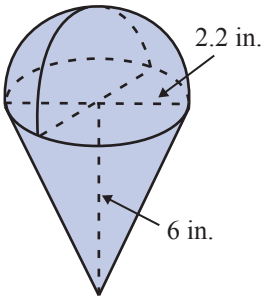
Applications

Solve. Use $\pi \approx 3.14$.

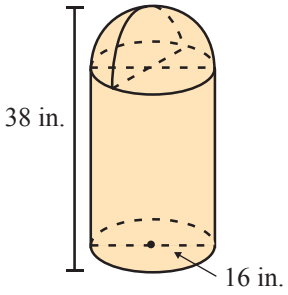
35. The Great Pyramid of Giza, which is located in Egypt, has a square base of 231 m on each side, and its height is 146 m. What is its volume?

36. A standard 55 gallon round steel drum is about 23 in. in diameter and 34.5 in. high. Assuming that the drum is totally enclosed, what is its surface area?

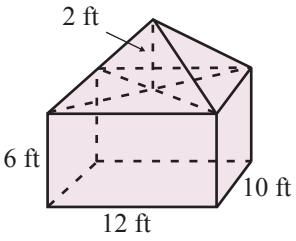
37. A 6 in. tall ice cream cone is filled solid with ice cream where the final scoop of ice cream forms a perfect hemisphere above the top of the cone. What is the total volume of ice cream in the cone if the top of the cone has a 2.2 in. opening? Round your answer to the nearest hundredth.



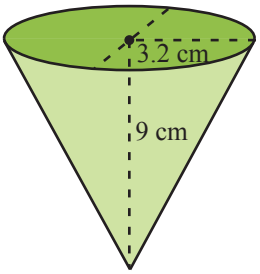
38. A cylindrical trash can has a hemispherical top (with a trap door for the trash). If the diameter of the can is 16 in. and its total height is 38 in., find its volume. (**Hint:** Begin by finding the height of the straight part of the can.)



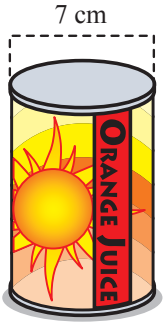
39. A rectangular tent with straight sides has a pyramidal shaped roof. The dimensions of the rectangular portion are 12 ft long, 10 ft wide, and 6 ft high. The peak of the pyramid is 2 ft above the top edge of the walls. What is the volume of the inside of the tent?



40. Disposable paper drinking cups, like those used at water coolers, are often cone-shaped. Find the volume of such a cup that is 9 cm high with a 3.2 cm radius. Express the answer to the nearest milliliter.



41. A manufacturer is to design a can in the shape of a right circular cylinder to hold 0.5 L of juice concentrate. If the can must have a diameter of 7 cm, how tall will the can be (to the nearest centimeter)?



42. A specialty lined storage chest has the inside dimensions of 5 ft long, 3 ft wide, and 2 ft high.

a. What is its volume?

b. What is its surface area?

43. A cubic footstool is 1.5 ft long in each direction.

a. What is the volume of the footstool?

b. How many square feet of material are necessary to cover the footstool? Assume the bottom is also being covered by the material.

44. A group of college students went to the beach and inflated their 2-ft spherical beach ball, whose radius is 1 ft.

a. What is the volume of the ball? Round your answer to the nearest hundredth.

b. What is the surface area of the ball?

45. Alan plans to weld pieces of metal together to create a metal cube. The length of each side of the cube will be 16 inches. How much metal will he need to create the cube?

46. A soup can has a diameter of 3 inches and a height of 5 inches.

a. Approximately how much material is needed to create the soup can? (**Hint:** It is the same as the surface area.)

b. What volume of soup can fit inside of the soup can? Round to the nearest tenth.

Writing & Thinking

47. Discuss the type of units used for volume and explain why.

48. List the steps and formulas you would use to find the volume of an ice cream cone (assuming the ice cream itself forms a perfect half sphere).

49. Discuss what you think would be more important to a UPS driver when loading his truck, surface area or volume.

50. No formula was given in the text for the surface area of a rectangular pyramid. Create a plan to find the surface area of this type of figure. Include formulas and operations you would use.