

## 3D Real World Application

Ex.1)

A can of tennis balls has a diameter of 3 in. and a height of 8 in. Find the volume of the can to the nearest cubic inch.

Ex.2)

In a chemistry lab you use a filter paper cone to filter a liquid. The diameter of the cone is 6.5 cm and its height is 6 cm. How much liquid will the cone hold when it is full?

Ex.3) Density =  $\frac{\text{weight}}{\text{volume}}$

A full waterbed mattress is 7 ft by 4 ft by 1 ft. If water weighs 62.4 lb/ft<sup>3</sup>, what is the weight of the water in the mattress to the nearest pound?

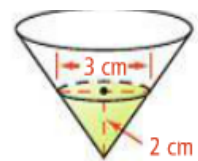
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30. **Swimming Pool** The approximate dimensions of an Olympic-size swimming pool are 164 ft by 82 ft by 6.6 ft.

- Find the volume of the pool to the nearest cubic foot.
- If 1 ft<sup>3</sup>  $\approx$  7.48 gal, about how many gallons does the pool hold?

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16. **Chemistry** This cone has a filter that was being used to remove impurities from a solution but became clogged and stopped draining. The remaining solution is represented by the shaded region. How many cubic centimeters of the solution remain in the cone?



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29. **Think About a Plan** A cylindrical tank with diameter 20 in. is half filled with water. How much will the water level in the tank rise if you place a metallic ball with radius 4 in. in the tank? Give your answer to the nearest tenth.

- What causes the water level in the tank to rise?
- Which volume formulas should you use?

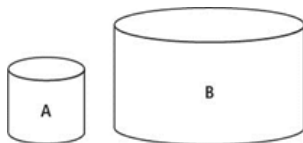
31. **Meteorology** On September 3, 1970, a hailstone with diameter 5.6 in. fell at Coffeyville, Kansas. It weighed about 0.018 lb/in.<sup>3</sup> compared to the normal 0.033 lb/in.<sup>3</sup> for ice. About how heavy was this Kansas hailstone?

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42. **Recreation** A spherical balloon has a 14-in. diameter when it is fully inflated. Half of the air is let out of the balloon. Assume that the balloon remains a sphere.
- Find the volume of the fully inflated balloon in terms of  $\pi$ .
  - Find the volume of the half-inflated balloon in terms of  $\pi$ .
  - What is the diameter of the half-inflated balloon to the nearest inch?
46. **Food** An ice cream vendor presses a sphere of frozen yogurt into a cone, as shown at the right. If the yogurt melts into the cone, will the cone overflow? Explain.
53. **Science** The density of steel is about  $0.28 \text{ lb/in.}^3$ . Could you lift a solid steel ball with radius 4 in.? With radius 6 in.? Explain.

Ex.4)

Can A has a diameter of 6 cm and a height of 6.5 cm. Can B has a diameter of 16 cm and a height of 11.5 cm. What is the difference in volume of the two can types, to the nearest cubic centimeter?



Ex.5)

A cylindrical thermos has a radius of 3 in. and is 12 in. high. It holds 20 fl oz. To the nearest ounce, how many ounces will a similar thermos with a radius of 4 in. hold?

Ex.6)

You have a set of three similar gift boxes. Each box is a rectangular prism. The large box has 15-cm base edges. The medium box has 10-cm base edges. The small box has 5-cm base edges. How does the volume of each box compare to every other box?

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- 22. Packaging** A cylinder with a 4-in. diameter and a 6-in. height holds 1 lb of oatmeal. To the nearest ounce, how much oatmeal will a similar 10-in.-high cylinder hold?  
(Hint: 1 lb = 16 oz)
- 27.** The volume of a spherical balloon with radius 3.1 cm is about  $125 \text{ cm}^3$ . Estimate the volume of a similar balloon with radius 6.2 cm.
- 33.** A clown's face on a balloon is 4 in. tall when the balloon holds  $108 \text{ in.}^3$  of air. How much air must the balloon hold for the face to be 8 in. tall?
- 40.** Square pyramids  $A$  and  $B$  are similar. In pyramid  $A$ , each base edge is 12 cm. In pyramid  $B$ , each base edge is 3 cm and the volume is  $6 \text{ cm}^3$ .
- Find the volume of pyramid  $A$ .
  - Find the ratio of the surface area of  $A$  to the surface area of  $B$ .
  - Find the surface area of each pyramid.