Lesson 2.2: Volume of 3-D Objects

Practice – III

1. A right rectangular pyramid has base dimensions 10 ft by 4 ft, and a height of 15 ft. Determine its volume, to the nearest cubic foot.

$$V_{\text{right pyramid}} = \frac{1}{3}Bh$$
$$V_{\text{right pyramid}} = \frac{1}{3}(10\text{ ft} \cdot 4\text{ ft}) \cdot 15\text{ ft}$$
$$V_{\text{right pyramid}} = \frac{1}{3} \cdot 600\text{ ft}^3$$
$$V_{\text{right pyramid}} = 200\text{ ft}^3$$

2. A right rectangular prism with base dimensions 5.8 m by 3.1 m has a volume of 187 m^3. Determine the height of the prism, to the nearest tenth of a metre.

$$V_{\text{right rectangular prism}} = lwh$$
$$187\text{ m}^3 = 5.8\text{ m} \cdot 3.1\text{ m} \cdot h$$
$$\frac{187\text{ m}^3}{17.98\text{ m}^2} = \frac{17.98\text{ m}^2}{17.98\text{ m}^2} \cdot h$$
$$10.4\text{ m} \doteq h$$

3. A cylindrical drum has a circumference of 47 inches and a height of 18 inches. What is the volume of the drum, to the nearest tenth of a cubic inch?

Determine the radius of the drum.

$$C = 2\pi r$$
$$47\text{ in} = 2\pi r$$
$$\frac{47\text{ in}}{2\pi} = \frac{2\pi}{2\pi} \cdot r$$
$$7.4802...\text{ in} \doteq r$$

$$V_{\text{drum}} = \pi r^2 h$$
$$V_{\text{drum}} = \pi(7.480...\text{in})^2 \cdot 18\text{ in}$$
$$V_{\text{drum}} = \pi \cdot 55.954...\text{ in}^2 \cdot 18\text{ in}$$
$$V_{\text{drum}} \doteq 3\,164.2\text{ in}^3$$

4. Explain why volume is measured in cubic units.

   Volume represents the space occupied by a three-dimensional object. As such, there are three dimensions to consider, each of which is measured in linear units. When the three linear dimensions' units are multiplied, the result is cubic units.

5. A beach ball holds 804 in^3 of air. Determine the diameter, to the nearest tenth, of the beach ball.

$$V_{\text{beach ball}} = \frac{4}{3}\pi r^3$$
$$804 \text{ in}^3 = \frac{4}{3}\pi r^3$$
$$3 \cdot 804 \text{ in}^3 = \cancel{3} \cdot \frac{4}{\cancel{3}}\pi r^3$$
$$\frac{2412 \text{ in}^3}{4\pi} = \frac{\cancel{4}\pi}{\cancel{4}\pi} \cdot r^3$$
$$191.940... \text{ in}^3 = r^3$$
$$\sqrt[3]{191.940... \text{ in}^3} = \sqrt[3]{r^3}$$
$$5.76840591 \text{ in} \doteq r$$

The radius of the beach ball is approximately 5.8 inches.

The diameter is

$$d = 2r$$
$$d \doteq 2(5.76840591)$$
$$d \doteq 11.53681182$$

The diameter of the beach ball is approximately 11.5 inches.

Please complete *Lesson 2.2 Explore Your Understanding Assignment* located in *Workbook 2.2* before proceeding to *Lesson 2.3*.