Study Guide and Intervention

Volume of Rectangular Prisms

The volume of a solid is the measure of space occupied by it. It is measured in cubic units such as cubic centimeters (cm³) or cubic inches (in³). The volume of the figure at the right can be shown using cubes.

The bottom layer, or base, has 4 \cdot 3 or 12 cubes.

There are two layers.

It takes 12 \cdot 2 or 24 cubes to fill the box. So, the volume of the box is 24 cubic meters.

A rectangular prism is a solid figure that has two parallel and congruent sides, or bases, that are rectangles. To find the volume of a rectangular prism, multiply the area of the base and the height, or find the product of the length \( l \), the width \( w \), and the height \( h \).

\[
V = Bh \quad \text{or} \quad V = lwh
\]

**Example 1**

Find the volume of the rectangular prism.

\[
V = lwh \quad \text{Volume of a rectangular prism}
\]

\[
V = 5 \cdot 6 \cdot 8 \quad \text{Replace } l \text{ with 5, } w \text{ with 6, and } h \text{ with 8.}
\]

\[
V = 240 \quad \text{Multiply.}
\]

The volume is 240 cubic inches.

**Exercises**

Find the volume of each rectangular prism. Round to the nearest tenth if necessary.

1. \(4 \text{ m} \times 3 \text{ m} \times 7 \text{ m}\)

2. \(9 \text{ cm} \times 10 \text{ cm} \times 7 \text{ cm}\)

3. \(2.7 \text{ ft} \times 2 \text{ ft} \times 3 \text{ ft}\)
Practice: Skills

Volume of Rectangular Prisms

Find the volume of each rectangular prism. Round to the nearest tenth if necessary.

1. 
   \[ \text{Volume} = \text{length} \times \text{width} \times \text{height} \]
   \[ 3 \text{ cm} \times 7 \text{ cm} \times 3 \text{ cm} \]

2. 
   \[ \text{Volume} = \text{length} \times \text{width} \times \text{height} \]
   \[ 10 \text{ in.} \times 6 \text{ in.} \times 5 \text{ in.} \]

3. 
   \[ \text{Volume} = \text{length} \times \text{width} \times \text{height} \]
   \[ 6 \text{ m} \times 4 \text{ m} \times 4 \text{ m} \]

4. 
   \[ \text{Volume} = \text{length} \times \text{width} \times \text{height} \]
   \[ 12 \text{ mm} \times 5 \text{ mm} \times 3 \text{ mm} \]

5. 
   \[ \text{Volume} = \text{length} \times \text{width} \times \text{height} \]
   \[ 9.5 \text{ in.} \times 2.8 \text{ in.} \times 7 \text{ in.} \]

6. 
   \[ \text{Volume} = \text{length} \times \text{width} \times \text{height} \]
   \[ 9 \text{ cm} \times 3 \text{ cm} \times 7.2 \text{ cm} \]

7. 
   \[ \text{Volume} = \text{length} \times \text{width} \times \text{height} \]
   \[ 2\frac{1}{2} \text{ ft} \times 4 \text{ ft} \times 4\frac{3}{4} \text{ ft} \]

8. 
   \[ \text{Volume} = \text{length} \times \text{width} \times \text{height} \]
   \[ 9.6 \text{ in.} \times 15 \text{ in.} \times 4.8 \text{ in.} \]

9. 
   \[ \text{Volume} = \text{length} \times \text{width} \times \text{height} \]
   \[ 4.5 \text{ cm} \times 1.2 \text{ cm} \times 1.5 \text{ cm} \]
1. **PACKAGING** A cereal box has a length of 8 inches, a width of \(1\frac{3}{4}\) inches, and a height of \(12\frac{1}{8}\) inches. What is the volume of the cereal box?

2. **FOOD STORAGE** Nara wants to determine how much ice it will take to fill her cooler. If the cooler has a length of 22 inches, a width of 12 inches, and a height of \(10\frac{1}{2}\) inches, how much ice will her cooler hold?

3. **TRANSPORTATION** The cargo-carrying part of Billy's truck has a length of 8.3 meters, a width of 3 meters, and a height of 4.2 meters. What is the maximum volume of sand that Billy's truck can carry?

4. **PLUMBING** Alexia's bathroom has a tub in the shape of a rectangular prism with a length of 1.5 meters, a width of 0.5 meter, and a height of 0.4 meter. How many cubic feet of water can it hold?

5. **PACKAGING** A box of tissues has a length of 11.2 centimeters, a width of 11.2 centimeters, and a height of 13 centimeters. What is the volume of the tissue box?

6. **GEOMETRY** A pentagonal prism is a prism that has bases that are pentagons. Use \(V = Bh\) where \(B\) is the area of the base, to find the volume of the pentagonal prism below.

\[ B = 26.3 \text{ cm}^2 \]

\[ 4.5 \text{ cm} \]