

LESSON  
10.7

# Volume of a Prism

**Goal:** Find the volume of a rectangular prism.

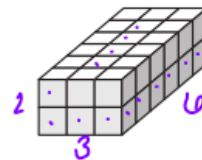


**Vocabulary**

Volume: *the entire object INCLUDING the space inside the object*

**EXAMPLE 1** Counting Cubes in a Stack

**Stacking Boxes** A grocery store stocker is stacking cube-shaped boxes as shown. How many boxes are stacked?



**Solution**

To find the total number of boxes, multiply the number of boxes in one layer by the number of layers. The boxes are stacked in **2** layers. Each layer is a rectangle that is **6** boxes long and **3** boxes wide.

**Boxes in one layer × Number of layers = Number of boxes**

$$\square \times \square \times \square = \square$$

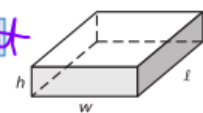
**Answer:** There are  $\square$  boxes stacked so far.

$$\begin{aligned} V &= l \cdot w \cdot h \\ &= 6 \cdot 3 \cdot 2 \\ &= 18 \cdot 2 \\ &= 36 \text{ boxes} \end{aligned}$$

If you have small building blocks, build a model of the figure shown in Example 1. Count the number of blocks you used in the model to check your answer.

**Volume of a Rectangular Prism**

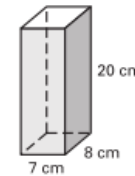
**Words** Volume = *length* · *width* · *height*  
**Algebra**  $V = l \cdot w \cdot h$



**EXAMPLE 2 Finding the Volume of a Prism**

Find the volume of the rectangular prism.

$$\begin{aligned}
 V &= \ell \cdot w \cdot h && \text{Write the volume formula.} \\
 &= 8 \cdot 7 \cdot 20 && \text{Substitute for } \ell, w, \text{ and } h. \\
 &= 56 \cdot 20 && \text{Simplify.}
 \end{aligned}$$



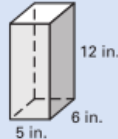

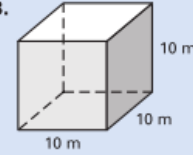
**Answer:** The volume is 1,120 cubic centimeters.

**WATCH OUT!**  
Surface area is measured in square units and volume is measured in cubic units.

$$\begin{array}{r}
 56 \\
 + 56 \\
 \hline
 112
 \end{array}$$

$$1,120 \text{ cm}^3$$

**Your turn now** Find the volume of the rectangular prism.

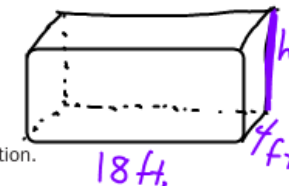
|  |   |   |
|--|---|---|
| <p>1. </p> | <p>2. </p> | <p>3. </p> |
|--|---|---|

**EXAMPLE 3 Using the Formula for Volume**

**Fish Hatchery** A holding tank at a fish hatchery is 4 feet wide and 18 feet long. The volume of the tank is 576 cubic feet. How deep is the tank?

**Solution**

$$\begin{aligned}
 V &= \ell \cdot w \cdot h && \text{Write the volume formula.} \\
 576 &= 18 \cdot 4 \cdot h && \text{Substitute for } V, \ell, \text{ and } w. \\
 576 &= 72 \cdot h && \text{Simplify.} \\
 72 &= 72 \div \square && \text{Write a related division equation.} \\
 8 &= h && \text{Simplify.}
 \end{aligned}$$



**Answer:** The depth of the tank is 8 feet.

**Your turn now** In Exercises 4 and 5, the solids are rectangular prisms.

4. The volume of a cushion is 2000 cubic inches. The cushion is 20 inches long and 5 inches tall. What is the width of the cushion?

5. The volume of a flower box is 140 cubic feet. The flower box is 5 feet long and 7 feet wide. How deep is the flower box?

$$V = l \cdot w \cdot h$$

$$140 = 5 \cdot 7 \cdot h$$

$$\frac{140}{35} = \frac{35 \cdot h}{35}$$

$$4 \text{ ft.} = h$$