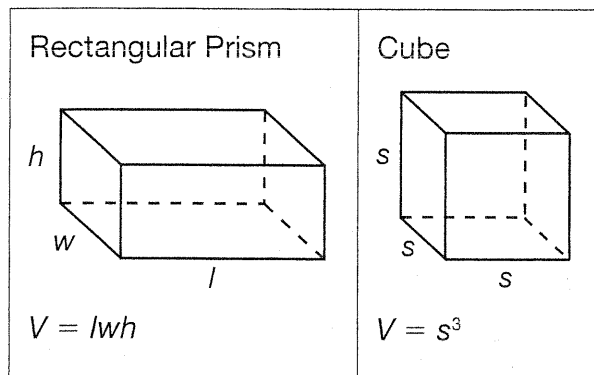


# 9 Volume $\text{in}^3$

## Key Words

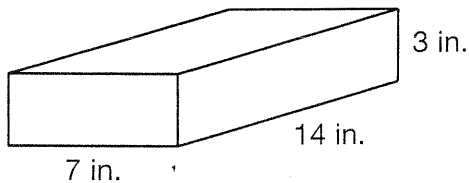
volume

The **volume** of a three-dimensional figure is the number of cubic units that fit inside it. You can also use formulas to find the volume of prisms.



## Example 1

What is the volume of this rectangular prism?



Substitute 7 for  $l$ , 14 for  $w$ , and 3 for  $h$  in the formula for finding the volume of a rectangular prism.

$$\begin{aligned} V &= lwh \\ &= 7 \cdot 14 \cdot 3 = 294 \text{ in.}^3 \end{aligned}$$

The volume of the rectangular prism is 294 cubic inches.

## Example 2

What is the volume of a cube with 2-foot sides?

Substitute 2 for  $s$  in the formula.

$$\begin{aligned} V &= s^3 \\ &= 2^3 = 2 \cdot 2 \cdot 2 = 8 \text{ ft}^3 \end{aligned}$$

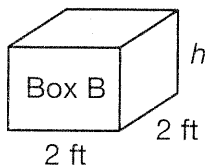
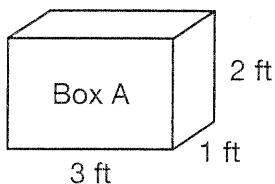
The volume of the cube is 8 cubic feet.

## DIFFERENTIATE

How are surface area and volume different?

## Guided Practice

The On the Move moving company sells the two boxes shown below.



1 What is the volume of Box A?

**Step 1** What values should you substitute for  $l$ ,  $w$ , and  $h$ ?

Substitute 3 for  $l$ , \_\_\_\_ for  $w$ , and \_\_\_\_ for  $h$  in the formula.

**Step 2** Substitute and multiply to find the volume.

$$V = lwh = 3 \cdot \underline{\hspace{1cm}} \cdot \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$$

The volume of Box A is \_\_\_\_ cubic feet.

2 Box B has the same volume as Box A, but its dimensions are different. What is the height of Box B?

**Step 1** What values should you substitute for  $V$ ,  $l$ , and  $w$ ?

Substitute \_\_\_\_ for  $V$ , 2 for  $l$ , and 2 for  $w$  in the formula.

**Step 2** Substitute and solve for  $h$ .

$$V = lwh$$

$$\underline{\hspace{1cm}} = 2 \cdot 2 \cdot h$$

$$\underline{\hspace{1cm}} = 4h$$

$$\underline{\hspace{1cm}} = h$$

The height of Box B is \_\_\_\_ feet.

### REMEMBER

It does not matter which value you decide is the length, width, or height. Just be consistent.

### THINK

In order to find the missing height, you need to substitute the volume you found in the previous problem for  $V$ .

### REMEMBER

After you substitute and simplify the equation, you can solve for  $h$  the same way you solve any one-variable equation.

# Independent Practice

1. What is volume?

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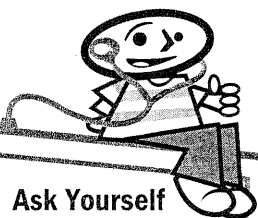
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2. A cube is a type of rectangular prism. Could you use the formula for finding the volume of a rectangular prism to find the volume of a cube? Explain.

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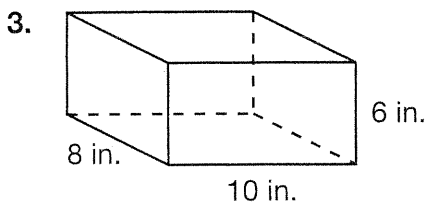


**Ask Yourself**

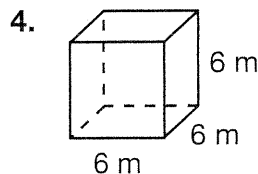
How can I use the given dimensions to find the volume?



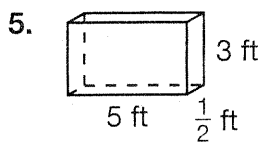
Use a formula to find the volume of each prism.



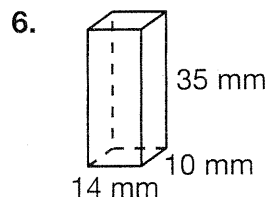
$V = \underline{\hspace{2cm}}$



$V = \underline{\hspace{2cm}}$



$V = \underline{\hspace{2cm}}$

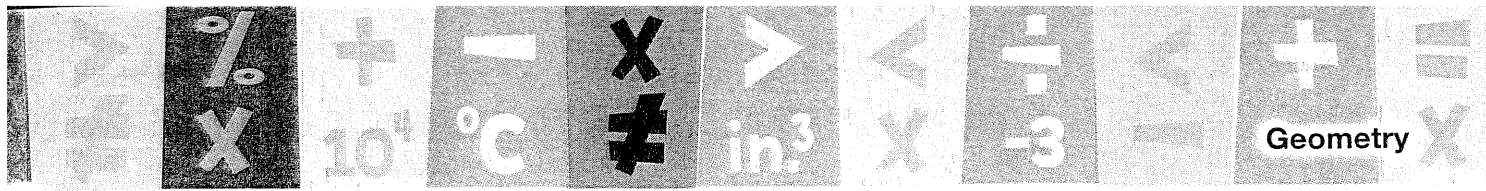


$V = \underline{\hspace{2cm}}$

**Solve.**

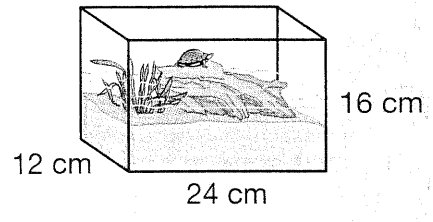
7. Karim needs to rent a storage unit. If he rents a cube-shaped unit with 4-foot sides, how many cubic feet of storage space will he have?

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**Solve each problem.**

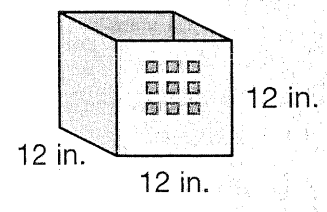
8. Julianna fills her turtle's tank so it is  $\frac{1}{2}$  full of water. About how many cubic centimeters of water does Julianna put in the tank?



\_\_\_\_\_

Mr. Nelson stores his important papers in the bin shown below. Use this diagram and information for questions 9 and 10.

9. What is the volume of the bin?

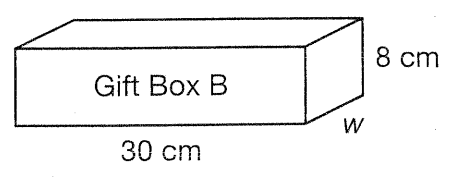
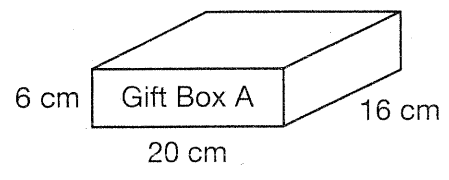


\_\_\_\_\_

10. Mr. Nelson is considering buying a different bin that is 2 inches longer on one side but that has the same width and height as the one above. What is the volume of the larger bin? Show or explain how you found your answer.

\_\_\_\_\_  
\_\_\_\_\_

A department store has two different gift boxes, which are shown below. Use this information for questions 11 and 12.



11. What is the volume of Gift Box A?

\_\_\_\_\_

12. Gift Box B has a different width, but it has the same volume as Gift Box A. What is  $w$ , the width of Gift Box B? Show or explain how you found your answer.

\_\_\_\_\_  
\_\_\_\_\_