

Volume



Getting the Idea

The **volume** of a solid figure is the number of cubic units that fit inside it. You can use the formula below to calculate the volume of any rectangular prism, including a cube.

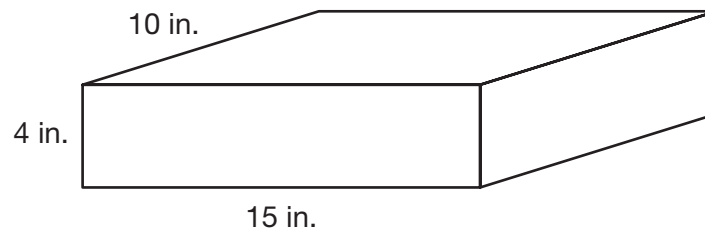
Rectangular Prism

$V = lwh$, where l is the length, w is the width, and h is the height.

Example 1

A department store uses the box below for shirts.

What is the volume of the box?



Strategy Use the formula for the volume of a rectangular prism.

Step 1

The box is a rectangular prism. Write the formula for the volume.

$V = lwh$, where l is the length, w is the width, and h is the height.

Step 2

Identify the values for the variables.

The length is 15 in., the width is 10 in., and the height is 4 in.

So $l = 15$ in., $w = 10$ in., and $h = 4$ in.

Step 3

Substitute the values for the variables. Then multiply.

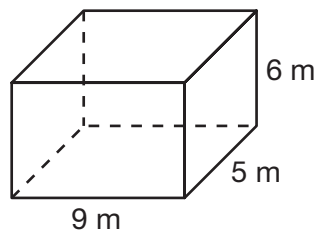
$$V = lwh$$

$$V = 15 \text{ in.} \times 10 \text{ in.} \times 4 \text{ in.} = 600 \text{ in.}^3$$

Solution The volume of the box is 600 cubic inches.

Example 2

What is the volume of this rectangular prism?



Strategy Use the formula for the volume of a rectangular prism.

Step 1

Identify the values for the variables.

The length is 9 m, the width is 5 m, and the height is 6 m.

So $l = 9$ m, $w = 5$ m, and $h = 6$ m.

Step 2

Substitute those values into the formula and solve.

$$V = lwh$$

$$V = 9 \times 5 \times 6$$

$$V = 270 \text{ m}^3$$

Solution The volume of the rectangular prism is 270 cubic meters.



Coached Example

Carol has a planter box that is in the shape of a cube. Each edge of the planter box measures 20 inches. What is the volume of Carol's planter box?

The formula for the volume of a cube is $V = \underline{\hspace{2cm}}$.

The length is $\underline{\hspace{2cm}}$ inches, the width is $\underline{\hspace{2cm}}$ inches, and the height is $\underline{\hspace{2cm}}$ inches.

Substitute the values for the variables.

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

Multiply.

$$V = \underline{\hspace{2cm}} \text{ in.}^3$$

The planter box has a volume of $\underline{\hspace{2cm}}$ cubic inches.



Lesson Practice

Choose the correct answer.

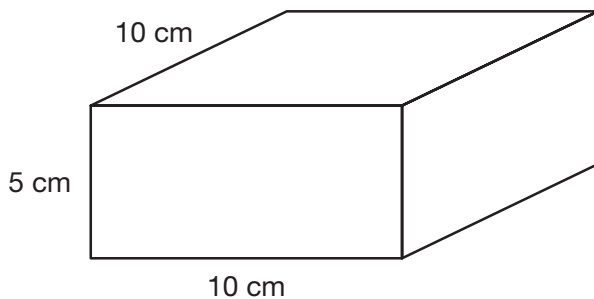
1. A rectangular prism has a length of 3 cm, a width of 7 cm, and a height of 2 cm. What is the volume of the prism?

A. 21 cm^3
B. 30 cm^3
C. 42 cm^3
D. 45 cm^3

2. A jewelry box is shaped like a cube. Each edge of the jewelry box measures 8 inches. What is the volume of the jewelry box?

A. 64 cubic inches
B. 384 cubic inches
C. 484 cubic inches
D. 512 cubic inches

3. What is the volume of this rectangular prism?

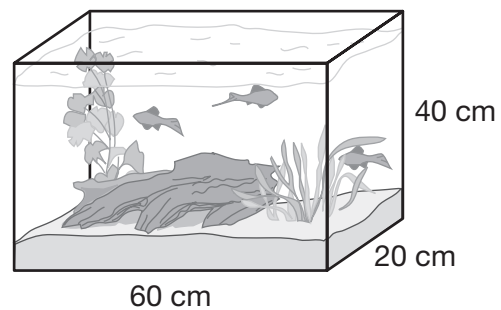


A. 250 cm^3
B. 500 cm^3
C. 750 cm^3
D. $5,000 \text{ cm}^3$

4. A cube has edge lengths of 5 meters. What is the volume of the cube?

A. 15 m^3
B. 125 m^3
C. 150 m^3
D. 750 m^3

5. Which is the volume of the fish tank below?



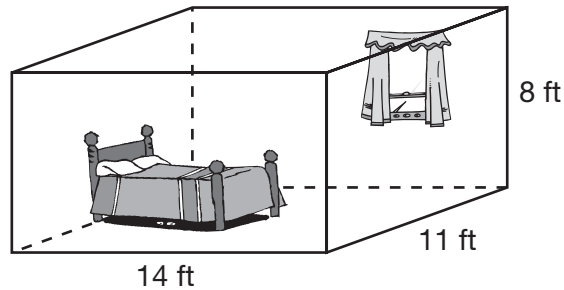
A. $48,000 \text{ cm}^3$
B. $40,000 \text{ cm}^3$
C. $36,000 \text{ cm}^3$
D. $18,000 \text{ cm}^3$

6. A salt shaker is in the shape of a cube and has edge lengths of 4 centimeters. What is the volume of the salt shaker?

A. 8 cm^3
B. 16 cm^3
C. 32 cm^3
D. 64 cm^3

7. A sandbox in the shape of a rectangular prism is 5.5 feet long, 3 feet wide, and 2 feet high. What is the volume of the sandbox?
- A. 35 ft^3
 B. 33 ft^3
 C. 30 ft^3
 D. 27 ft^3
8. A cube has a volume of 1,000 cubic inches. What is the length of an edge of the cube?
- A. 5 in.
 B. 10 in.
 C. 20 in.
 D. 100 in.

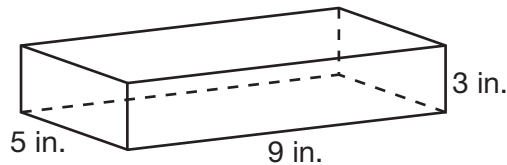
9. Jake is designing his bedroom in the shape of a rectangular prism. His model for the bedroom is shown below.



- A. What will be the total volume of his bedroom? Show your work.

- B. If Jake decides to increase the width of his bedroom by 3 feet, what will be the new volume? Show your work.

10. Hee Sun has a box that is in the shape of a rectangular prism as shown below. Circle the number that makes the statement true.



The volume of this box is

135
174
289

 cubic inches.

11. Select True or False for each statement.
- A. If the volume of a cube is 125 cubic inches, the length of each edge of the cube is 5 inches. True False
- B. If the volume of a cube is 64 cubic inches, the length of each edge of the cube is 6 inches. True False
- C. If the volume of a cube is 343 cubic inches, the length of each edge of the cube is 7 inches. True False
- D. If the volume of a cube is 731 cubic inches, the length of each edge of the cube is 9 inches. True False
- E. If the volume of a cube is 1,728 cubic inches, the length of each edge of the cube is 12 inches. True False
12. Which figure has a volume of 216 cubic meters? Circle all that apply.
- A. rectangular prism with length 10 meters, width 3 meters, and height 7 meters
- B. rectangular prism with length 9 meters, width 4 meters, and height 6 meters
- C. rectangular prism with length 9 meters, width 3 meters, and height 8 meters
- D. cube with edge 8 meters
- E. cube with edge 6 meters

13. Use numbers from the box to make each statement true.

The volume of a rectangular prism with length 12 centimeters, width 14 centimeters, and height 3 centimeters is _____ cubic centimeters.

The volume of a rectangular prism with length 20 centimeters, width 2 centimeters, and height 6 centimeters is _____ cubic centimeters.

The volume of a rectangular prism with length 33 centimeters, width 16 centimeters, and height 9 centimeters is _____ cubic centimeters.

468	2,080
504	2,400
1,872	2,880

14. Compare the volume of each rectangular prism to 40 cubic meters. Write the name of each rectangular prism in the correct box.

Prism A $l = 6$ m $w = 2$ m $h = 3$ m	Prism B $l = 3$ m $w = 4$ m $h = 4$ m	Prism C $l = 2$ m $w = 4$ m $h = 5$ m	Prism D $l = 2$ m $w = 2$ m $h = 7$ m	Prism E $l = 3$ m $w = 5$ m $h = 3$ m
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Volume < 40 m ³	Volume ≥ 40 m ³