

Volume

Name: _____

Prerequisite: Use Formulas

Study the example problem showing how to use formulas to find the volume of a rectangular prism. Then solve problems 1–8.

Example

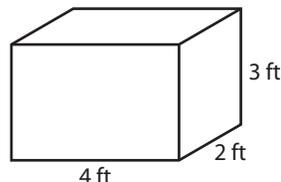
Some building supplies are stored in a container that is 4 feet long, 2 feet wide, and 3 feet high. What is the volume of the container?

Use the formula.

Volume = length \times width \times height

Volume = $4 \times 2 \times 3 = 24$

The volume is 24 cubic feet.



- 1** What part of the formula represents the area of the base of the container?

- 2** Use your answer to problem 1 to write another formula for finding the volume of a rectangular prism.

Volume = _____ \times height

- 3** Use the new formula to find the volume of a container that is 6 feet long, 5 feet wide, and 7 feet high.

area of the base = _____ \times _____

area of the base = _____ square feet

Volume = _____ \times _____

Volume = _____ cubic feet

- 4** If you know the volume of a rectangular prism and the area of the base, how can you find the height?



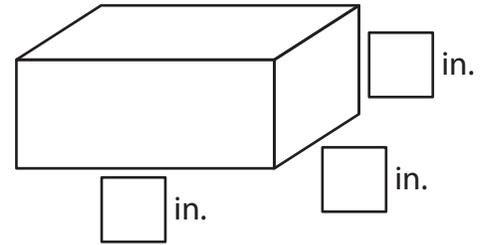
Solve.

5 Some sewing supplies are stored in a container that is 5 inches tall, 7 inches wide, and 12 inches long.

a. Label the picture of the box with its dimensions.

b. What is the volume of the box?

Show your work.

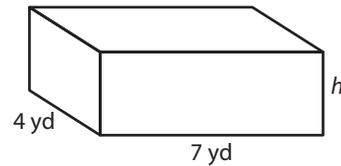


Solution: _____

6 The base of a rectangular prism is 40 centimeters long and 5 centimeters wide. The height of the prism is 2 centimeters. Write two different equations that represent the volume of the prism.

7 The volume of the prism shown is 84 cubic yards. What is the height of the prism?

Show your work.



Solution: _____

8 Shawn's teacher said that the volume of a rectangular prism is 64 cubic centimeters. Shawn said that he has enough information already to find the width. Is this correct? If not, explain why not. Otherwise, give the width and explain your thinking.

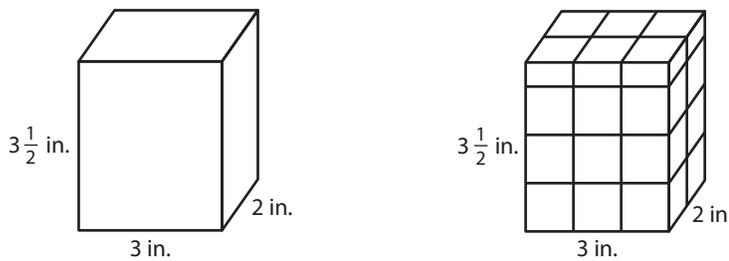
Fractional Dimensions

Study the example problem showing how to find the volume of a rectangular prism whose dimensions are not all whole numbers. Then solve problems 1–6.

Example

A food storage container is a rectangular prism that is 3 inches long, 2 inches wide, and 4 inches tall. The granola in the container is $3\frac{1}{2}$ inches deep. What is the volume of the granola?

You can sketch the amount of granola in the container and label its dimensions. You can also model the volume with 1-inch unit cubes.



The volume of the granola is 21 cubic inches.

- 1 Look at the model. How many whole cubes can you make with the half cubes in the top layer? Explain.

- 2 Use your answer to problem 1 to explain how the model shows that the volume of the granola in the container is 21 cubic inches?

- 3 Use the formula $V = lwh$ to find the volume of the granola in the container.



Solve.

- 4 A school locker is $\frac{3}{4}$ foot wide, $1\frac{1}{2}$ feet deep, and 6 feet tall. What is the volume of the locker? Draw a picture and label the dimensions.

Show your work.

Solution: _____

- 5 Kylie has two full containers of trail mix, one that is red and one that is blue. The red container is 4 inches long, 5 inches wide, and $2\frac{3}{4}$ inches tall. The blue container is $2\frac{2}{3}$ inches long, 7 inches wide, and 3 inches tall. Which container holds more trail mix?

Show your work.

Solution: _____

- 6 The height of a rectangular prism is half its width. The width of the prism is $\frac{1}{3}$ of its length. If the width of the prism is 3 centimeters, what is the volume?

Find an Unknown Dimension

Study the example problem showing how to find one dimension of a rectangular prism whose dimensions are not all whole numbers. Then solve problems 1–6.

Example

A walkway is made up of rectangular blocks. The volume of a block is 255 cubic inches. The width is 10 inches and the height is 2 inches. What is the length of a block?

You can sketch the block and label it with the given information. Then you can use the formula $V = l \times w \times h$ to find the value of l .

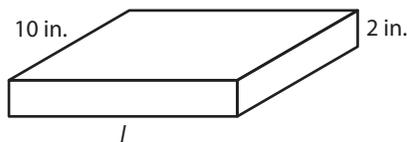
$$V = l \times w \times h$$

$$255 = l \times 10 \times 2$$

$$255 = l \times 20$$

$$12\frac{3}{4} = l$$

The length of a block is $12\frac{3}{4}$ inches.



- 1** What operation was used on the equation $255 = l \times 20$ to find the length l ?

- 2** Another block has a volume of 180 cubic inches. The area of the base is 72 square inches. What is the height of the block? Use the formula $V = Bh$ to find the answer.

- 3** A third block that is 5 inches high has a volume of 165 cubic inches. The width is $5\frac{1}{2}$ inches. Is the length the smallest dimension? Explain.



Solve.

- 4 The owner of a gift shop keeps holiday decorations in a rectangular box that has a volume of 30 cubic feet. The length of the box is 4 feet and the height is 2.5 feet. What is the width of the box? Draw a picture and label the dimensions.

Show your work.

Solution: _____

- 5 Vicky and Jim have a lawn care business. Jim keeps equipment in a shed that has a volume of 66 cubic feet. The length of his shed is 5 feet and the width is $2\frac{1}{5}$ feet. Vicky keeps equipment in another shed that has a volume of 63 cubic feet. The length of her shed is 4 feet and the width is $2\frac{1}{4}$ feet. They want to store a new lawn mower in the taller shed. Which shed will they use?

Show your work.

Solution: _____

- 6 The base of a rectangular prism is a square. The height of the prism is half the length of one edge of the base. The volume of the rectangular prism is 13.5 cubic units. What are the dimensions of the prism?

Volume

Solve the problems.

- 1 Is the volume of a rectangular prism with the given dimensions less than, equal to, or greater than 24 cubic meters? Mark an X in the correct column.

Dimensions	Less than	Equal to	Greater than
5 m, $1\frac{1}{2}$ m, 3 m			
3 m, 4 m, 2 m			
5 m, 2 m, $2\frac{1}{2}$ m			

What is the formula for the volume of a rectangular prism?



- 2 The volume of a rectangular gift box is 98 cubic inches. The height is 4 inches and the width is $3\frac{1}{2}$ inches. What is the length of the gift box?
Show your work.

Sketching the prism is a good way to organize the information.



Solution: _____

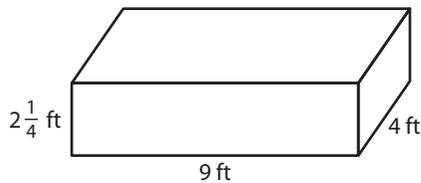
- 3 The volume of a cube is 125 cubic centimeters. A rectangular prism with three different whole-number dimensions has the same volume. What are the dimensions of the rectangular prism?
- _____

Could finding factors of 125 help you solve the problem?



Solve.

- 4** Tell whether each statement about the rectangular prism is *True* or *False*.



- a.** The base is a square. True False
- b.** The volume of the rectangular prism is 81 cubic feet. True False
- c.** The area of the base is 36 square feet. True False
- d.** If you doubled the height, the volume would also double. True False

Which two dimensions identify the base of a rectangular prism?



- 5** A rectangular prism has a volume of 52 cubic meters, a length of 12 meters, and a width of $2\frac{1}{6}$ meters. Which expression could you use to find the height of the rectangular prism? Select all that apply.

- A** $52 \div 26$ **C** $52 + 12 + 2\frac{1}{6}$
- B** $52 \times 12 \times 2\frac{1}{6}$ **D** $52 \div (12 \times 2\frac{1}{6})$

Can the formula for volume help you answer the question?



- 6** The length of a rectangular prism is 5 feet. The width is 2.4 feet and the height is 8 feet. What is the volume of the rectangular prism?

- A** 12 cubic feet **C** 40 cubic feet
- B** 15.4 cubic feet **D** 96 cubic feet

What operation do you use to find volume?



Olivia chose **A** as the correct answer. How did she get that answer?
