

Finding the Volume of Solids

Math Focus Points

- Using formulas to find the volume of rectangular prisms
- Finding the volume of a solid composed of two rectangular prisms

Vocabulary

cubic feet
cubic inches

Today's Plan

Materials

<p>1 ACTIVITY Volume Formulas</p>	 25 MIN  CLASS  PAIRS  INDIVIDUALS	<ul style="list-style-type: none"> <i>Student Activity Book</i>, p. 19A or C9, Volume of Rectangular Prisms Make copies. (as needed)
<p>2 ACTIVITY Combining Volumes</p>	 35 MIN  CLASS  PAIRS	<ul style="list-style-type: none"> <i>Student Activity Book</i>, pp. 19B–19C or C10–C11, Volume of Solids Make copies. (as needed)
<p>3 SESSION FOLLOW-UP Daily Practice</p>		<ul style="list-style-type: none"> <i>Student Activity Book</i>, p. 19D or C12, Volume Problems Make copies. (as needed) <i>Student Math Handbook</i>, pp. 105–107, 109–110

Ten-Minute Math

Order of Operations Write the following equation on the board:

$$18 - [14 - (3 + 5)] \div 3 =$$

Ask students to solve the equation and compare solutions with a partner. Call on volunteers to explain their answers. Record each step of the solution process. Then have students solve each of the following equations and explain their work:

$$(15 - 3) \div [5 + 3 - (6 + 1)] \times 4 =$$

$$\{(2 + 2) \times [9 - (10 - 7)]\} \div 12 =$$

Answers: 16; 48; 2

1

ACTIVITY

Volume Formulas



25 MIN



CLASS



PAIRS



INDIVIDUALS

When we discussed strategies for finding the volume of a rectangular prism, many of you said that you started by finding out how many cubes would fit in the bottom layer and then you multiplied that number by the number of layers going up.

On the board, write $V = b \times h$.

This formula says we can find the volume of a rectangular prism by multiplying the area of a base of the prism by the height. V stands for *volume*, b stands for *area of a base*, and h stands for *height*. Does this formula represent the same strategy as the one I described? Talk to a partner and then we'll compare your ideas.

Students might say:

"We think it's the same. We multiply the length and width of the bottom layer to get the number of cubes. That's faster than counting. And when you multiply the length times the width, you get the area. So that's b . Then we multiply the area by the number of layers high, and that's the same as the height, which is the letter h ."

[Rachel] said she multiplies the length times the width, and then she multiplies by the height. So, we could write the volume formula another way, like this.

Beneath the first formula, write $V = l \times w \times h$.

How are these two formulas the same?

Students might say:

"The area of a base is equal to the length times the width of a base. So they are really the same thing."

Work with a partner and find the volume of a rectangular prism that is 4 units by 7 units on the bottom and 10 units high. How does the way you solved the problem relate to the volume formulas: $V = l \times w \times h$ or $V = b \times h$?

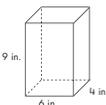
Now, picture a closet that is a rectangular prism. The area of the floor is 15 square feet. The height of the closet is 8 feet. Find the volume of the closet. How do the volume formulas relate to how you solved the problem?

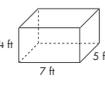
Name _____ Date _____

Prisms and Pyramids

Volume of Rectangular Prisms

Find the volume of each rectangular prism. Show your work.

1.  Volume: _____ cubic inches

2.  Volume: _____ cubic feet

3. Talisha's bedroom is a rectangular prism. The area of the floor is 156 square feet, and the height of the bedroom is 9 feet. What is the volume of Talisha's bedroom?
Volume: _____ cubic feet

4. What is the volume of a shoe box with a length of 14 inches, width of 8 inches, and height of 5 inches?
Volume: _____ cubic inches

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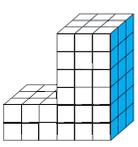
▲ Student Activity Book, Unit 2, p. 19A; Resource Masters, C9

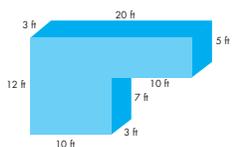
Name _____ Date _____

Prisms and Pyramids

Volume of Solids (page 1 of 2)

Find the volume of each solid. Show how you found the volume.

1.  Volume: _____ cubic units

2.  Volume: _____ cubic feet

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▲ Student Activity Book, Unit 2, p. 19B; Resource Masters, C10

Students might say:



“You told us the area of the floor, and the height, so we multiplied 15 and 8 and got 120. We knew the area of a base of a rectangular prism and the height—we multiplied the base and the height, but we don’t know the length and the width. So we multiplied b and h and got 120.”

That’s right. The volume is 120 **cubic feet**. When the dimensions are in feet, the volume is in units called cubic feet. A cubic foot is a cube that measures a foot along each edge. When the dimensions are in inches, the volume is in units called **cubic inches**. A cubic inch is a cube that measures an inch along each edge. We’ll talk more about cubic feet and cubic inches later in the unit.

Have students solve the volume problems on *Student Activity Book* page 19A or C9. Then discuss the solutions. Relate the volume formulas to each of the students' solutions.

2 ACTIVITY Combining Volumes



Ask students to look at the solids on *Student Activity Book* page 19B or C10.

What do you notice about these solids?

Students might say:



“They’re not rectangular prisms, but they’re made up of rectangular prisms.”

That’s right. So far we have found the volume of rectangular prisms. How can we find the volume of these solids?

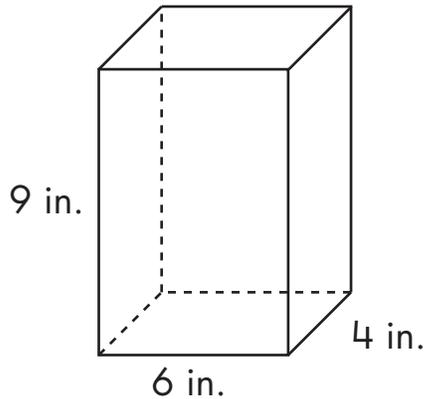
Students might say:



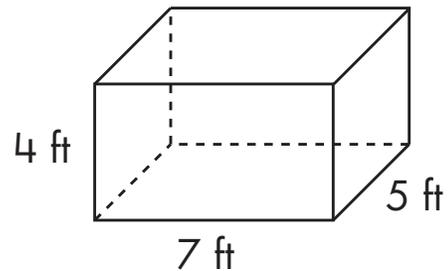
“You can find the volume of each of the individual prisms and then add them together.”

Volume of Rectangular Prisms

Find the volume of each rectangular prism. Show your work.

1.

Volume: _____ cubic inches

2.

Volume: _____ cubic feet

- 3.** Talisha's bedroom is a rectangular prism. The area of the floor is 156 square feet, and the height of the bedroom is 9 feet. What is the volume of Talisha's bedroom?

Volume: _____ cubic feet

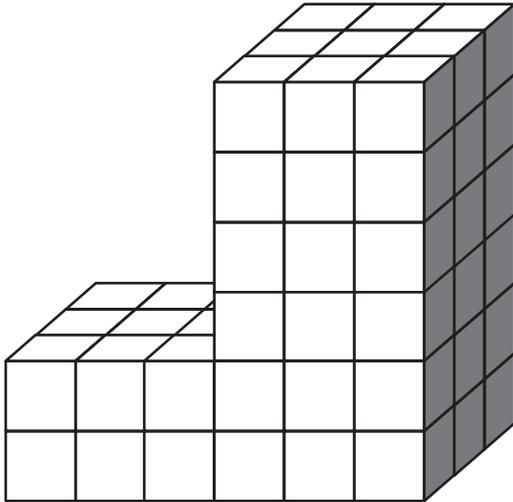
- 4.** What is the volume of a shoe box with a length of 14 inches, width of 8 inches, and height of 5 inches?

Volume: _____ cubic inches

Volume of Solids (page 1 of 2)

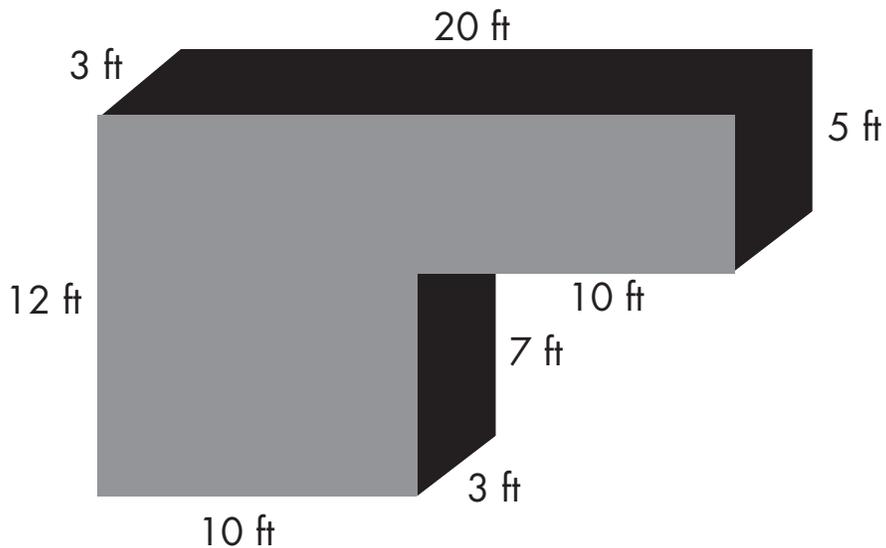
Find the volume of each solid. Show how you found the volume.

1.



Volume: _____ cubic units

2.

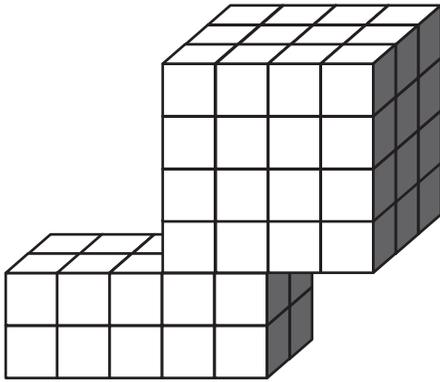


Volume: _____ cubic feet

Volume of Solids (page 2 of 2)

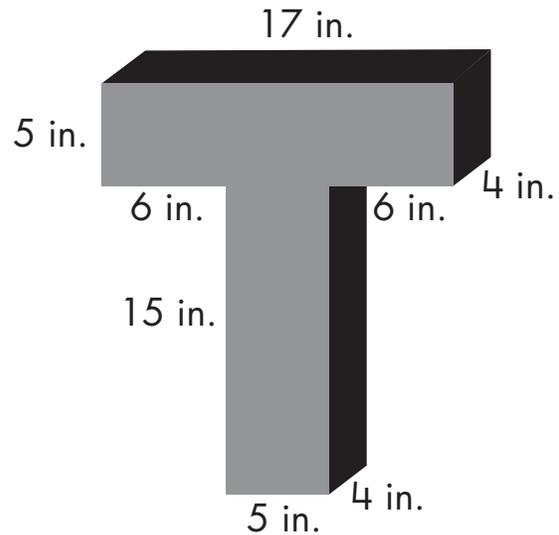
Find the volume of each solid. Show how you found the volume.

3.



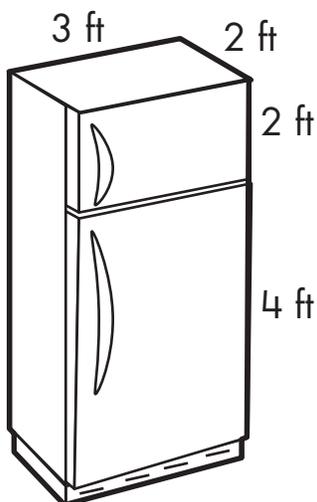
Volume: _____ cubic units

4.



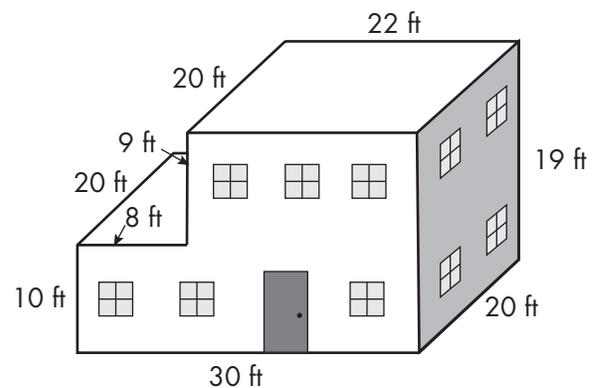
Volume: _____ cubic inches

5.

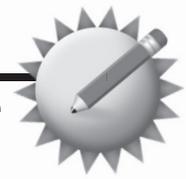


Volume: _____ cubic feet

6.



Volume: _____ cubic feet

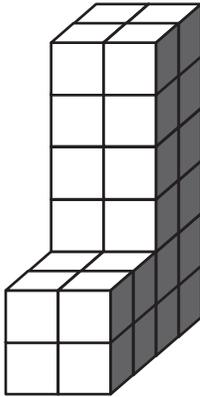


Volume Problems

NOTE Students find the volume of solids that are made up of rectangular prisms.

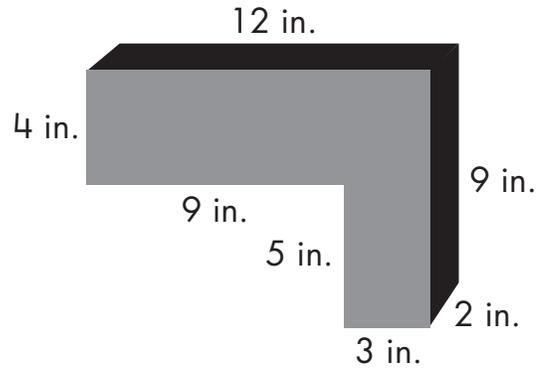
Find the volume of each solid. Show how you found the volume.

1.



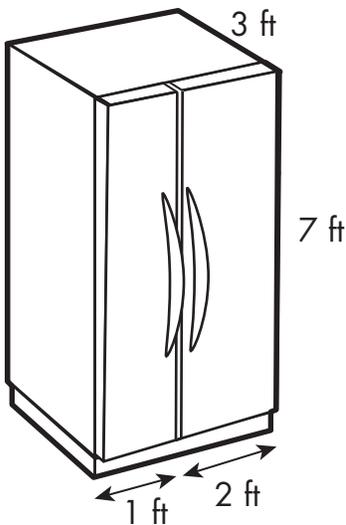
Volume: _____ cubic units

2.



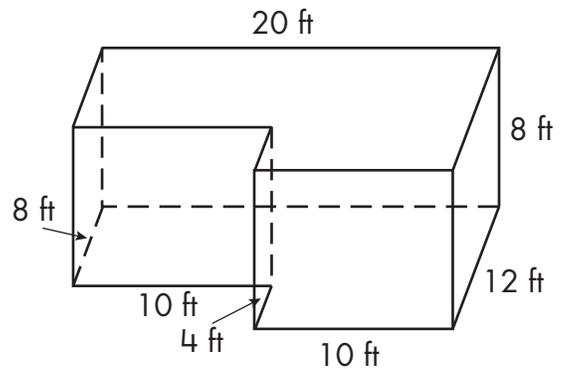
Volume: _____ cubic inches

3. Side-by-side refrigerator



Volume: _____ cubic feet

4. Deon's L-shaped bedroom



Volume: _____ cubic feet