©Curriculum Associates, LLC Copying is not permitted.

Name: _____

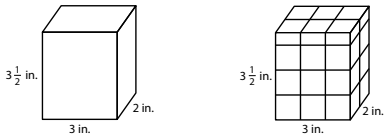
Fractional Dimensions

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.

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

3; Six half cubes equal 3 whole cubes.

B 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?

Possible answer: When you add 3 rows of 6 cubes to 3 cubes, you get 21 cubes.

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

Possible answer: Volume of the granola $= lwh = 3 \times 2 \times 3\frac{1}{2} = 21$ cubic inches.

©Curriculum Associates, LLC Copying is not permitted.

Solve.

M 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.

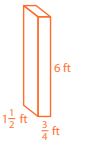
Show your work.

$V = lwh$

$= \frac{3}{4} \cdot 1\frac{1}{2} \cdot 6$

$= \frac{3}{4} \cdot \frac{3}{2} \cdot 6$

$= 6\frac{3}{4}$



Solution: The volume of the locker is $6\frac{3}{4}$ cubic feet.

M 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.

red container	blue container
$V = lwh$	$V = lwh$
$= 4 \cdot 5 \cdot 2\frac{3}{4}$	$= 2\frac{2}{3} \cdot 7 \cdot 3$
$= 4 \cdot 5 \cdot \frac{11}{4}$	$= \frac{8}{3} \cdot 7 \cdot 3$
$= 55$	$= 56$

Solution: The blue container holds more trail mix.

C 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?

$40\frac{1}{2}$ cubic centimeters

©Curriculum Associates, LLC Copying is not permitted.

Name: _____

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?

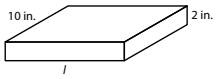
You can sketch the block and label it with the given information. Then you can use the formula $V = l \times w \times h$ to find the value of l.

$V = l \times w \times h$

$255 = l \times 10 \times 2$

$255 = l \times 20$

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



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

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

Both sides were divided by 20.

B 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.

$2\frac{1}{2}$ inches; $V = Bh$, $180 = 72 \times h$, $2\frac{1}{2} = h$

M 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.

No; Possible explanation: $V = l \times w \times h$, so $165 = l \times 5\frac{1}{2} \times 5$, so $l = 6$.

©Curriculum Associates, LLC Copying is not permitted.

Solve.

M 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.

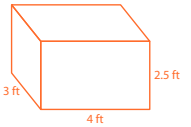
Show your work.

$V = lwh$

$30 = 4 \cdot w \cdot 2.5$

$30 = 10w$

$3 = w$



Solution: The width of the box is 3 feet.

M 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.

Jim's shed	Vicky's shed
$V = lwh$	$V = lwh$
$66 = 5 \cdot 2\frac{1}{5} \cdot h$	$63 = 4 \cdot 2\frac{1}{4} \cdot h$
$66 = 11h$	$63 = 9h$
$6 = h$	$7 = h$

Solution: They will use Vicky's shed.

C 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?

length: 3 units, width: 3 units, height: 1.5 units

©Curriculum Associates, LLC Copying is not permitted.

©Curriculum Associates, LLC Copying is not permitted.