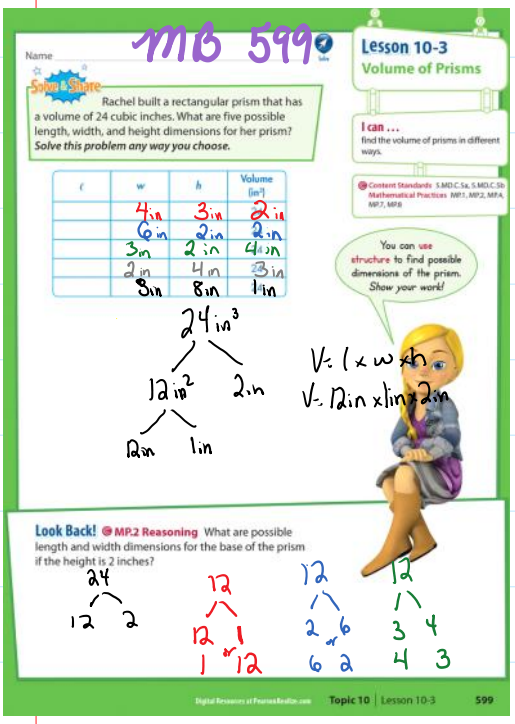
Lesson 10-3

Monday, February 3, 2020 8:44 PM



MB 599

Name

Lesson 10-3
Volume of Prisms

Solve & Share
Rachel built a rectangular prism that has a volume of 24 cubic inches. What are five possible length, width, and height dimensions for her prism? *Solve this problem any way you choose.*

I can ...
find the volume of prisms in different ways.

Content Standards 5.MD.C.5a, 5.MD.C.5b
Mathematical Practices MP.1, MP.2, MP.4, MP.7, MP.8

ℓ	w	h	Volume (in³)
	4in	3in	24 in³
	6in	2in	24 in³
	3in	2in	24 in³
	2in	4in	24 in³
	8in	1in	24 in³

You can use structure to find possible dimensions of the prism. Show your work!

$24 in^3$
$12 in^2$ 2in
12in 1in

V = l x w x h
V = 12in x 1in x 2in

Look Back! MP.2 Reasoning What are possible length and width dimensions for the base of the prism if the height is 2 inches?

24
12 2

12
12 1
1 or 12

12
2 or 6
6 2

12
3 4
4 3

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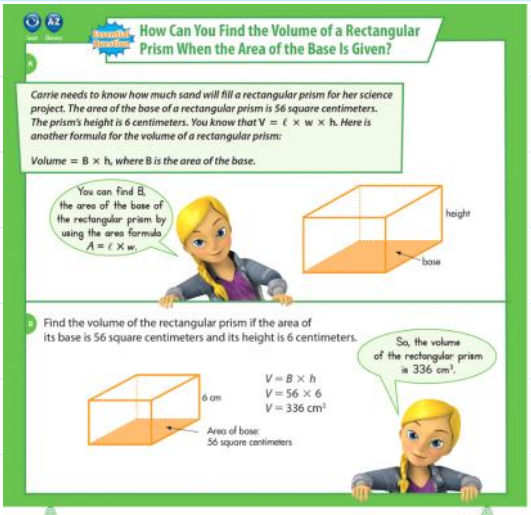
Length	width	height	Volume (in^3)
24	1	1	24
1	24	1	24
1	1	24	24
2	3	4	24
4	2	3	24
3	4	2	24
4	6	1	24
1	4	6	24
6	1	4	24
3	8	1	24
1	3	8	24
8	1	3	24
6	2	2	24
2	6	2	24
2	2	6	24



How Can You Find the Volume of a Rectangular Prism When the Area of the Base Is Given?

Carrie needs to know how much sand will fill a rectangular prism for her science project. The area of the base of a rectangular prism is 56 square centimeters. The prism's height is 6 centimeters. You know that V = ℓ × w × h. Here is another formula for the volume of a rectangular prism:

Volume = B × h, where B is the area of the base.

You can find B, the area of the base of the rectangular prism by using the area formula $A = \ell \times w$.

height
base

Find the volume of the rectangular prism if the area of its base is 56 square centimeters and its height is 6 centimeters.

6 cm
Area of base: 56 square centimeters

$V = B \times h$
$V = 56 \times 6$
$V = 336 \text{ cm}^3$

So, the volume of the rectangular prism is 336 cm^3.

Convince Me! MP.2 Reasoning In the example above, what are possible length and width dimensions of the base of the rectangular prism? Explain.

56 cm^2
8cm 7cm
7cm or 8cm

56
56cm 1cm
1cm or 56cm

56 cm
28cm 2cm
2cm or 28cm

56
14cm 4cm
4cm or 14cm

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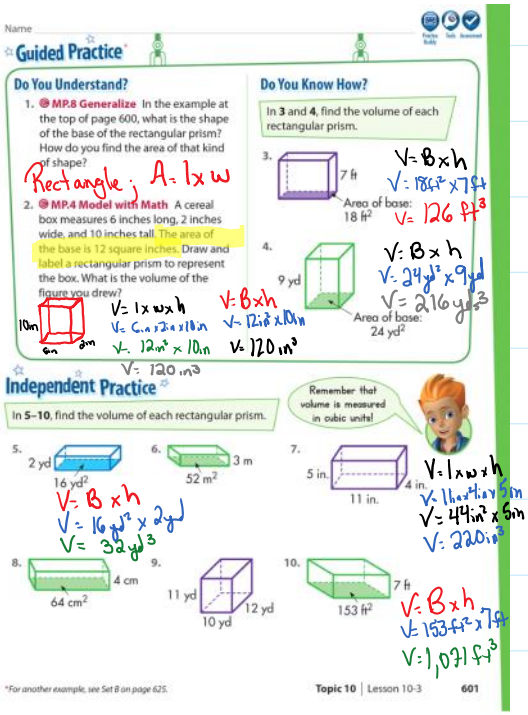

Guided Practice

Do You Understand?

1. **MP.8 Generalize** In the example at the top of page 600, what is the shape of the base of the rectangular prism? How do you find the area of that kind of shape?

Rectangle; $A = l \times w$

2. **MP.4 Model with Math** A cereal box measures 6 inches long, 2 inches wide, and 10 inches tall. The area of the base is 12 square inches. Draw and label a rectangular prism to represent the box. What is the volume of the figure you drew?

$V = l \times w \times h$
$V = 6in \times 2in \times 10in$
$V = 12in^2 \times 10in$
$V = 120 in^3$

$V = B \times h$
$V = 12in^2 \times 10in$
$V = 120 in^3$

Do You Know How?

In **3** and **4**, find the volume of each rectangular prism.

3. 7 ft; Area of base: 18 ft²

$V = B \times h$
$V = 18ft^2 \times 7ft$
$V = 126 ft^3$

4. 9 yd; Area of base: 24 yd²

$V = B \times h$
$V = 24yd^2 \times 9yd$
$V = 216 yd^3$

Independent Practice

In **5–10**, find the volume of each rectangular prism.

Remember that volume is measured in cubic units!

5. 2 yd; 16 yd²

$V = B \times h$
$V = 16yd^2 \times 2yd$
$V = 32 yd^3$

6. 3 m; 52 m²

7. 5 in., 4 in., 11 in.

$V = l \times w \times h$
$V = 11in \times 4in \times 5in$
$V = 220 in^3$

8. 4 cm; 64 cm²

9. 11 yd, 12 yd, 10 yd

10. 7 ft; 153 ft²

$V = B \times h$
$V = 153ft^2 \times 7ft$
$V = 1,071 ft^3$

*For another example, see Set B on page 625.

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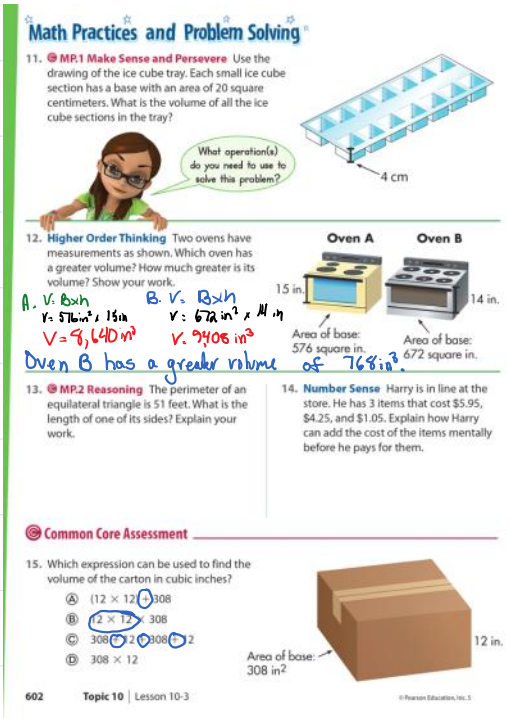
Complete:
5, 7, 10, 12 & 15

$18 \times 7 = 126$

$24 \times 9 = 216$

$44 \times 5 = 220$

$153 \times 7 = 1071$



Math Practices and Problem Solving

11. **MP.1 Make Sense and Persevere** Use the drawing of the ice cube tray. Each small ice cube section has a base with an area of 20 square centimeters. What is the volume of all the ice cube sections in the tray?

What operation(s) do you need to use to solve this problem?

4 cm

12. **Higher Order Thinking** Two ovens have measurements as shown. Which oven has a greater volume? How much greater is its volume? Show your work.

Oven A: 15 in.; Area of base: 576 square in.
Oven B: 14 in.; Area of base: 672 square in.

A. $V = B \times h$
$V = 576in^2 \times 15in$
$V = 8,640 in^3$

B. $V = B \times h$
$V = 672in^2 \times 14in$
$V = 9408 in^3$

Oven B has a greater volume of $768 in^3$.

13. **MP.2 Reasoning** The perimeter of an equilateral triangle is 51 feet. What is the length of one of its sides? Explain your work.

14. **Number Sense** Harry is in line at the store. He has 3 items that cost $5.95, $4.25, and $1.05. Explain how Harry can add the cost of the items mentally before he pays for them.

Common Core Assessment

15. Which expression can be used to find the volume of the carton in cubic inches?

Ⓐ $(12 \times 12) + 308$
Ⓑ $12 \times 12 \times 308$
Ⓒ $308 \times 2 \times 308 \times 2$
Ⓓ 308×12

Area of base: 308 in²; 12 in.

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$576 \times 15 = 8640$

$672 \times 14 = 9408$

$9408 - 8640 = 768$

$V = B \times h$
$V = 308in^2 \times 12in$
D