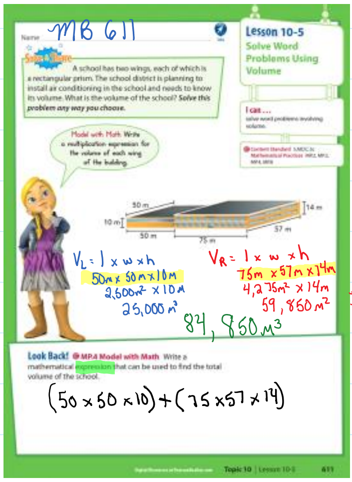
Lesson 10-5

Monday, February 3, 2020 8:44 PM



Name MB 611

Solve & Share A school has two wings, each of which is a rectangular prism. The school district is planning to install air conditioning in the school and needs to know its volume. What is the volume of the school? *Solve this problem any way you choose.*

Lesson 10-5 Solve Word Problems Using Volume

I can … solve word problems involving volume.

Model with Math Write a multiplication expression for the volume of each wing of the building.

$V_L = l \times w \times h$
50m x 50m x 10m
2,500 m² x 10 m
25,000 m³

$V_R = l \times w \times h$
75m x 57m x 14m
4,275 m² x 14 m
59,850 m³

84,850 m³

Look Back! MP.4 Model with Math Write a mathematical expression that can be used to find the total volume of the school.

(50 x 50 x 10) + (75 x 57 x 14)

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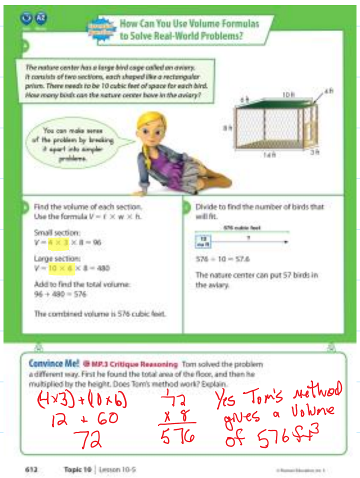
75
x 57
525
3750
4275

4,275
x 14
17100
+ 42750
59,850

25,000 m³
+ 59,850 m³
84,850 m³



How Can You Use Volume Formulas to Solve Real-World Problems?

The nature center has a large bird cage called an aviary. It consists of two sections, each shaped like a rectangular prism. There needs to be 10 cubic feet of space for each bird. How many birds can the nature center have in the aviary?

You can make sense of the problem by breaking it apart into simpler problems.

Find the volume of each section. Use the formula $V = \ell \times w \times h$.
Small section: $V = 4 \times 3 \times 8 = 96$
Large section: $V = 10 \times 6 \times 8 = 480$
Add to find the total volume: $96 + 480 = 576$
The combined volume is 576 cubic feet.

Divide to find the number of birds that will fit.
$576 \div 10 = 57.6$
The nature center can put 57 birds in the aviary.

Convince Me! MP.3 Critique Reasoning Tom solved the problem a different way. First he found the total area of the floor, and then he multiplied by the height. Does Tom's method work? Explain.

(4x3) + (10x6)
12 + 60
72

72
x 8
576

Yes Tom's method gives a volume of 576 ft³

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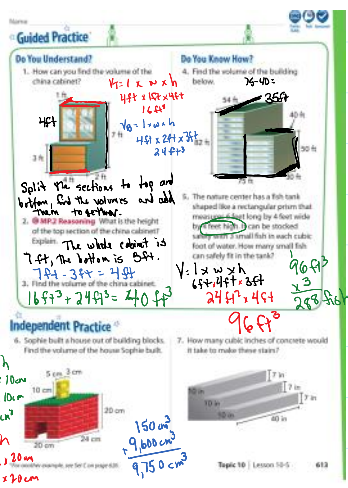

Guided Practice

Do You Understand?

1. How can you find the volume of the china cabinet?

$V_T = l \times w \times h$
4ft x 1ft x 4ft
16 ft³

$V_B = l \times w \times h$
4ft x 2ft x 3ft
24 ft³

Split the sections to top and bottom, find the volumes and add them together.

2. MP.2 Reasoning What is the height of the top section of the china cabinet? Explain.

The whole cabinet is 7 ft, the bottom is 3 ft.
7 ft - 3 ft = 4 ft

3. Find the volume of the china cabinet.

16 ft³ + 24 ft³ = 40 ft³

Do You Know How?

4. Find the volume of the building below.

75-40 = 35 ft

5. The nature center has a fish tank shaped like a rectangular prism that measures 6 feet long by 4 feet wide by 4 feet high. It can be stocked safely with 3 small fish in each cubic foot of water. How many small fish can safely fit in the tank?

V: l x w x h
6ft x 4ft x 3ft
24 ft² x 4 ft
96 ft³

96 ft³
x 3
288 fish

Independent Practice

6. Sophie built a house out of building blocks. Find the volume of the house Sophie built.

$V_T = l \times w \times h$
5cm x 3cm x 10cm
15 cm² x 10 cm
150 cm³

$V_B = l \times w \times h$
20cm x 24cm x 20cm
480 cm² x 20 cm
9,600 cm³

150 cm³
+ 9,600 cm³
9,750 cm³

7. How many cubic inches of concrete would it take to make these stairs?

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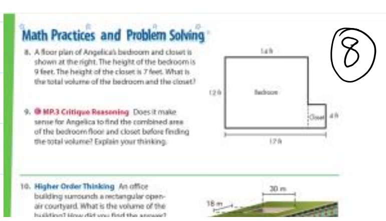
$V_L = l \times w \times h$
35 x 54 x 82

$V_R = 40 \times 30 \times 50$

Complete 6, 8, & 11



Math Practices and Problem Solving

8. A floor plan of Angelica's bedroom and closet is shown at the right. The height of the bedroom is 9 feet. The height of the closet is 7 feet. What is the total volume of the bedroom and the closet?

9. MP.3 Critique Reasoning Does it make sense for Angelica to find the combined area of the bedroom floor and closet before finding the total volume? Explain your thinking.

10. Higher Order Thinking An office building surrounds a rectangular open-air courtyard. What is the volume of the building? How did you find the answer?

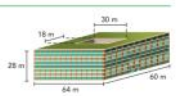
(8) $V_B = l \times w \times h$
14 ft x 12 ft x 9 ft
168 ft² x 9 ft
1,512 ft³

$V_C = l \times w \times h$
3 ft x 4 ft x 7 ft
12 ft² x 7 ft
84 ft³

1,512 ft³
+ 84 ft³
1,596 ft³

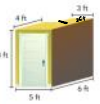
sense for Angelica to find the combined area of the bedroom floor and closet before finding the total volume? Explain your thinking.

10. **Higher Order Thinking** An office building surrounds a rectangular open-air courtyard. What is the volume of the building? How did you find the answer?



Common Core Assessment

11. Mrs. Bhatia's closet consists of two sections, each shaped like a rectangular prism. She plans to buy mothballs to keep the moths away. She needs one box for every 32 cubic feet of space. How many boxes should she buy? Explain how you found the answer.



$V_P = l \times w \times h$
$5ft \times 4ft \times 8ft$
$20 ft^2 \times 8ft$
$160 ft^3$

$V_R = l \times w \times h$
$3ft \times 2ft \times 6ft$
$6ft^2 \times 8ft$
$48 ft^3$

$160 ft^3 + 48 ft^3 = 208 ft^3$

The volume of the closet is $208 ft^3$

$208 ft^3 \div 32 ft^3 = 6 r 16$ → 6 full boxes and $16 ft^2$ left over.

She needs 7 boxes.

$$32 \overline{)208} \quad 6$$
$$-192$$
$$16$$

$168 ft^2 \times 9 ft$

$1,512 ft^3$

$14 \times 12 = 140 + 28 = 168$

$168 \times 9 = 1512$

$12 ft^2 \times 7 ft$

$84 ft^3$

$1596 \; ft^3$