LESSON MAKER PRO

Build the Volume

Count cube layers and combine solid parts.

GRADE 5 · MT.5.MD.5

MT.5.MD.5 "Relate volume to the operations of multiplication and addition and volume problems including problems in context by: Finding the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes and showing..."

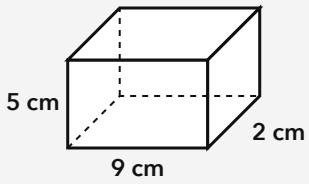
NAME _____ DATE _____

THE BIG IDEA

A layer of a rectangular prism holds length × width unit cubes. Multiply the cubes in one layer by the number of layers to find the volume: V = l × w × h, or V = B × h when B is the area of the base. If two solid prisms do not overlap, add their volumes.

WORKED EXAMPLE

How many 1-cm cubes fit in the prism shown? Find its volume.

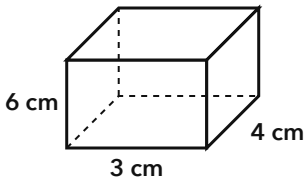


1. One layer holds 9 × 2 = 18 cubes.
2. There are 5 layers, so 18 × 5 = 90 cubes.
3. Grouping another way gives 9 × (2 × 5) = 90.

Answer: 90 cubes; 90 cubic centimeters

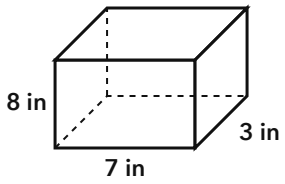
PRACTICE 6 problems

1 Find the volume of the prism shown.



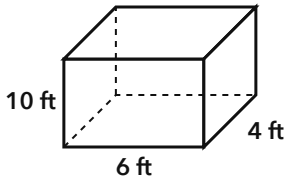
ANSWER _____

2 Find the volume of the prism shown.



ANSWER _____

3 Find the area of the base, then find the volume of the prism shown.



ANSWER _____

_____

4 A prism has 11 rows of 3 unit cubes in each layer and 4 layers. Write two ways to group the three factors, then find the volume.

ANSWER _____

_____

5 The table gives the measurements of two solid rectangular prisms joined without overlap. Find their total volume.

PRISM MEASUREMENTS

Piece	Length (cm)	Width (cm)	Height (cm)
A	6	3	4
B	6	3	7

ANSWER _____

6 A prism has a base area of 24 square inches and a height of 11 inches. Find its volume and the number of 1-inch cubes it holds.

ANSWER _____

_____

APPLY IT Show your work

1 For a school exhibit of artwork by Montana Indigenous artists, students build a model display stand from 1-cm cubes. The stand is 8 cm long, 6 cm wide, and 3 cm high. What is its volume?

WORK SPACE

ANSWER _____

2 Students build a model skate park from two solid rectangular blocks that do not overlap. One block is 7 cm long, 4 cm wide, and 3 cm high. The other is 6 cm long, 4 cm wide, and 3 cm high. What is the total volume?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Two solid prisms are stacked without overlap. Their measurements are in the table. A student multiplies 10 × 8 × 7 and gets 560 cubic centimeters. Explain why that answer is too large, then find the correct total volume.

STACKED PRISM MEASUREMENTS

Prism	Length (cm)	Width (cm)	Height (cm)
Bottom	10	8	3
Top	6	8	4

WORK SPACE AND ANSWER

ANSWER KEY

Build the Volume

GRADE 5 · MT.5.MD.5

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the volume of the prism shown.	**72 cubic centimeters**
2	Find the volume of the prism shown.	**168 cubic inches**
3	Find the area of the base, then find the volume of the prism shown.	**Base area: 24 square feet; volume: 240 cubic feet**
4	A prism has 11 rows of 3 unit cubes in each layer and 4 layers. Write two ways to group the three factors, then find the volume.	**(11 × 3) × 4 = 132; 11 × (3 × 4) = 132; volume: 132 cubic units**
5	The table gives the measurements of two solid rectangular prisms joined without overlap. Find their total volume.	**198 cubic centimeters**
6	A prism has a base area of 24 square inches and a height of 11 inches. Find its volume and the number of 1-inch cubes it holds.	**264 cubic inches; 264 cubes**

PART 2 · APPLY IT

1. **144 cubic centimeters** Multiply the three edge lengths: 8 × 6 × 3 = 144 cubic centimeters.
2. **156 cubic centimeters** The blocks have volumes of 7 × 4 × 3 = 84 and 6 × 4 × 3 = 72 cubic centimeters. Add them to get 156 cubic centimeters.

CHALLENGE

432 cubic centimeters. The calculation 10 × 8 × 7 counts empty space beside the shorter top prism. Add the parts instead: 10 × 8 × 3 + 6 × 8 × 4 = 240 + 192 = 432.

Accept equivalent multiplication groupings in problem 4. For the challenge, accept an explanation that the larger calculation includes empty space beside the top prism.