LESSON MAKER PRO

Build the Volume

Use layers and edge lengths to find cubic units.

GRADE 5 · NY-5.MD.5.a

NY-5.MD.5.a "Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths..."

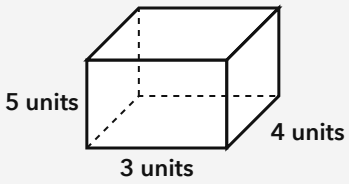
NAME _____ DATE _____

LAYERS MAKE VOLUME

A right rectangular prism can be packed with equal layers of unit cubes. Multiply the length by the width to find the cubes in one layer, then multiply by the height. This is the same as multiplying the area of the base by the height.

WORKED EXAMPLE

Find the volume of the prism shown, 3 units long, 4 units wide, and 5 units high. Show the layer method and the edge-length multiplication.

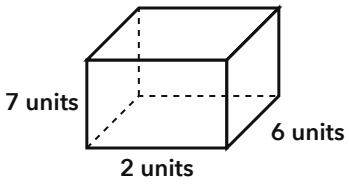


1. One base layer has 3 x 4 = 12 unit cubes.
2. The prism has 5 equal layers.
3. 12 x 5 = 60 unit cubes.
4. 3 x 4 x 5 = 60 cubic units.

Answer: 60 cubic units

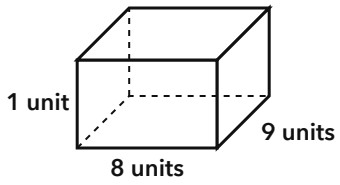
PRACTICE 6 problems

1 The prism shown is 2 units long, 6 units wide, and 7 units high. What is its volume?



ANSWER _____

2 The prism shown is 8 units long, 9 units wide, and 1 unit high. How many unit cubes fill it?



ANSWER _____

3 A rectangular prism is 10 units long, 2 units wide, and 11 units high. Find its volume.

ANSWER _____

4 A rectangular prism is 12 units long, 7 units wide, and 2 units high. Find its volume.

ANSWER _____

5 A prism has a base area of 56 square units and a height of 9 units. Find its volume.

ANSWER _____

6 A rectangular prism has a base that is 7 units by 8 units. Its height is 6 units. Find its volume.

ANSWER _____

APPLY IT Show your work

1 For a school game club, Eli builds a rectangular prize box that is 9 cm long, 7 cm wide, and 8 cm high. What is the volume of the box?

WORK SPACE

ANSWER _____

2 The garden club fills a rectangular planter box with soil. The inside is 12 cm long, 6 cm wide, and 7 cm deep. What volume of soil can the planter hold?

WORK SPACE

ANSWER _____

3 Use the open rectangular box and identical cube blocks your teacher provides. Pack the box completely, with no gaps or overlaps. Count the cubes in one base layer and the number of layers. Measure each inside edge in cube-edge units. Record the counted volume, length × width × height, and base area × height. Explain why all three results agree.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A right rectangular prism has a volume of 864 cubic units. Its base is 12 units by 8 units. What is its height? Explain why multiplying the base area by your height gives the volume.

WORK SPACE AND ANSWER

ANSWER KEY

Build the Volume

GRADE 5 · NY-5.MD.5.a

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The prism shown is 2 units long, 6 units wide, and 7 units high. What is its volume?	**84 cubic units**
2	The prism shown is 8 units long, 9 units wide, and 1 unit high. How many unit cubes fill it?	**72 unit cubes**
3	A rectangular prism is 10 units long, 2 units wide, and 11 units high. Find its volume.	**220 cubic units**
4	A rectangular prism is 12 units long, 7 units wide, and 2 units high. Find its volume.	**168 cubic units**
5	A prism has a base area of 56 square units and a height of 9 units. Find its volume.	**504 cubic units**
6	A rectangular prism has a base that is 7 units by 8 units. Its height is 6 units. Find its volume.	**336 cubic units**

PART 2 · APPLY IT

1. **504 cm^3** Multiply the base dimensions: 9 x 7 = 63 square centimeters. Multiply by the height: 63 x 8 = 504 cm^3.
2. **504 cm^3** The base area is 12 x 6 = 72 square centimeters. Multiply 72 x 7 to get 504 cm^3.
3. **12 cubic units; 6 cubes per layer × 2 layers = 12; 3 × 2 × 2 = 12; base area 6 square units × height 2 units = 12 cubic units.** Teacher setup: prepare an open box with inside dimensions exactly 3 cube-edge units by 2 cube-edge units by 2 cube-edge units, and twelve identical solid cube blocks. Use the block edge as 1 unit; no centimeter size is assumed. Learners actually pack all space with six blocks in each of two layers, count, and identify the 3, 2, 2 edge lengths. Observe packing without gaps/overlaps and compare actual count 12 with both products. A product alone is incomplete.

CHALLENGE

Height = 9 units; the base area is 12 x 8 = 96 square units, and 96 x 9 = 864 cubic units.

Accept any correct multiplication order, such as length x width x height or base area x height. For the challenge, students should identify a height of 9 units and connect 96 x 9 to the given volume. Prepare the Apply 3 box and cubes before class. Require actual packing/count evidence and both equivalent product methods; learners may explain orally while recording the measurements/equations.