LESSON MAKER PRO

Build the Volume

Use layers and edge lengths to find cubic units.

GRADE 5 · 5.MD.C.5a

CCSS.Math.Content.5.MD.C.5a "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..."

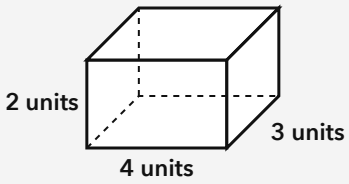
NAME _____ DATE _____

VOLUME IN LAYERS

A right rectangular prism can be packed in layers of unit cubes. Find the cubes in one base layer, then multiply by the number of layers, or height. This is the same as multiplying length × width × height.

WORKED EXAMPLE

Find the volume of the prism: length 4 units, width 3 units and height 2 units.



1. Find one base layer: 4 × 3 = 12 cubes.
2. Use 2 layers.
3. Multiply: 12 × 2 = 24.
4. Check: 4 × 3 × 2 = 24.

Answer: 24 cubic units

PRACTICE 4 problems

1 Find the volume of a prism that is 5 units long, 6 units wide, and 7 units high.

ANSWER _____

2 A prism has a base that is 8 units by 9 units and a height of 5 units. Find its volume.

ANSWER _____

3 A prism is 6 units by 7 units by 8 units. Write two equal multiplication expressions that show its volume.

ANSWER _____

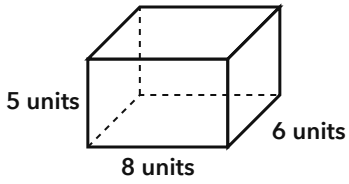
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4 A prism has a base area of 45 square units and a height of 6 units. Find its volume.

ANSWER _____

APPLY IT Show your work

1 A gaming club fills a storage bin with 1-cubic-unit blocks. The bin is 8 units long, 6 units wide and 5 units high. How many blocks fit?



ANSWER _____

2 Mia builds a rectangular display with 7 rows, 9 blocks in each row, and 5 layers. What is the display's volume?

WORK SPACE

ANSWER _____

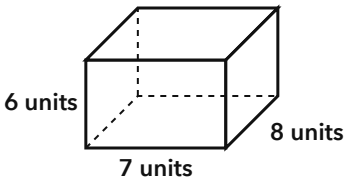
3 Pack and check: Your teacher provides 12 identical unit cubes. Build a right rectangular prism with no gaps or overlaps: 3 cubes long, 2 cubes wide and 2 cubes high. Count all the cubes actually packed. Sketch one base layer and label the three dimensions. Record the count, length × width × height, and base area × height. Compare the results. Explain how (3 × 2) × 2 and 3 × (2 × 2) describe the same volume. Show your packed prism to your teacher.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Sam says choosing a different face as the base changes the volume. Is Sam correct? Use the prism with edge lengths 7, 8 and 6 units to write two different base-area calculations and explain.



WORK SPACE AND ANSWER

ANSWER KEY

Build the Volume

GRADE 5 · 5.MD.C.5a

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the volume of a prism that is 5 units long, 6 units wide, and 7 units high.	**210 cubic units**
2	A prism has a base that is 8 units by 9 units and a height of 5 units. Find its volume.	**360 cubic units**
3	A prism is 6 units by 7 units by 8 units. Write two equal multiplication expressions that show its volume.	**(6 × 7) × 8 = 336; 6 × (7 × 8) = 336 cubic units**
4	A prism has a base area of 45 square units and a height of 6 units. Find its volume.	**270 cubic units**

PART 2 · APPLY IT

1. **240 blocks** One layer holds 8 × 6 = 48 blocks. With 5 layers, 48 × 5 = 240 blocks.
2. **315 cubic units** Multiply the three dimensions: 7 × 9 × 5 = 315.
3. **12 cubes; volume 12 cubic units. 3 × 2 × 2 = 12 and 6 × 2 = 12. (3 × 2) × 2 = 3 × (2 × 2) = 12.** The actual prism has two layers of 6 cubes, so counting gives 12. The base sketch has 2 rows of 3 squares. Base area is 6 square units; multiply by height 2 units for 12 cubic units. Both grouping orders count the same packed cubes.

CHALLENGE

Sam is not correct. (7 × 8) × 6 = 336 cubic units, and (7 × 6) × 8 = 336 cubic units. Changing the base changes the layers, but not the total volume.

Accept equivalent multiplication orders and parentheses. Accept cubic units, unit cubes, or blocks when the context asks for them. Before Apply It 3, supply each learner or pair with 12 identical unit cubes. Observe the actual gap-free 3-by-2-by-2 packing and cube count; check the labeled sketch and agreement of the count with both products. A hypothetical calculation alone does not complete this task.