LESSON MAKER PRO

Stack the Layers

Find volume by counting layers of unit cubes.

GRADE 5 · 5.M.B.19.a

5.M.B.19.a "Use the associative property of multiplication to find the volume of a right rectangular prism and relate it to packing the prism with unit cubes..."

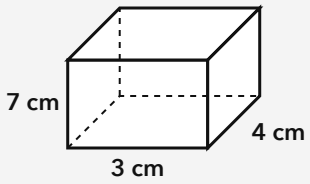
NAME _____ DATE _____

THE BIG IDEA

A rectangular prism can be packed with layers of unit cubes. Multiply length by width to find the number of cubes in one layer, then multiply by the number of layers. You can group the three factors in a different order and get the same volume.

WORKED EXAMPLE

Find the volume of the prism shown. How many unit cubes with 1-cm edges would fill it?

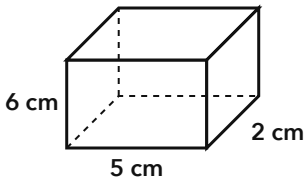


1. Cubes in one layer: $3 \times 4 = 12$.
2. Volume: $(3 \times 4) \times 7 = 12 \times 7 = 84$ cm^3.
3. Regroup to check: $3 \times (4 \times 7) = 3 \times 28 = 84$.

Answer: 84 cm^3; 84 unit cubes

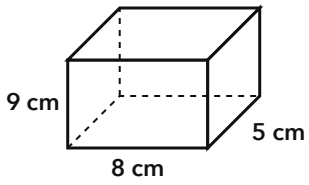
PRACTICE 6 problems

1 What is the volume of the prism shown?



ANSWER _____

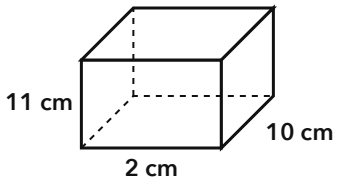
2 Find the area of the base and the volume of the prism shown.



ANSWER _____

_____

3 How many unit cubes with 1-cm edges would fill the prism shown?



ANSWER _____

4 A prism has 6 cubes in each row, 8 rows in each layer, and 10 layers. How many unit cubes fill it?

ANSWER _____

5 A prism has a base area of 90 cm^2 and a height of 2 cm. What is its volume?

ANSWER _____

6 A prism holds 360 unit cubes. Each layer has 12 rows of 5 cubes. How many layers does it have?

ANSWER _____

APPLY IT Show your work

1 A gamer builds a rectangular storage chest from blocks with 1-cm edges. The chest is 12 cm long, 8 cm wide, and 5 cm high. How many blocks fill it?

WORK SPACE

ANSWER _____

2 A collector has a rectangular display box for a model robot. The inside is 9 cm long, 11 cm wide, and 6 cm high. How many cubes with 1-cm edges would fill it?

WORK SPACE

ANSWER _____

CHALLENGE One step up

You have 576 unit cubes to build a rectangular tower. Each layer will be 12 cubes long and 8 cubes wide. How many layers high can you build? Show how you can group the three factors in two ways to check your answer.

WORK SPACE AND ANSWER

ANSWER KEY

Stack the Layers

GRADE 5 · 5.M.B.19.a

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	What is the volume of the prism shown?	**60 cm^3**
2	Find the area of the base and the volume of the prism shown.	**Base area: 40 cm^2; volume: 360 cm^3**
3	How many unit cubes with 1-cm edges would fill the prism shown?	**220 unit cubes**
4	A prism has 6 cubes in each row, 8 rows in each layer, and 10 layers. How many unit cubes fill it?	**480 unit cubes**
5	A prism has a base area of 90 cm^2 and a height of 2 cm. What is its volume?	**180 cm^3**
6	A prism holds 360 unit cubes. Each layer has 12 rows of 5 cubes. How many layers does it have?	**6 layers**

PART 2 · APPLY IT

1. **480 blocks** Each layer holds 12 × 8 = 96 blocks. Five layers hold 96 × 5 = 480 blocks.
2. **594 cubes** The base holds 9 × 11 = 99 cubes in one layer. Six layers hold 99 × 6 = 594 cubes.

CHALLENGE

6 layers; (12 × 8) × 6 = 96 × 6 = 576, and 12 × (8 × 6) = 12 × 48 = 576.

Accept either grouping of the three edge lengths when students show their work. In the challenge, both groupings must equal 576.