LESSON MAKER PRO

Cube Packing

Count unit cubes to find volume.

HIGH SCHOOL · ATM.MD.9

ATM.MD.9 "Recognize volume as an attribute of solid figures and understand concepts of volume measurement wherein a solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units."

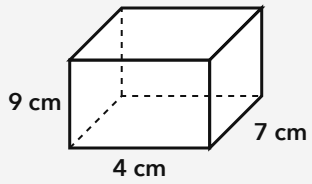
NAME _____ DATE _____

VOLUME AND UNIT CUBES

Volume tells how much space a solid takes up. If a solid can be packed with unit cubes without gaps or overlaps, its volume is the number of cubes in cubic units. For a rectangular prism, count the cubes in one layer, then multiply by the number of layers.

WORKED EXAMPLE

Each dimension in the figure is measured in centimeters. How many 1-cm cubes pack the prism without gaps or overlaps, and what is its volume?

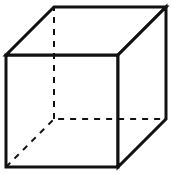


1. One layer holds 4 × 7 = 28 cubes.
2. There are 9 layers.
3. The prism holds 28 × 9 = 252 cubes.

Answer: 252 cubes; 252 cm^3

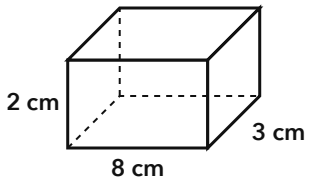
PRACTICE 6 problems

1 Find the volume of the cube shown.



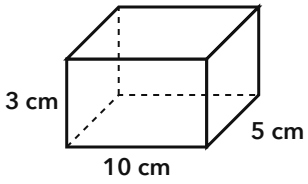
ANSWER _____

2 Find the volume of the prism shown.



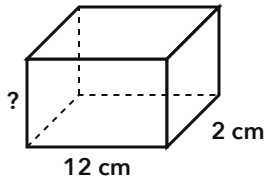
ANSWER _____

3 How many 1-cm cubes pack the prism shown without gaps or overlaps?



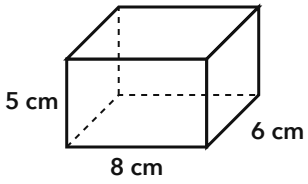
ANSWER _____

4 The prism shown has a volume of 120 cm^3. Find its height.



ANSWER _____

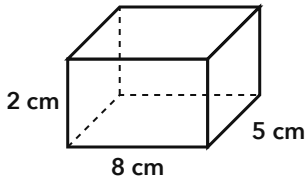
5 How many 1-cm cubes pack the prism shown without gaps or overlaps? What is its volume?



ANSWER _____

_____

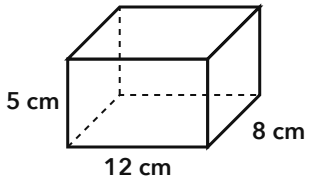
6 A second carton holds 100 one-cubic-centimeter cubes. How many more cubes does it hold than the prism shown?



ANSWER _____

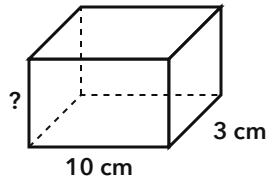
APPLY IT Show your work

1 A 3D-printing club is choosing a box for a model. How many 1-cm cubes would pack the inside of the box shown without gaps or overlaps?



ANSWER _____

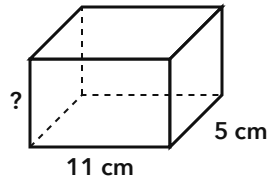
2 A student wants a desk organizer that holds 180 one-cubic-centimeter cubes without gaps or overlaps. If its inside is shaped like the prism shown, how tall must it be?



ANSWER _____

CHALLENGE One step up

A display is made by joining two rectangular prisms along flat faces with no overlap. One prism is shown. The other has a volume of 110 cm^3, and the whole display has a volume of 275 cm^3. Find the height of the prism shown. Explain using unit-cube layers.



WORK SPACE AND ANSWER

Cube Packing

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the volume of the cube shown.	**216 cm^3**
2	Find the volume of the prism shown.	**48 cm^3**
3	How many 1-cm cubes pack the prism shown without gaps or overlaps?	**150 cubes**
4	The prism shown has a volume of 120 cm^3. Find its height.	**5 cm**
5	How many 1-cm cubes pack the prism shown without gaps or overlaps? What is its volume?	**240 cubes; 240 cm^3**
6	A second carton holds 100 one-cubic-centimeter cubes. How many more cubes does it hold than the prism shown?	**20 cubes**

PART 2 · APPLY IT

1. **480 cubes** Each layer holds 12 × 8 = 96 cubes. Five layers hold 96 × 5 = 480 cubes.
2. **6 cm** Each 1-cm-high layer holds 10 × 3 = 30 cubes. The organizer needs 180 ÷ 30 = 6 layers, so its height is 6 cm.

CHALLENGE

3 cm. The prism shown holds 275 − 110 = 165 one-cubic-centimeter cubes. Each 1-cm-high layer holds 11 × 5 = 55 cubes, so 165 ÷ 55 = 3 layers.

Accept cubic centimeters or cm^3 for volume. For the challenge, accept any explanation that finds the shown prism's volume first and then divides by the cubes per layer.