LESSON MAKER PRO

Cube Count Lab

Measure solid figures by counting unit cubes.

HIGH SCHOOL · ATM.MD.8

ATM.MD.8 "Recognize volume as an attribute of solid figures and understand concepts of volume measurement wherein a cube with a side length of 1 unit, called a "unit cube," is said to have "one cubic unit" of volume and can be used to measure volume."

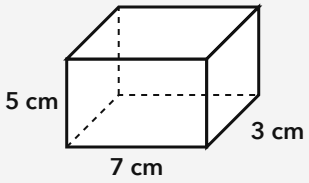
NAME _____ DATE _____

COUNT THE SPACE

A cube with sides 1 unit long has a volume of 1 cubic unit. To find the volume of a rectangular prism built from unit cubes, count the cubes in one layer and multiply by the number of layers. If cubes are removed, subtract their volume from the original volume.

WORKED EXAMPLE

The prism shown is filled with 1-cm unit cubes. How many cubes fill it, and what is its volume?

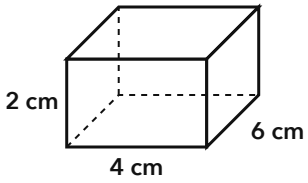


1. One layer holds 7 × 3 = 21 cubes.
2. There are 5 layers, so the prism holds 21 × 5 = 105 cubes.
3. Each cube has a volume of 1 cm^3.

Answer: 105 unit cubes; 105 cm^3

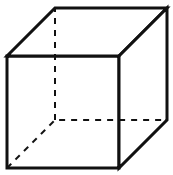
PRACTICE 6 problems

1 How many 1-cm unit cubes fill the prism shown?



ANSWER _____

2 How many 1-cm unit cubes fill the cube shown? What is its volume?



ANSWER _____

3 An irregular solid has 4 layers of 8 cubes and 6 layers of 9 cubes. Each cube has sides 1 inch long. What is the solid's volume?

ANSWER _____

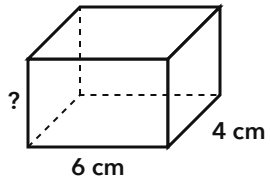
4 A container holds 96 cm^3. It is filled without gaps by cubes with sides 2 cm long. How many cubes are needed?

ANSWER _____

5 Two solids each contain 80 cubes with sides 1 mm long. Move 16 cubes from the first solid to the second. What is the difference between their volumes now?

ANSWER _____

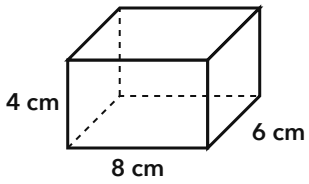
6 The prism shown holds 144 unit cubes with sides 1 cm long. How many layers of cubes tall is it?



ANSWER _____

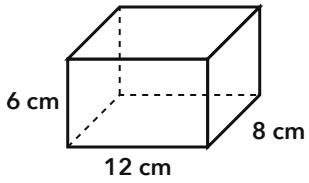
APPLY IT Show your work

1 A design class builds a phone stand from the block shown using 1-cm unit cubes. To form a ledge, they remove the top 2 layers from half the base area. How many cubes remain, and what volume do they occupy?



ANSWER _____

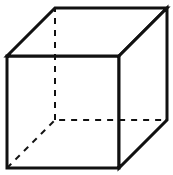
2 A game developer builds a display block with the dimensions shown. One version uses 1-cm unit cubes. A second version has the same outside dimensions but uses cubes with sides 2 cm long. How many cubes does each version use?



ANSWER _____

CHALLENGE One step up

The cube shown is built from 1-cm unit cubes. A centered cube with sides 6 cm long is removed from its interior without breaking through the surface. How many unit cubes remain? Explain how you counted.



WORK SPACE AND ANSWER

ANSWER KEY

Cube Count Lab

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	How many 1-cm unit cubes fill the prism shown?	**48 unit cubes**
2	How many 1-cm unit cubes fill the cube shown? What is its volume?	**64 unit cubes; 64 cm^3**
3	An irregular solid has 4 layers of 8 cubes and 6 layers of 9 cubes. Each cube has sides 1 inch long. What is the solid's volume?	**86 in^3**
4	A container holds 96 cm^3. It is filled without gaps by cubes with sides 2 cm long. How many cubes are needed?	**12 cubes**
5	Two solids each contain 80 cubes with sides 1 mm long. Move 16 cubes from the first solid to the second. What is the difference between their volumes now?	**32 mm^3**
6	The prism shown holds 144 unit cubes with sides 1 cm long. How many layers of cubes tall is it?	**6 layers**

PART 2 · APPLY IT

1. **144 unit cubes; 144 cm^3** The full block contains 8 × 6 × 4 = 192 cubes. Half of each top layer has 24 cubes, so removing 2 such layers leaves 192 − 48 = 144 cubes.
2. **576 of the 1-cm cubes; 72 of the 2-cm cubes** The block's volume is 12 × 8 × 6 = 576 cm^3, so it takes 576 unit cubes. Each 2-cm cube has a volume of 8 cm^3, and 576 ÷ 8 = 72.

CHALLENGE

784 unit cubes remain. The outer cube has 10 × 10 × 10 = 1,000 unit cubes, and the removed cube has 6 × 6 × 6 = 216. Subtracting gives 1,000 − 216 = 784.

For counts of unit cubes, accept an equivalent volume when the unit is clear. In the challenge, students should subtract the interior cube's volume, not its side length.