

VOLUME AND CUBIC UNITS

Today's goal: I can recognize volume as an attribute of solid figures; understand cubic units and measure volumes by counting unit cubes.



Tan



Digit



Blaze



Pi



One unit cube

- 1 A cube 1 unit on every side.
- 2 Its volume is ONE cubic unit.

TURN & TALK

Volume is how many of those fill a solid.



No gaps

- 1 Packed tight, no spaces between.
- 2 Cubes with gaps do not measure anything.

REMEMBER

Same rule as tiling a rectangle.



BIG IDEA 2

Count what you see

1 A $3 \times 3 \times 3$ drawing shows at most 19 cubes.

2 Careful counting of the outside gives 26.

REMEMBER

One cube is hidden from every direction.



BIG IDEA 3

It is still there

- 1 A flat picture cannot show an inside.
- 2 The drawing is not the solid.

REMEMBER

27. Do not count the picture.



BIG IDEA 4

Count by **LAYERS**

1 One layer: $3 \times 3 = 9$ cubes.

2 Three layers.

REMEMBER

27. Nothing needs to be visible.



WATCH OUT!

Volume is not surface

1 $2 \times 2 \times 2$: volume 8 cubic units.

2 Its skin is 24 unit squares.

DON'T FALL FOR IT

Inside, or skin. Two questions.



Something went wrong here...

THE PROBLEM

Find the volume by counting layers: a $5 \times 2 \times 3$ prism.

WHAT A STUDENT DID

Added the dimensions: $5 + 2 + 3 = 10$ — which happens to equal ONE layer here, so the answer looks plausible. That coincidence is why the check is to picture the block.

YOUR MISSION

What went wrong? What's the right answer?



Find the volume by counting layers: a $5 \times 2 \times 3$ prism.

1 The base layer is $5 \times 2 = 10$ cubes.

2 Three layers, so 30 cubic units.

Answer: 30 cubic units



Pick your pepper!



MILD

Find the volume by counting layers: a $4 \times 3 \times 2$ prism.

#1 on your practice sheet



MEDIUM

Two solids are $6 \times 2 \times 2$ and $4 \times 3 \times 2$. Which holds more cubes?

#5 on your practice sheet



SPICY

How many cubes are completely hidden in a $4 \times 4 \times 4$? What shape do the hidden cubes make?

#6 on your practice sheet

How's it going?



3 • Got it!

I could teach it



2 • Almost

One more example, please



1 • Not yet

I need some help



MATH WITH MR DJ

NOW YOU!

Practice sheet: everyone does Mild & Medium, then climb the peppers.

Stuck? Look back at Mr DJ's example at the top of the sheet.

Need it again? Step-by-step videos on YouTube @MathWithMrDJ

Brain break: 3 new daily puzzles at puzzles.mathwithmrdj.com

