



GRADE 5 • MEASUREMENT & DATA

VOLUME BY MULTIPLICATION

Today's goal: I can relate volume to multiplication and addition; solve real-world problems.



Tan



Digit



Blaze



Pi



You already count layers

1 $4 \times 3 \times 2$. One layer: $4 \times 3 = 12$ cubes.

2 Two layers.

TURN & TALK

24 cubic units. You did this yesterday.



That IS the formula

1 4×3 is the AREA OF THE BASE.

2 2 is the NUMBER OF LAYERS.

REMEMBER

$$l \times w \times h = (\text{base}) \times (\text{layers}).$$



BIG IDEA 2

So why multiply?

- 1 Because each layer has the same number of cubes.
- 2 Adding $4 + 3 + 2 = 9$ counts nothing.

REMEMBER

9 is fewer than ONE layer.



BIG IDEA 3

Any face can be the base

1 12×2 , or 8×3 , or 6×4 .

REMEMBER

All 24. A free check, every time.



BIG IDEA 4

Working backwards

1 Volume 72, height 3. Base area?

2 $72 \div 3 = 24$.

REMEMBER

6×4 , or 8×3 , or 12×2 .



BIG IDEA 5

An L-shape

1 $5 \times 4 \times 1$ slab, $2 \times 2 \times 3$ block on part of it.

2 $20 + 12 = 32$ cubic units.

REMEMBER

Its box would be $5 \times 4 \times 4 = 80$. Mostly air.



Something went wrong here...

THE PROBLEM

Find the volume of a $6 \times 4 \times 5$ prism.

WHAT A STUDENT DID

Answered 15 — the dimensions added. The gap between 15 and 120 is the clearest illustration that adding is the wrong operation.

YOUR MISSION

What went wrong? What's the right answer?



Find the volume of a $6 \times 4 \times 5$ prism.

- 1 $6 \times 4 = 24$ in the base layer.
- 2 5 layers, so 120 cubic units.
- 3 Worth noticing this base equals the WHOLE volume of item 1 — the numbers grow fast.

Answer: 120 cubic units



Pick your pepper!

**MILD**

Find the volume of a $4 \times 3 \times 2$ prism.

#1 on your practice sheet

**MEDIUM**

For the $4 \times 3 \times 2$ prism, work out the volume three times, using a different face as the base each time.

#3 on your practice sheet

**SPICY**

A $3 \times 3 \times 3$ block sits on a $3 \times 3 \times 1$ slab. Find the total volume, and explain why you must not count the join twice.

#8 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

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

