Cube Fit Test

Which solids can unit cubes fill exactly?

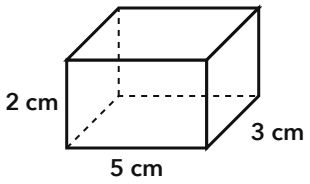
4.GM.2.3 "Develop the concept that the volume of rectangular prisms with whole-number edge lengths can be found by counting the total number of same-sized unit cubes that fill a shape without gaps or overlaps..."

NAME _____ DATE _____

CUBES FIT

Cubes with 1-cm edges can fill this solid with no gaps or overlaps. Each cube takes up 1 cm^3 of space.

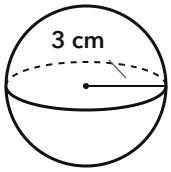
A rectangular prism measuring 5 cm by 3 cm by 2 cm holds 30 unit cubes.



GAPS LEFT

Cubes with 1-cm edges cannot fill this solid exactly. A curved or slanted side leaves gaps.

A ball with a 3 cm radius has a curved surface. Unit cubes would leave gaps near its edge.



1 SORT

8 items

Circle FITS or GAPS for each figure, then choose one figure from each group and explain how you knew in Part 2.

1.

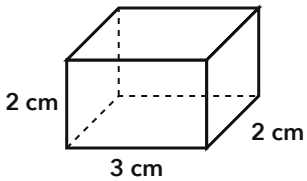


Figure 1

FITS GAPS

2.

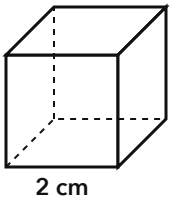


Figure 2

FITS GAPS

3.

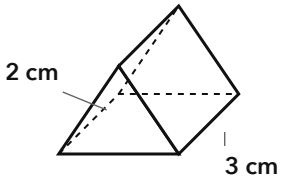


Figure 3

FITS GAPS

4.

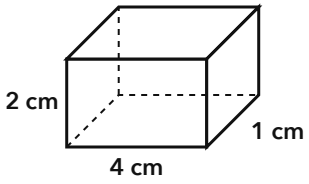


Figure 4

FITS GAPS

5.

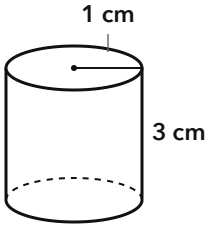


Figure 5

FITS GAPS

6.

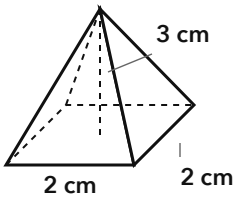


Figure 6

FITS GAPS

7.

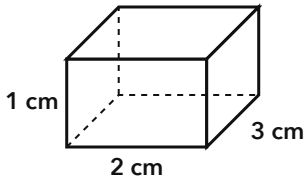


Figure 7

FITS GAPS

8.

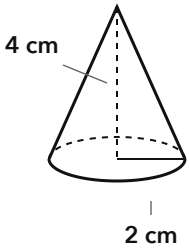


Figure 8

FITS GAPS

2 PROVE IT

Explain your thinking

Choose one figure from each group and explain how you knew in Part 2.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write one new example for FITS and one for GAPS. For each, name the solid, give its measurements in centimeters, and tell why it belongs in that group.

FITS

GAPS

CHALLENGE

Choose one FITS figure. Find its volume in cubic centimeters, and explain how you counted the unit cubes.

ANSWER KEY

Cube Fit Test

GRADE 4 · 4.GM.2.3

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	Figure 1 (prism)	**FITS**	A rectangular prism with whole-number centimeter edges can be filled by 12 unit cubes.
2	Figure 2 (cube)	**FITS**	A cube with 2-cm edges can be filled by eight unit cubes.
3	Figure 3 (triangular_prism)	**GAPS**	The slanted face of the triangular prism leaves gaps beside unit cubes.
4	Figure 4 (prism)	**FITS**	Two layers of four unit cubes fill the rectangular prism exactly.
5	Figure 5 (cylinder)	**GAPS**	The cylinder's curved side leaves gaps beside unit cubes.
6	Figure 6 (pyramid)	**GAPS**	The pyramid's slanted sides prevent unit cubes from filling it exactly.
7	Figure 7 (prism)	**FITS**	One layer of six unit cubes fills the rectangular prism exactly.
8	Figure 8 (cone)	**GAPS**	The cone's curved side leaves gaps beside unit cubes.

PART 2 · PROVE IT

Task: Choose one figure from each group and explain how you knew in Part 2.
Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **FITS**: A rectangular prism measuring 6 cm by 2 cm by 2 cm holds 24 cubes with 1-cm edges and no gaps.
- **GAPS**: A cylinder 2 cm tall with a 3 cm radius has a curved side that leaves gaps beside unit cubes.

Challenge: Figure 1 has two layers of six unit cubes. Its volume is 12 cm^3.

FITS: 1, 2, 4, 7. GAPS: 3, 5, 6, 8. A GAPS solid still has volume, but unit cubes cannot fill it exactly.