Fill It Exactly

Decide which solids can be filled with unit cubes.

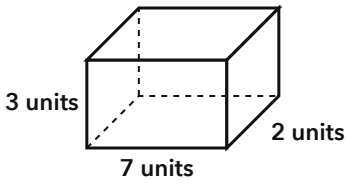
5.6.A "recognize a cube with side length of one unit as a unit cube having one cubic unit of volume and the volume of a three-dimensional figure as the number of unit cubes (n cubic units) needed to fill it with no gaps or overlaps if possible..."

NAME _____ DATE _____

EXACT UNIT-CUBE FILL

This solid can be filled with whole unit cubes with no gaps or overlaps. Its volume can be counted in cubic units.

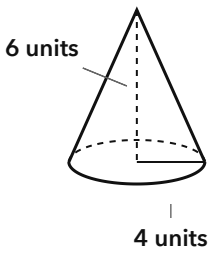
A rectangular prism that is 7 units long, 2 units wide, and 3 units high has an exact unit-cube fill.



NOT AN EXACT UNIT-CUBE FILL

This solid cannot be filled with whole unit cubes with no gaps or overlaps. Curved or slanted surfaces prevent an exact fill.

A cone has a curved surface, so whole unit cubes cannot fill it exactly.



1 SORT

8 items

Part 1: For each figure, circle EXACT or NOT EXACT; Part 2: Choose two figures and explain how the shape and measurements show your choice.

1.

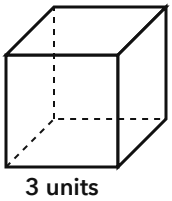


Figure 1

EXACT NOT EXACT

2.

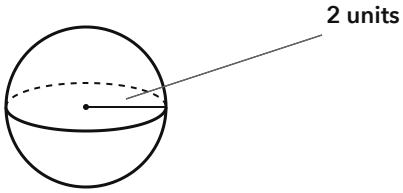


Figure 2

EXACT NOT EXACT

3.

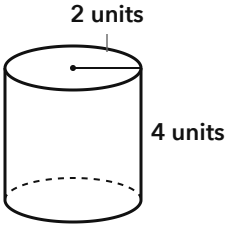


Figure 3

EXACT NOT EXACT

4.

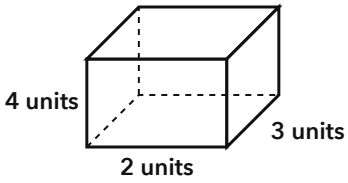


Figure 4

EXACT NOT EXACT

5.

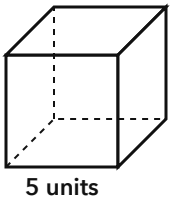


Figure 5

EXACT NOT EXACT

6.

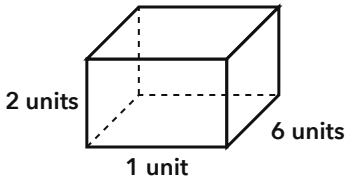


Figure 6

EXACT NOT EXACT

7.

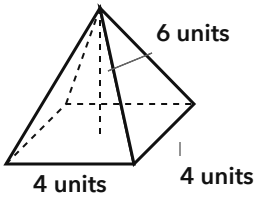


Figure 7

EXACT NOT EXACT

8.

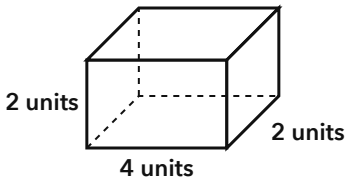


Figure 8

EXACT NOT EXACT

2 PROVE IT

Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write one new example of an EXACT solid and one new example of a NOT EXACT solid. Tell why each belongs in that category.

EXACT _____

NOT EXACT _____

CHALLENGE

A rectangular prism is 5 units long, 2 units wide, and 4 units high. Decide its category and find how many unit cubes fill it.

ANSWER KEY

Fill It Exactly

GRADE 5 · TEKS 5.6.A

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	Figure 1 (cube)	**EXACT**	A cube with a whole-number side length can be filled by 1-unit cubes with no gaps or overlaps.
2	Figure 2 (sphere)	**NOT EXACT**	A sphere has a curved surface, so unit cubes leave gaps around the curve.
3	Figure 3 (cylinder)	**NOT EXACT**	A cylinder has curved sides, so unit cubes cannot fill it with no gaps or overlaps.
4	Figure 4 (prism)	**EXACT**	This rectangular prism has whole-number unit dimensions and can be filled by unit cubes.
5	Figure 5 (cube)	**EXACT**	A cube with side length 5 units can be filled exactly by unit cubes.
6	Figure 6 (prism)	**EXACT**	This rectangular prism has whole-number unit dimensions and can be filled exactly by unit cubes.
7	Figure 7 (pyramid)	**NOT EXACT**	A pyramid has slanted faces, so whole unit cubes cannot make an exact fill.
8	Figure 8 (prism)	**EXACT**	This rectangular prism has whole-number unit dimensions and can be filled by unit cubes.

PART 2 · PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **EXACT**: A rectangular prism that is 3 units long, 3 units wide, and 2 units high can be filled with 18 unit cubes.
- **NOT EXACT**: A cone with a radius of 3 units and a height of 4 units cannot be filled exactly with whole unit cubes because it has a curved surface.

Challenge: EXACT. 5 × 2 × 4 = 40, so 40 unit cubes fill the prism.

Items 1, 4, 5, 6, and 8 are EXACT. Items 2, 3, and 7 are NOT EXACT because their curved or slanted surfaces prevent a gap-free, overlap-free fill with whole unit cubes.