Understanding Volume

Understanding Volume: Models and Computation

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

Volume measures occupied space. A cube with edge 1 unit occupies 1 cubic unit. The count of cubes and their volume are different quantities, even when their numbers match. Empty space is not part of the occupied volume.

Worked example

A solid has layers of $4, 4, 3$ unit cubes. Find its cube count and volume.

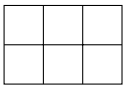
1. Count all layers: $4 + 4 + 3 = 11$ cubes.
2. Each contributes 1 cubic unit, so $11 \times 1 = 11$ cubic units.
Answer: 11 cubes; 11 cubic units.

Practice Problems

Show your thinking.

1. A solid is built from 18 cubes with 1 cm edges and no overlap. Give its volume and the correct unit.

2. The grid shows one complete layer. Each square is the top of a cube with 1 cm edges. A solid has two layers like this. Give its cube count and volume.



3. Two solids use 14 and 19 identical unit cubes. Which has greater volume, and by how many cubic units?

4. A student labels the volume of 15 unit cubes as 15 square units. Correct the label and explain what is measured.

5. The three layers of a model contain $7, 5, 2$ unit cubes. Find its volume without filling the empty positions.

6. A solid has 24 unit cubes arranged in equal layers of 8 cubes. Find the layer count.

Answer Key

1. 18 cm^3.
2. 12 cubes; 12 cm^3.
3. The second; 5 cubic units more.
4. 15 cubic units.
5. 14 cubic units.
6. 3 layers.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Each cube occupies $1 \times 1 \times 1 = 1$ cm^3.
2. All 18 occupy $18 \times 1 = 18$ cm^3.

Problem 2

1. Count 3 columns and 2 rows: $3 \times 2 = 6$ cubes per layer.
2. Two layers contain $2 \times 6 = 12$ cubes. This is a count of objects.
3. Each cube occupies $1 \times 1 \times 1 = 1$ cm^3, so the volume is $12 \times 1 = 12$ cm^3.

Problem 3

1. Volumes are 14 and 19 cubic units because each cube counts once.
2. $19 - 14 = 5$ cubic units.

Problem 4

1. One unit cube occupies $1 \times 1 \times 1 = 1$ cubic unit of space.
2. $15 \times 1 = 15$ cubic units. Square units measure area, not the space inside the solid.

Problem 5

1. Count the actual layers: $7 + 5 = 12$ cubes, then $12 + 2 = 14$ cubes.
2. Each occupies 1 cubic unit, so $14 \times 1 = 14$ cubic units.

Problem 6

1. Layers count groups of 8: $24 \div 8 = 3$.
2. Check: $3 \times 8 = 24$ cubes.

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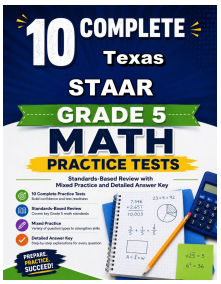

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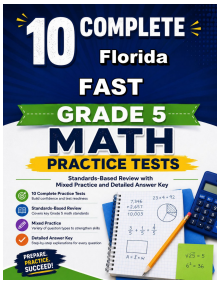

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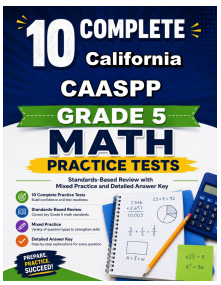

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