Measuring Volume with Unit Cubes

Measuring Volume with Unit Cubes: Models and Computation

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

Each unit cube takes up one cubic unit of space. Count a complete layer, then count how many layers have that size. Add separate layer counts if the layers differ. Include hidden cubes, not just faces you can see.

Worked example

A model has 3 full layers. Each layer has 2 rows of 5 unit cubes. Find its volume.

1. One layer has $2 \times 5 = 10$ cubes.

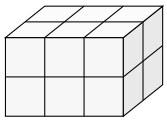
2. Three layers have $3 \times 10 = 30$ unit cubes, so volume is 30 cubic units.

Answer: 30 cubic units.

Practice Problems

Show your thinking.

1. Each cube in the solid has a 1 cm edge. Use the grid on the solid to count cubes in one horizontal layer and find the volume.



2. A stack has 4 equal layers, each with 2 rows of 3 unit cubes. Write a multiplication expression and find the volume.

3. A solid has 2 complete layers. Each layer has 4 rows of 2 cubes. Draw a top view and find the cubes per layer and in the solid.

4. Each complete layer contains 7 unit cubes. Fill the two missing counts in the table.

Layers	Cubes in all
1	7
2	?
3	?

5. A solid has a full bottom layer 4 cubes by 3 cubes. Its top layer is only one row of 4 cubes. Find the total volume.

6. A block of one-inch cubes is 3 cubes long, 5 cubes deep, and 3 cubes high. Give the volume and explain why the unit is cubic inches.

7. A 2 by 2 by 3 block of unit cubes has one extra unit cube placed beside it. Find the volume of the whole solid.

8. A block is 4 cubes long, 3 deep, and 2 high. Instead of horizontal layers, group it into 4 vertical slices along its length. Find the cubes in each slice and in all.

Answer Key

1. 6 cubes per layer; 12 cm^3.
2. $4 \times (2 \times 3) = 24$ cubic units.
3. Top view: 4 rows of 2; 8 cubes per layer and 16 in all.
4. 2 layers: 14 cubes; 3 layers: 21 cubes.
5. 16 cubic units.
6. 45 cubic inches.
7. 13 cubic units.
8. 6 cubes per slice; 24 cubes in all.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

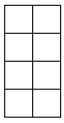
1. One layer is 3 cubes across and 2 deep: $3 \times 2 = 6$ cubes.
2. There are 2 full layers, so $6 \times 2 = 12$ cubes of 1 cm^3 each.

Problem 2

1. One layer contains $2 \times 3 = 6$ cubes.
2. Count all four layers: $4 \times 6 = 24$ cubic units.

Problem 3

1. Draw 4 rows of 2 squares for $4 \times 2 = 8$ cube positions in one layer.



2. There are 2 such layers, so $2 \times 8 = 16$ cubes.

Problem 4

1. Two layers contain $2 \times 7 = 14$ cubes.
2. One more layer gives $14 + 7 = 21$ cubes.

Problem 5

1. The full layer has $4 \times 3 = 12$ cubes.
2. The partial layer has 4, so the total is $12 + 4 = 16$ cubic units.

Problem 6

1. One layer has $3 \times 5 = 15$ cubes. Three layers have $15 \times 3 = 45$.
2. Each cube occupies 1 cubic inch, so 45 cubes occupy 45 cubic inches.

Problem 7

1. The block has $2 \times 2 = 4$ cubes per layer and $4 \times 3 = 12$ cubes.
2. Add the separate cube: $12 + 1 = 13$ cubic units.

Problem 8

1. Each slice is 3 cubes deep and 2 high, so it holds $3 \times 2 = 6$ cubes.
2. There are 4 such slices, so $4 \times 6 = 24$ cubes.

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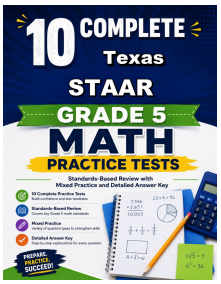

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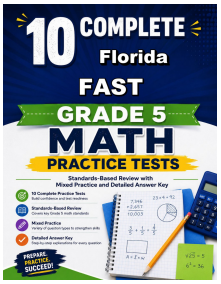

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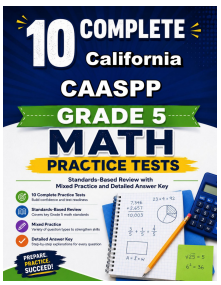

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