

Understanding Volume and Unit Cubes

Grade 5 Math • Section 9.1

Name: _____

Date: _____

Score: _____ / 12

Quick Review and Helpful Hints

Volume: The amount of space inside a three-dimensional figure, measured in **cubic units** (cubic cm, cubic in, cubic ft, etc.).

Unit cube: A cube with side length 1 unit. Its volume is 1 cubic unit.

Volume is measured in **cubic units** (e.g., cm^3 , in^3), not square units. Think of how many unit cubes fill the shape.

Example: A box is filled with unit cubes that are 1 cm on each side. The bottom layer has 12 cubes and the box is 3 layers tall. What is the volume?

12 cubes per layer \times 3 layers = 36 unit cubes. Volume = 36 cm^3 .

Answer: 36 cm^3

Practice Problems

Find the volume of each figure by counting unit cubes or using the given information.

- A box has 10 cubes per layer and 4 layers. Volume = _____
- A box has 6 cubes per layer and 5 layers. Volume = _____
- A box has 15 cubes per layer and 2 layers. Volume = _____
- A box has 8 cubes per layer and 3 layers. Volume = _____
- A cube is 1 in on each side. What is its volume? _____
- A box contains 24 unit cubes in one layer and 6 layers. Volume = _____
- A prism contains 48 unit cubes total. If it has 4 layers, how many cubes per layer? _____
- A shoebox is filled with 1 cm cubes. It fits 20 cubes along the bottom and has 3 layers. Volume = _____
- Two boxes each have a volume of 30 cubic units. Combined volume = _____
- A layer of cubes has 5 rows of 4 cubes. How many cubes in one layer? _____

Word Problems

- A toy chest is 3 cubes long, 2 cubes wide, and 4 cubes tall (using 1-inch cubes). What is its volume in cubic inches? _____
- Emma fills a box with 1 cm cubes. She counts 36 cubes in the bottom layer, and the box is 5 layers tall. What is the volume of the box? _____



Answer Keys

- | | |
|---------------------|------------------------|
| 1. 40 | 7. 12 |
| 2. 30 | 8. 60 cm^3 |
| 3. 30 | 9. 60 |
| 4. 24 | 10. 20 |
| 5. 1 in^3 | 11. 24 in^3 |
| 6. 144 | 12. 180 cm^3 |

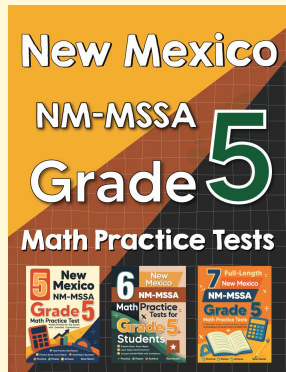
Step-by-Step Explanations

- Start with the main idea. For volume and unit cubes, 10 cubes per layer times 4 layers is 40. Volume counts cubic units, so the unit on the answer should be cubic units.
- Keep the work tidy. For volume and unit cubes, $6 \times 5 = 30$ cubes. For rectangular prisms, multiply length, width, and height.
- Look at what the numbers mean. For volume and unit cubes, $15 \times 2 = 30$ cubes. For composite figures, find each prism's volume first and then add.
- Use the setup first. For volume and unit cubes, $8 \times 3 = 24$ cubes. Volume counts cubic units, so the unit on the answer should be cubic units.
- Check the size of the answer. For volume and unit cubes, a 1 inch cube has volume $1 \times 1 \times 1 = 1$ cubic inch. For rectangular prisms, multiply length, width, and height.
- Match the operation to the words. For volume and unit cubes, $24 \times 6 = 144$ unit cubes. For composite figures, find each prism's volume first and then add.
- Write the important values first. For volume and unit cubes, $48 \div 4 = 12$ cubes per layer. Volume counts cubic units, so the unit on the answer should be cubic units.
- Follow the pattern carefully. For volume and unit cubes, 20 cubes per layer times 3 layers is 60 cubic centimeters. For rectangular prisms, multiply length, width, and height.
- Start with the main idea. For volume and unit cubes, $30 + 30 = 60$ cubic units. For composite figures, find each prism's volume first and then add.
- Keep the work tidy. For volume and unit cubes, 5 rows of 4 cubes is $5 \times 4 = 20$. Volume counts cubic units, so the unit on the answer should be cubic units.
- Look at what the numbers mean. For volume and unit cubes, $3 \times 2 \times 4 = 24$ cubic inches. For rectangular prisms, multiply length, width, and height.
- Use the setup first. For volume and unit cubes, 36 cubes per layer times 5 layers is 180 cubic centimeters. For composite figures, find each prism's volume first and then add.



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