

# 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.,  $\text{cm}^3$ ,  $\text{in}^3$ ), 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 =  $36 \text{ cm}^3$ .

**Answer:**  $36 \text{ cm}^3$

## 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

2. 30

3. 30

4. 24

5.  $1 \text{ in}^3$

6. 144

7. 12

8.  $60 \text{ cm}^3$

9. 60

10. 20

11.  $24 \text{ in}^3$

12.  $180 \text{ cm}^3$

### Step-by-Step Explanations

1. 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.

2. Keep the work tidy. For volume and unit cubes,  $6 \times 5 = 30$  cubes. For rectangular prisms, multiply length, width, and height.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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.

10. 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.

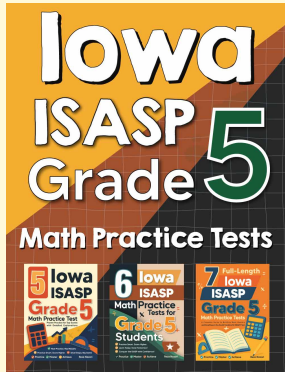
11. Look at what the numbers mean. For volume and unit cubes,  $3 \times 2 \times 4 = 24$  cubic inches. For rectangular prisms, multiply length, width, and height.

12. 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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