MATHEMATICS · GRADES 4-6

Volume of rectangular prisms

Difficulty level: Intermediate

Mathematics: Grades 4-6

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Overview of the concept

This is how you work out how much a box shaped object holds, like a shipping box, a fish tank, or a moving crate, by counting the cubes that fill it. A box is filled with unit cubes, and the number that fit is the length times the width times the height. That count is the volume, and it tells you how much the box can hold. That is how you check whether a crate will fit your belongings, how much water a tank holds, or how big a shipping box you need.



Rule

Volume of rectangular prisms: $V = l \times w \times h$

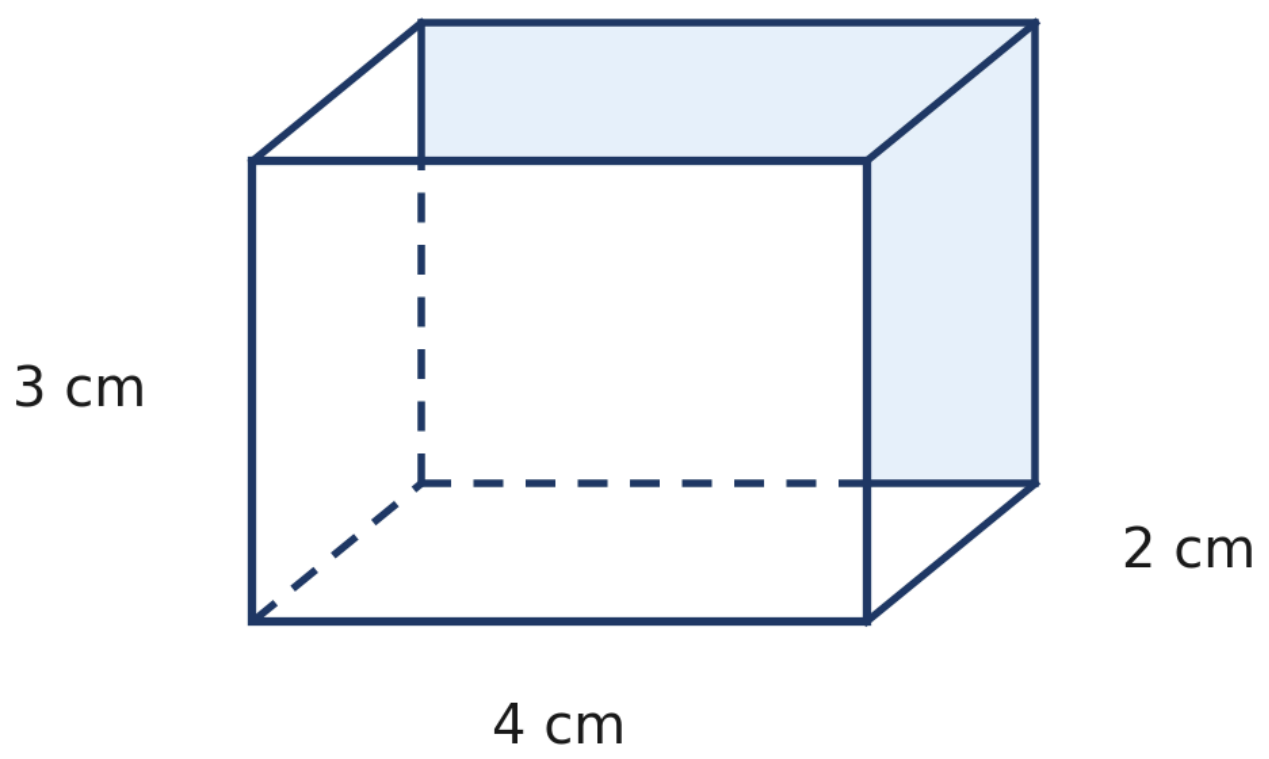
The volume is in cubic units.

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Worked examples

EXAMPLE 1

Q What is the volume of a rectangular prism that is 4 cm long, 3 cm wide and 2 cm high?



SOLUTION

This is a volume question, so the one rule to remember is: volume is length times width times height, the number of unit cubes that fit inside the box. Multiply all three edges together.

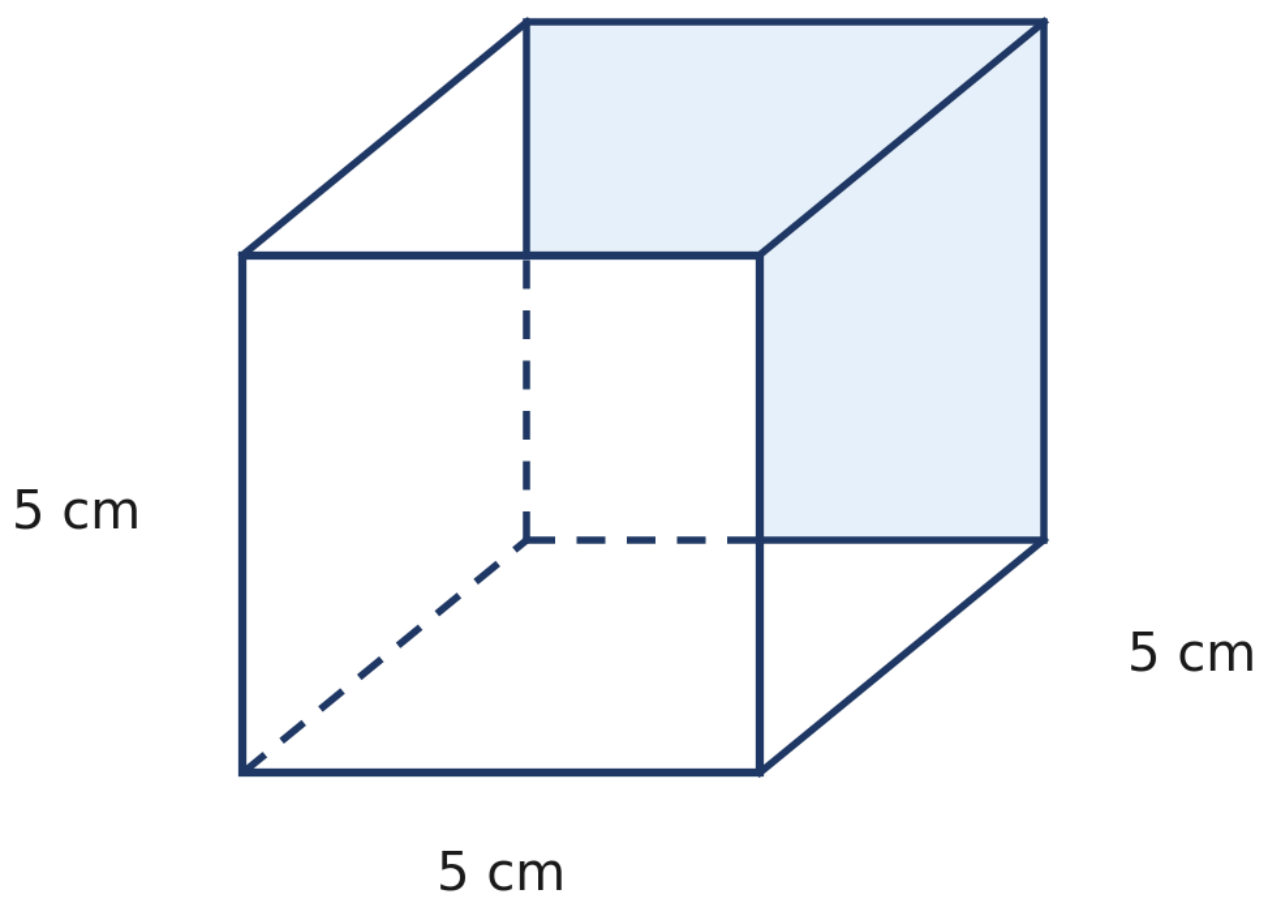
Volume = $4 \times 3 \times 2 = 24$

So the volume is 24 cm^3.

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EXAMPLE 2

Q What is the volume of a cube with side length 5 cm?



SOLUTION

This is the same question type for a cube: all three edges are the same length, so the volume is that length multiplied by itself three times.

Volume = $5 \times 5 \times 5 = 125$

So the volume is $125\ \text{cm}^3$.

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Practice questions

1 A rectangular prism is 5 cm long, 4 cm wide and 3 cm high. What is its volume?

- **A** 12 cm^3
- **B** 20 cm^3
- **C** 15 cm^3
- **D** 60 cm^3

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2 A rectangular prism has a volume of 90 cm^3. Its base is 6 cm by 5 cm. What is its height?

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3 A fish tank is 24 inches long, 12 inches wide and 10 inches tall. It is filled with water to a depth of 8 inches. How many cubic inches of water are in the tank?

- **A** 1152 in^3
- **B** 1920 in^3
- **C** 2304 in^3
- **D** 2880 in^3

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4 The volume of a cube is 125 cm^3. What is the length of each side?

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5 A box has a base area of 36 square feet and a height of 4 feet. What is its volume?

- **A** 9 ft^3
- **B** 40 ft^3
- **C** 72 ft^3
- **D** 144 ft^3

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6 A juice box is 8 cm long, 5 cm wide and 12 cm high. What is its volume?

- **A** 25 cm^3
- **B** 40 cm^3
- **C** 96 cm^3
- **D** 480 cm^3

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7 An aquarium has a volume of 1728 cubic inches. It is 12 inches long and 9 inches wide. How tall is it?

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8 How many 1-cm cubes fit in a box that is 8 cm long, 5 cm wide and 4 cm high?

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9 A rectangular prism has a volume of 120 cubic inches. It is 4 inches wide and 5 inches high. How long is it?

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10 A sandbox is 8 feet long, 5 feet wide and 1 foot deep. Sand is sold in 2-cubic-foot bags. How many bags are needed to fill the sandbox?

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ANSWER KEY

1. 60 cm^3

2. 3

3. 2304 in^3

4. 5

5. 144 ft^3

6. 480 cm^3

7. 16

8. 160

9. 6

10. 20

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