

WA7MMGTH2

Three-dimensional space

Core + Challenge

Volume of Rectangular Prisms

I can find the volume of rectangular prisms, connect volume to capacity, and solve problems with cubic units.

Name: _____ Date: _____ Score: _____ / 58

Key idea

Volume is the space inside a 3D object, measured in **cubic units** (cm^3 , m^3).

Rectangular prism: $V = l \times w \times h$ (= area of base $\times$ height). Cube: $V = \text{side} \times \text{side} \times \text{side}$.

Volume $\leftrightarrow$ capacity: $1 \text{ cm}^3 = 1 \text{ mL}$ · $1000 \text{ cm}^3 = 1 \text{ L}$ · $1 \text{ m}^3 = 1000 \text{ L}$.

Same units first. A $60 \text{ cm} \times 30 \text{ cm} \times 40 \text{ cm}$ tank holds $72\,000 \text{ cm}^3 = 72 \text{ L}$.

A

Fluency *practise the skill*

/ 16 marks

Work out each answer. 1 mark each.

1. $5 \text{ cm} \times 3 \text{ cm} \times 2 \text{ cm}$ _____

9. $V = 96 \text{ cm}^3$, $l = 8$, $w = 4$: height _____

2. $10 \text{ cm} \times 4 \text{ cm} \times 6 \text{ cm}$ _____

10. Cube of volume 125 cm^3 : side _____

3. Cube, side 4 cm _____

11. $2000 \text{ cm}^3 = \underline{\hspace{1cm}} \text{ L}$ _____

4. $8 \text{ cm} \times 2.5 \text{ cm} \times 3 \text{ cm}$ _____

12. $3.5 \text{ L} = \underline{\hspace{1cm}} \text{ cm}^3$ _____

5. $12 \text{ cm} \times 5 \text{ cm} \times 10 \text{ cm}$ _____

13. $750 \text{ mL} = \underline{\hspace{1cm}} \text{ cm}^3$ _____

6. Cube, side 10 cm _____

14. $2 \text{ m}^3 = \underline{\hspace{1cm}} \text{ L}$ _____

7. $1.5 \text{ m} \times 2 \text{ m} \times 4 \text{ m}$ _____

15. Capacity of $6 \times 5 \times 4 \text{ cm}$ box (mL) _____

8. Base area 24 cm^2 , height 5 cm _____

16. $0.5 \text{ m} \times 0.4 \text{ m} \times 0.3 \text{ m}$ _____

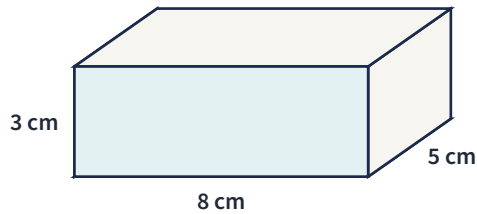
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B**Core** *apply the skill to problems*

/ 22 marks

- 1 Find the volume of this rectangular prism.

[2 marks]



Answer: _____

- 2 A fish tank is 60 cm long, 30 cm wide and 40 cm high. Find its volume in cm^3 and its capacity in litres.

[2 marks]

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Answer: _____

- 3 A box is packed with 1 cm cubes: 6 cubes long, 4 cubes wide and 3 layers high. How many cubes fit? What is the volume?

[2 marks]

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Answer: _____

- 4 A shipping container is 12 m long, 2.4 m wide and 2.6 m high. Find its volume.

[2 marks]

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Answer: _____

- 5 A pool is 8 m long, 4 m wide and 1.5 m deep. How many litres of water does it hold when full?

[2 marks]

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Answer: _____

- 6 A milk carton is $7\text{ cm} \times 7\text{ cm} \times 20\text{ cm}$. Can it hold 1 litre of milk? Explain.

[2 marks]

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Answer: _____

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- 7 A sandpit 2 m by 1.5 m is filled with sand 0.3 m deep. Sand comes in bags of 0.05 m^3 . How many bags are needed? [3 marks]

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Answer: _____

- 8 How many 2 cm cubes fit exactly into a box $10 \text{ cm} \times 6 \text{ cm} \times 4 \text{ cm}$? [2 marks]

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Answer: _____

- 9 A rectangular prism has a volume of 360 cm^3 . Its base is $12 \text{ cm} \times 6 \text{ cm}$. Find its height. [2 marks]

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Answer: _____

- 10 25 mm of rain falls on a flat roof 10 m by 8 m. How many litres of water land on the roof? [3 marks]

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Answer: _____

C Reasoning *explain, justify and check*

/ 9 marks

- 1 Explain why volume is measured in cubic units, using 1 cm cubes in your answer. [2 marks]

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- 2 Leo says doubling every dimension of a box doubles its volume. Test this with a $2 \times 3 \times 4$ box. [3 marks]

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- 3 A $4 \times 4 \times 4 \text{ cm}$ box and an $8 \times 4 \times 2 \text{ cm}$ box have the same volume. Which uses less cardboard? Show working. [2 marks]

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- 4 Explain why $1 \text{ m}^3 = 1\,000\,000 \text{ cm}^3$. [2 marks]

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D Challenge *multi-step and problem-solving*

/ 11 marks

- 1 A cube has a volume of 216 cm^3 . Find the total length of all its edges. [3 marks]

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Answer: _____

- 2 A tank with base $50 \text{ cm} \times 40 \text{ cm}$ has water 30 cm deep. When a rock is dropped in, the water rises to 32 cm . Find the volume of the rock. [3 marks]

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Answer: _____

- 3 An open box is made from a $20 \text{ cm} \times 15 \text{ cm}$ card by cutting a 3 cm square from each corner and folding up the sides. Find its volume. [3 marks]

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Answer: _____

- 4 How many boxes $20 \text{ cm} \times 10 \text{ cm} \times 10 \text{ cm}$ fit into a carton $60 \text{ cm} \times 40 \text{ cm} \times 30 \text{ cm}$? [2 marks]

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Answer: _____

How did I go?Fluency ____ / 16 Core ____ / 22 Reasoning ____ / 9 Challenge ____ / 11 **Total ____ / 58**

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