

Volume

Maths

Level 2

Exam-style practice · 10 questions · 29 marks · Calculator allowed

Remember

Cuboid: length $\times$ width $\times$ height. **Cylinder:** $\pi \times r^2 \times h$. **Any prism:** area of the end (cross-section) $\times$ length.

Capacity: $1 \text{ cm}^3 = 1 \text{ ml}$, so $1,000 \text{ cm}^3 = 1 \text{ litre}$. $1 \text{ m}^3 = 1,000 \text{ litres}$.

Same units before you multiply: a tank 1.2 m by 80 cm by 50 cm $\rightarrow 120 \times 80 \times 50 \text{ cm}^3$ or $1.2 \times 0.8 \times 0.5 \text{ m}^3$.

How many fit? Divide the big volume by the small volume for an upper limit – but check the boxes actually stack along each dimension.

Section A – Formulas

1. Find the volume of a cuboid 12 cm by 8 cm by 5 cm. (1 mark)

2. A cylindrical water butt has a radius of 30 cm and a height of 90 cm. Find its volume in cm^3 , then in litres. (3 marks)

3. A triangular prism has a triangular end with base 6 cm and height 4 cm, and is 15 cm long. Find its volume. (2 marks)

4. A fish tank is 1.2 m long, 40 cm wide and 50 cm high. How many litres does it hold when full? (3 marks)

Section B – In context

5. A skip is a cuboid 3.5 m long, 1.7 m wide and 1.2 m deep. It is filled level to the top. What volume of rubbish does it hold? (2 marks)

6. A van's load space is 2.4 m by 1.6 m by 1.4 m. Boxes are 40 cm by 40 cm by 35 cm. (a) How many boxes fit along each dimension? (b) How many boxes fit in total? (4 marks)

7. A swimming pool is 25 m long and 10 m wide with a constant depth of 1.5 m. Water costs £1.85 per m^3 . What does it cost to fill? (3 marks)

8. A cylindrical tin of paint has a diameter of 16 cm and a height of 20 cm. Is it big enough to hold 5 litres of paint? Show your working. (3 marks)

9. A concrete post is a cuboid 10 cm by 10 cm by 1.8 m. Concrete costs £95 per m^3 . What is the cost of concrete for 40 posts? (4 marks)

10. A paddling pool is a cylinder of diameter 2 m filled to a depth of 25 cm. A hose delivers 12 litres a minute. How long does it take to fill? Give your answer to the nearest minute. (4 marks)

Volume – Answers

Level 2 · Working shown so you can check your method, not just the final number.

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Section A

- $12 \times 8 \times 5 = 480 \text{ cm}^3$.
- $\pi \times 30^2 \times 90 = 254,469 \text{ cm}^3 = 254.5 \text{ litres}$ (accept 254,000–254,500 cm^3 and 254 litres).
- End area $\frac{1}{2} \times 6 \times 4 = 12 \text{ cm}^2$. Volume = $12 \times 15 = 180 \text{ cm}^3$.
- $120 \times 40 \times 50 = 240,000 \text{ cm}^3 = 240 \text{ litres}$.

Section B

- $3.5 \times 1.7 \times 1.2 = 7.14 \text{ m}^3$.
- (a) Length: $240 \div 40 = 6$. Width: $160 \div 40 = 4$. Height: $140 \div 35 = 4$. (b) $6 \times 4 \times 4 = 96 \text{ boxes}$.
- $25 \times 10 \times 1.5 = 375 \text{ m}^3 \times 1.85 = \text{£}693.75$.
- $r = 8$. $\pi \times 64 \times 20 = 4,021 \text{ cm}^3 = 4.02 \text{ litres}$. **No** – it holds just over 4 litres.
- One post: $0.1 \times 0.1 \times 1.8 = 0.018 \text{ m}^3$. 40 posts = $0.72 \text{ m}^3 \times 95 = \text{£}68.40$.
- $r = 100 \text{ cm}$. $\pi \times 100^2 \times 25 = 785,398 \text{ cm}^3 = 785.4 \text{ litres}$. $785.4 \div 12 = 65.4 \rightarrow 65 \text{ minutes}$.

Where Level 2 students lose marks on this topic

- Multiplying metres by centimetres. Convert everything to one unit first.
- Using the diameter as the radius in the cylinder formula.
- Working out how many boxes fit by dividing volumes only – 96 fits here, but a 50 cm box would not fit $2.4 \div 0.5 = 4.8$ times along the length.