Marking guide | Surface area, volume and measurement

Surface area, volume and measurement - Practice test 1

16 questions | 40 marks | 55 minutes

Build from units and familiar prisms to cylinders, error and a tank model.

Equivalent correct methods earn the corresponding marks.

1. Which quantity measures the space inside a tank: surface area or volume? State a suitable metric unit. [1 mark]

Volume measures occupied space; area measures the outside faces.

Answer: Volume; cubic centimetres, cubic metres or another cubic unit.

2. Convert 1.8 m² into square centimetres. [2 marks]

1 m² $= 10000$ cm², so $1.8 \times 10000 = 18000$ cm².

Answer: 18,000 cm²

3. Convert 3600 cm³ into litres. [2 marks]

$3600 \div 1000 = 3.6$ L.

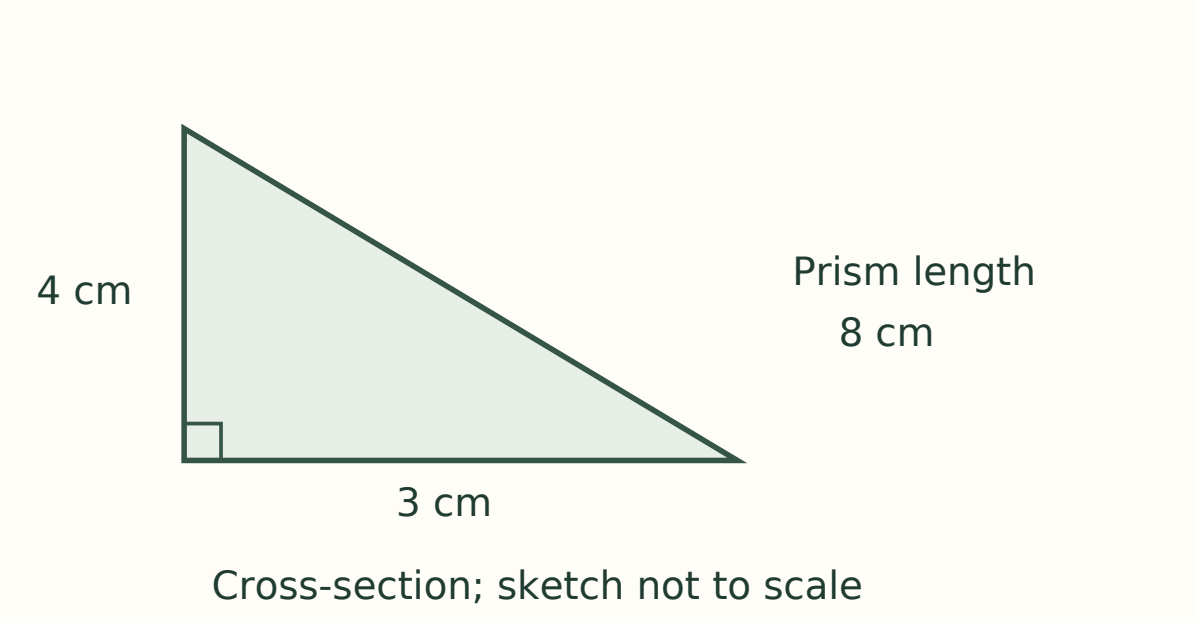
Answer: 3.6 L

4. Find the total surface area of a closed rectangular prism 6 cm by 4 cm by 2 cm. [3 marks]

$A = 2(6 \times 4 + 6 \times 2 + 4 \times 2) = 2(24 + 12 + 8) = 88$ cm².

Answer: 88 cm²

5. A right triangular prism has a cross-section with base 3 cm and perpendicular height 4 cm. Its length is 8 cm. Find its volume. [2 marks]



Cross-section area $= \frac{1}{2}(3)(4) = 6$ cm²; volume $= 6(8) = 48$ cm³.

Answer: 48 cm³

6. Find the curved area of a cylinder with radius 2 cm and height 9 cm. Give an exact answer. [2 marks]

$A_{curved} = 2\pi(2)(9) = 36\pi$ cm².

Answer: 36π cm²

7. A closed cylinder has diameter 8 cm and height 5 cm. Find its total surface area. [3 marks]

The radius is 4 cm. $A = 2\pi(4^2) + 2\pi(4)(5) = 32\pi + 40\pi = 72\pi$ cm².

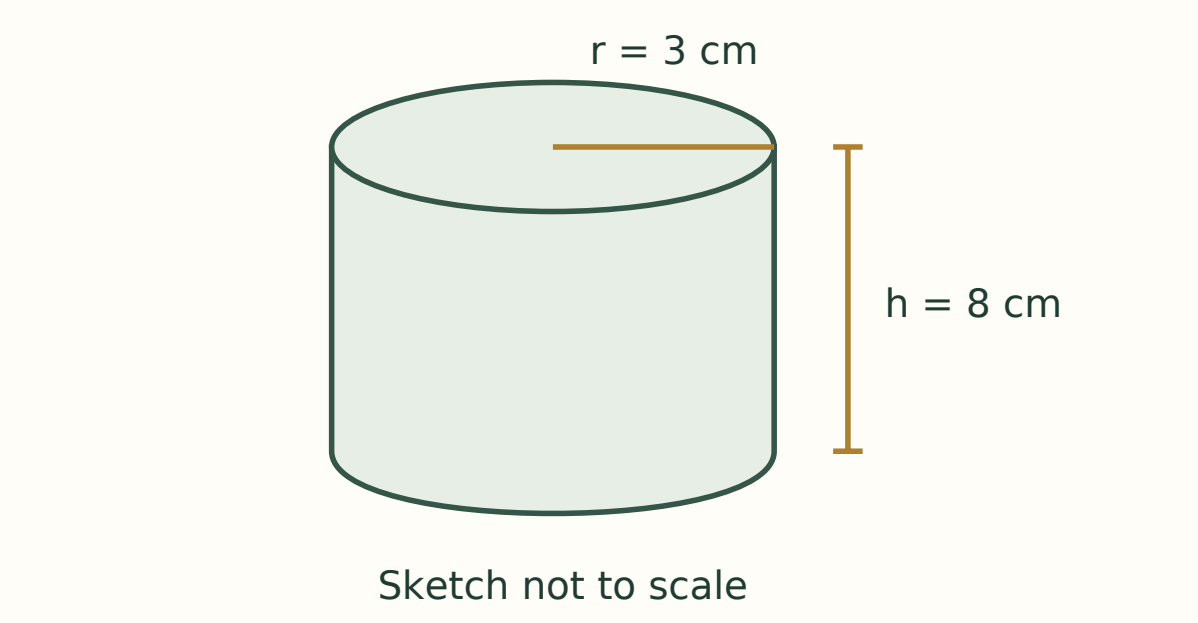
Answer: 72π cm²

8. A right prism has cross-section area 14 cm², cross-section perimeter 18 cm and length 6 cm. Find its surface area. [2 marks]

$A = 2B + PL = 2(14) + 18(6) = 28 + 108 = 136$ cm².

Answer: 136 cm²

9. A cylindrical container has internal radius 3 cm and height 8 cm. Find its capacity to the nearest millilitre. [3 marks]



$V = \pi(3^2)(8) = 72\pi$ cm³ ≈ 226.19 cm³.

Each cm³ is 1 mL, so the answer is 226 mL.

Answer: 226 mL

10. A rectangular tank has internal dimensions 0.6 m by 0.4 m by 0.5 m. Find its full capacity in litres. [2 marks]

$V = 0.6 \times 0.4 \times 0.5 = 0.12$ m³; $0.12 \times 1000 = 120$ L.

Answer: 120 L

11. A reference capacity is 120 L. A measurement gives 117 L. Find the absolute and percentage error. [3 marks]

Absolute error $= |117 - 120| = 3$ L.

Percentage error $= \frac{3}{120} \times 100\% = 2.5\%$.

Answer: 3 L; 2.5%

12. A length is recorded as 8.6 cm to the nearest 0.1 cm. [3 marks]

(a) State the maximum rounding error. [1 mark]

Half of 0.1 cm is 0.05 cm.

Answer: 0.05 cm

(b) Give the interval of unrounded lengths. [2 marks]

Subtract and add 0.05 cm; the upper endpoint would round to 8.7 cm.

Answer: $8.55 \le L < 8.65$ cm.

13. An open-top rectangular container is 12 cm long, 8 cm wide and 5 cm high. Find its material area, ignoring thickness. [3 marks]

Base $= 12(8) = 96$ cm²; walls $= 2(12)(5) + 2(8)(5) = 200$ cm².

Total $96 + 200 = 296$ cm².

Answer: 296 cm²

14. A student writes $4\ \text{m}^2 = 400\ \text{cm}^2$. Explain the error and correct the conversion. [3 marks]

1 m² contains $100 \times 100 = 10000$ cm². Multiply by 4.

Answer: $4\ \text{m}^2 = 40{,}000\ \text{cm}^2$; the length factor was not squared.

15. A label covers the curved wall of a cylinder. The circumference is 31.4 cm and the label height is 12 cm. Find the label area. [2 marks]

The unrolled label is a rectangle: $31.4 \times 12 = 376.8$ cm².

Answer: 376.8 cm²

16. A rectangular tank has an internal base 25 cm by 10 cm and height 40 cm. It starts empty and fills at 2 L per minute. [4 marks]

(a) Find its full capacity in litres. [2 marks]

$25 \times 10 \times 40 = 10000$ cm³ $= 10$ L.

Answer: 10 L

(b) How long does filling take, assuming a constant flow and no overflow? [2 marks]

$10 \div 2 = 5$ minutes.

Answer: 5 minutes