Marking guide | Measurement and scale

Measurement and scale - Applications test

16 questions | 42 marks | 60 minutes

Apply measurement models to packaging, storage and purchasing.

Equivalent correct methods earn the corresponding marks.

1. A doorway measures 0.9 cm on a $1:100$ plan. Find real width. [2 marks]

$0.9 \times 100 = 90$ cm $= 0.9$ m.

Answer: 0.9 m

2. A 2 m cube is a model for a 6 m cube. Find the length factor. [1 mark]

$\frac{6}{2} = 3.$

Answer: 3

3. An area 7 m² is similarly enlarged with lengths tripled. Find new area. [2 marks]

$7 \times 3^2 = 63.$

Answer: 63 m²

4. A board is 2.40 m to the nearest 0.01 m. Give bounds. [2 marks]

Half-unit 0.005 m.

Answer: $2.395 \le L < 2.405$ m

5. Combine non-overlapping blocks 10 by 8 by 4 cm and 6 by 4 by 3 cm. Find volume. [2 marks]

$320 + 72 = 392.$

Answer: 392 cm³

6. A 12 by 8 by 5 cm box has a 4 by 2 cm hole through its entire 5 cm height. Find remaining volume. [3 marks]

$480 - 4 \times 2 \times 5 = 440.$

Answer: 440 cm³

7. A cylindrical tank has internal radius 1 m and water depth 2 m. Find water capacity to nearest litre. [3 marks]

2000π L ≈ 6283.185 L.

Answer: 6283 L

8. A model container holds 0.5 L. A similar container doubles every length. Find capacity. [2 marks]

$0.5 \times 2^3 = 4.$

Answer: 4 L

9. Compare relative errors for 20 cm with 0.2 cm error and 50 cm with 0.4 cm error, using readings as reference. Which is smaller? [3 marks]

1% compared with 0.8%.

Answer: The 50 cm reading.

10. A design uses 12 copies of exact length $\frac{1}{3}$ m. Compare exact total with using 0.33 m each. [3 marks]

$\frac{12}{3} = 4;\ 12 \times 0.33 = 3.96.$

Answer: 4 m versus 3.96 m; short by 0.04 m.

11. A pyramid roof has square base edge 8 m and triangular slant height 5 m. Find the four roof faces' total area. [2 marks]

$4 \times \frac{1}{2} \times 8 \times 5 = 80.$

Answer: 80 m²

12. A closed cubic shell has outer edge 10 cm and 1 cm walls. Find material volume. [3 marks]

Inner edge 8 cm.

$10^3 - 8^3 = 488.$

Answer: 488 cm³

13. Cut 4 cm corner squares from 30 by 24 cm card. Find folded open-box volume. [3 marks]

Height 4; base 22 by 16.

$4 \times 22 \times 16 = 1408.$

Answer: 1408 cm³

14. A job needs 12.5 m² of tiles plus 8% waste. Boxes cover 2 m². Find minimum boxes. [3 marks]

Area 13.5 m²; 6.75 boxes, so buy 7.

Answer: 7

15. Two similar cubes have surface areas 96 cm² and 216 cm². The smaller cube has volume 64 cm³. Find the larger volume. [4 marks]

Surface area factor $= \frac{216}{96} = 2.25.$

Length factor $= \sqrt{2.25} = 1.5.$

$\text{Volume} = 64 \times 1.5^3 = 216$ cm³.

Answer: 216 cm³

16. A tank model uses outside dimensions, assumes full capacity, and quotes nearest millilitre. Identify two justified improvements. [4 marks]

Walls reduce water space; head space reduces fill height.

Rounded measurements do not support millilitre certainty.

Answer: Use internal dimensions and realistic fill height; report suitable precision.