

Exercise walk-through

3.1.2

Scale Drawings

AQA · GCSE · Mathematics

22. Scale drawings and maps · Foundation

Scale drawings and maps · Foundation

At 1:25,000, 4 cm represents $100,000 \text{ cm} = 1000 \text{ m} = 1 \text{ km}$. A real 1.5 km path is 150,000 cm, so it measures $150,000 / 25,000 = 6 \text{ cm}$ on the map. A room 6 m by 4 m drawn at 1:100 becomes 6 cm by 4 cm because each metre is 100 cm. Its drawing diagonal is $\sqrt{(6^2 + 4^2)} \approx 7.21 \text{ cm}$ and the real diagonal is about 7.21 m. Enlarging the printed map changes its numerical scale: doubling drawing lengths halves the scale denominator. A scale bar printed with the map enlarges with it.

48. Length, area and volume scale factors · Higher

Length, area and volume scale factors · Higher

For similar shapes with corresponding length factor k , area factor is k^2 and volume factor is k^3 . Name the direction of the comparison: model to real or real to model. Recover k from an area ratio by a square root and from a volume ratio by a cube root. A change in only one dimension does not create similar solids. Higher links corresponding sides to equal trigonometric ratios.

50. Length, area and volume scale factors · Higher

Length, area and volume scale factors · Higher

Enlarging a box from $2 \times 3 \times 4$ to $6 \times 9 \times 12$ multiplies lengths by 3. Its volume changes from 24 to 648, a factor of 27; a 2×3 face changes area from 6 to 54, a factor of 9. Length ratio 2:5 corresponds to area ratio 4:25 and volume ratio 8:125. If similar shapes have areas 20 and 80 cm^2 , the larger-to-smaller length factor is $\sqrt{(80/20)}=2$. If similar solids have volumes 16 and 128 cm^3 , $k=\sqrt[3]{8}=2$. Higher: triangles with the same acute angle have equal opposite/hypotenuse ratios; doubling both lengths leaves $\sin\theta$ unchanged.

Exercises 2.1·2.3

2.1 (Foundation) At 1:25000, find the real length in km for 4 cm.

2.2 (Foundation) Find the drawing length in cm of a 1.5 km route at that scale.

2.3 (Foundation) Find the drawing width in cm of a 4 m room at 1:100.

3 Exam-style questions

Exercises 2.1·2.3

2.1 (Foundation) At 1:25000, find the real length in km for 4 cm.

2.1 $4 \times 25000 / 100000 = 1$ km.

2.2 (Foundation) Find the drawing length in cm of a 1.5 km route at that scale.

2.2 1.5 km = 150000 cm; divide by 25000.

2.3 (Foundation) Find the drawing width in cm of a 4 m room at 1:100.

3 Exam-style questions

2.3 4 m = 400 cm; $400 / 100 = 4$ cm.

Exercise 3.1

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: A scale of 1:25000 means 1 cm represents 25000 km.

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3.1 False. The ratio uses matching units: 1 cm represents 25000 cm=250 m=0.25 km.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.