3.11 Scale Drawings: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A scale drawing of a toy uses a scale of 1 : 10. The real toy is 45 cm tall. Work out the height of the toy on the scale drawing, in cm.

(Total for Question 1 is 2 marks)

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2 On a map the scale is 1:50 000. How many kilometres does 3 cm on the map represent?

(Total for Question 2 is 1 mark)

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3 Which of these scales would give the smallest scale drawing of the same real-life object?

- ☐ A) 1 : 10
- ☐ B) 1 : 100
- ☐ C) 1 : 1000
- ☐ D) 1 : 10000

(Total for Question 3 is 1 mark)

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4 A scale drawing is to be made of a school hall that is 30 m long in real life. Explain why a scale of 1 : 1 would not be sensible to use for this drawing.

(Total for Question 4 is 1 mark)

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5 A scale drawing of a garden is made using a scale of 1 : 20. The area of the garden on the scale drawing is 15 cm². Work out the real area of the garden, giving your answer in m^2.

(Total for Question 5 is 3 marks)

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6 A large rectangular plot is shown on a plan at scale 1 cm: 250 m. The plot measures 6.4 cm by 3.75 cm on the plan. A diagonal path across the plot will be surfaced with gravel at a cost of £12 per metre. Calculate the total cost to the nearest pound.

(Total for Question 6 is 5 marks)

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7 A rectangular swimming pool is 15 m long and 9 m wide in real life. On a scale drawing the pool is shown 10 cm long. Show that the scale of the drawing is 1:150, and work out the width of the pool on the drawing, in centimetres.

(Total for Question 7 is 4 marks)

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8 A planning officer examines a new development drawn at scale 1:1250. A circular recreational area appears on the plan with radius 2.88 cm. The developer plans to make the actual area a grassed circular area with a perimeter path of constant width around the grass (path lies outside the grass circle and is included in the overall circular area). The total area including the path must be 5000 m².

(a) Work out the actual radius of the grassed circle in metres. **(3)**

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(b) Hence calculate the width of the path required (in metres) so that the total overall area including the path is 5000 m². Give your answer to 2 decimal places. **(6)**

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(Total for Question 8 is 9 marks)

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Mark scheme · 3.11 Scale Drawings: 30-minute Pack

Question 1

45 / 10 (oe) **M1**

4.5 cm cao **A1**

Answer: 4.5 cm

Question 2

1.5 km cao **B1**

Answer: 1.5 km (1500 m). Use: 1:50 000 => 1 cm = 500 m, so 3 cm = 1500 m = 1.5 km (cao).

Question 3

D cao **B1**

Answer: D) 1 : 10000

Question 4

Correct reason, e.g. the drawing would have to be 30 m long (the same size as the real hall), which is too big to fit on a sheet of paper **B1**

Answer: The drawing would be the same size as the real hall (30 m long), which is impractically large for a sheet of paper.

Question 5

area scale factor = $20^2 = 400$ **M1**

15 x 400 (= 6000 cm²) **M1**

0.6 m² cao **A1**

Answer: 0.6 m^2

Question 6

Convert map measurements to real lengths: 6.4 cm × 250 = 1600 m, 3.75 cm × 250 = 937.5 m **M1**

State and use Pythagoras for diagonal d: $d^2 = 1600^2 + 937.5^2$ **M1**

Calculate diagonal length approx 1854.43 m (correct to at least 3 significant figures) ft **M1**

Multiply length by cost per metre: 1854.42878... × 12 = 22253.14536... **M1**

£22,253 cao (to the nearest pound) **A1**

Answer: £22,253

Question 7

Convert 15 m to 1500 cm oe **M1**

1500 / 10 = 150, so the scale is 1:150 (working must be shown, since the answer is given) cso **B1**

Convert 9 m to 900 cm and divide by 150, or an equivalent method, to find the plan width **M1**

6 cm cao **A1**

Answer: Scale confirmed as 1:150; the width of the pool on the drawing is 6 cm.

Question 8

(a) convert 2.88 cm at 1:1250 -> actual radius = 2.88 * 1250 cm = 3600 cm **M1**

(a) convert to metres: 3600 cm = 36.00 m **M1**

(a) 36.00 m cao **A1**

(a) Answer: 36.00 m

(b) use A_total = π * R_total^2 where R_total = r + w and A_total = 5000, r = 36.00 **M1**

(b) set up equation: π * $(36 + w)^2 = 5000$ **M1**

(b) rearrange: $(36 + w)^2 = 5000 / \pi$ and take square root to get $36 + w = \sqrt{5000 / \&\pi;}$ **M1**

(b) numerical evaluation: $\sqrt{5000 / \&\pi;} = 39.89...$ (show method) **M1**

(b) 36 + w = 39.89... -> w = 3.89... m **A1**

(b) w = 3.89 m to 2 d.p. cao **A1**

(b) Answer: 3.89 m

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