3.11 Scale Drawings: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A plan of a garden uses scale 1 cm on the plan = 2 m in the garden. On the plan a path is 3 cm long. Work out the actual length of the path in metres.

(Total for Question 1 is 1 mark)

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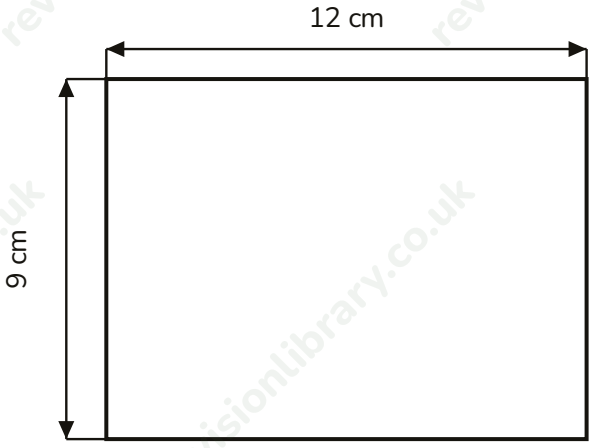
2 On a scale drawing, the scale is 1 : 20. A wall is drawn with a length of 4 cm. What is the real length of the wall?

- ☐ A) 4 cm
- ☐ B) 24 cm
- ☐ C) 80 cm
- ☐ D) 0.2 cm

(Total for Question 2 is 1 mark)

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3 A scale drawing of a school hall is made using a scale of 1 : 200. On the drawing, the hall is a rectangle measuring 12 cm by 9 cm. Work out the real area of the hall, giving your answer in m^2.



Scale 1 : 200

(Total for Question 3 is 4 marks)

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4 On a map, 8 cm represents 15 km in real life.
Write the scale of the map in the form 1:n.

(Total for Question 4 is 3 marks)

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5 A scale is given as: 1 cm represents 4 km. Write this scale in the ratio form 1 : n.

(Total for Question 5 is 2 marks)

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6 On a scale drawing, a road that is 3.6 km long in real life is drawn as a straight line 4.5 cm long.

(a) Write the scale of the drawing in the form 1 : n. **(3)**

(b) Another road is 1.9 km long in real life. Work out the length of this road on the same scale drawing, in centimetres, giving your answer correct to 1 decimal place. **(2)**

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(Total for Question 6 is 5 marks)

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7 Priya is using a map with scale 1:20 000 to find the real distance represented by a road that measures 8 cm on the map. Her working is shown below:

8 x 20 000 = 160 000
160 000 cm = 16 km

Priya has made an error. Identify what she did wrong, and work out the correct real distance, in kilometres.

(Total for Question 7 is 3 marks)

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8 A rectangular bedroom is shown on a floor plan with scale 1:50. On the plan the room measures 8.4 cm by 6 cm. A wardrobe has a longest edge of 2.9 m and needs to be carried flat across the room, diagonally from corner to corner. Work out the length of the room's diagonal, in metres, correct to 3 significant figures, and use your answer to determine whether the wardrobe's longest edge is shorter than the diagonal. Give a reason for your answer.

(Total for Question 8 is 5 marks)

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9 A scaled drawing of a rectangular swimming pool has length 5x cm and width 3x cm on the plan. The scale is 1:100 for linear measurements. The actual pool has an area of 450 m². Show that x satisfies the equation $x^2 = 30$. Hence find the value of x to 2 decimal places.

(Total for Question 9 is 4 marks)

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10 A surveyor produces a scale drawing of a triangular field. On the drawing the sides are 7.2 cm, 5.4 cm and 4.2 cm. The scale is 1:500 for linear measurements.

(a) Work out the actual perimeter of the field in metres to 3 significant figures. **(3)**

(b) Hence, or otherwise, find the actual area of the field in square metres. Give your answer to 3 significant figures. (You may use Heron's formula.) **(6)**

(Total for Question 10 is 9 marks)

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11 A designer creates a scale elevation of a triangular sail on a boat. On the drawing the base is 24.0 cm and the height (from base to apex perpendicular) is 18.0 cm. The actual sail must have an area of 27.0 m².

Find the linear scale factor (drawing : actual) and hence find the actual base and actual perpendicular height of the sail in metres. Give answers to 3 significant figures.

(a) Find the area of the sail on the drawing in cm^2. **(2)**

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(b) Find the linear scale factor k (drawing : actual) and hence find the actual base and height in metres. Give all answers to 3 significant figures. **(7)**

.....

(Total for Question 11 is 9 marks)

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Mark scheme · 3.11 Scale Drawings: Test Pack

Question 1

6 m cao **B1**

Answer: 6 m (3 cm x 2 m/cm = 6 m)

Question 2

C (80 cm) cao **B1**

Answer: C) 80 cm

Question 3

12 x 200 (= 2400) and 9 x 200 (= 1800) **M1**

convert to metres: 24 m and 18 m **M1**

24 x 18 **M1**

432 m² cao **A1**

Answer: 432 m^2

Question 4

15 km = 1500000 cm **M1**

1500000 / 8 **M1**

1:187500 **A1**

Answer: 1:187500

Question 5

4 km converted to 400000 cm **M1**

1 : 400000 cao **A1**

Answer: 1 : 400000

Question 6

(a) 3.6 km converted to 360000 cm **M1**

(a) 360000 / 4.5 (= 80000) **M1**

(a) 1 : 80000 cao **A1**

(a) Answer: 1 : 80000

(b) 1.9 km = 190000 cm, then 190000 / 80000 ft **M1**

(b) awrt 2.4 cm ft **A1**

(b) Answer: 2.4 cm

Question 7

Correctly identifies Priya's error, e.g. she divided by 10 000 instead of 100 000 when converting cm to km (or an equivalent statement of the error) oe **B1**

160 000 / 100 000, or an equivalent complete method to convert cm to km **M1**

1.6 km cao **A1**

Answer: Priya divided by the wrong power of 10 (she used 10 000 instead of 100 000); the correct real distance is 1.6 km.

Question 8

Convert plan lengths to real lengths: 4.2 m and 3 m oe **M1**

Use Pythagoras: diagonal^2 = $4.2^2 + 3^2$ (= 17.64 + 9 = 26.64) **M1**

5.16 m awrt (3 sf) cao ft from candidate's converted dimensions **A1**

Correct comparison stated: 2.9 m < 5.16 m oe **C1**

Correct conclusion with a reason, e.g. since the wardrobe's longest edge (2.9 m) is shorter than the room's diagonal (5.16 m), it can be carried across the room diagonally oe **C1**

Answer: Diagonal = 5.16 m (3 sf); since 2.9 m < 5.16 m, the wardrobe's longest edge is shorter than the room's diagonal.

Question 9

convert plan lengths to actual using the scale 1:100 (1 cm on plan = 1 m actual): length = 5x m and width = 3x m, then form area = 5x * 3x **M1**

simplify area equation: 15 x^2 = 450 leading to x^2 = 450 / 15 **M1**

x^2 = 30 cao **A1**

x = 5.48 to 2 d.p. cao **A1**

Answer: x = 5.48

Question 10

(a) convert each side by factor 500: 7.2*500 = 3600 cm, 5.4*500 = 2700 cm, 4.2*500 = 2100 cm **M1**

(a) sum perimeter in cm = 3600 + 2700 + 2100 = 8400 cm = 84.00 m **M1**

(a) 84.0 m cao to 3 s.f. **A1**

(a) Answer: 84.0 m

(b) convert sides to metres: 36.00 m, 27.00 m, 21.00 m **M1**

(b) use Heron: s = (36 + 27 + 21)/2 = 42.0 m **M1**

(b) compute area = $\sqrt{s(s-a)(s-b)(s-c)}$ method **M1**

(b) numerical substitution: area = $\sqrt{42*(42-36)*(42-27)*(42-21)}$ = $\sqrt{42*6*15*21}$ **M1**

(b) area = 281.7... m^2 awrt 282 m² to 3 s.f. **A1**

(b) final area 282 m² cao **A1**

(b) Answer: 282 m^2

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Question 11

(a) area drawing = 1/2 * base * height = 0.5 * 24.0 * 18.0 **M1**

(a) 216 cm² cao **A1**

(a) Answer: 216 cm^2

(b) use area scale relation: area_drawing / area_actual = k^2 where k is linear scale (drawing : actual). Here 216 cm² / 27.0 m² **M1**

(b) convert 27.0 m² to cm^2: 27.0 * 10000 = 270000 cm² and form k^2 = 216 / 270000 **M1**

(b) compute k^2 = 0.0008 and take square root k = $\sqrt{0.0008}$ **M1**

(b) numerical evaluation to find k = 0.028284271... (showing correct method) **M1**

(b) k = 0.0283 to 3 s.f. **A1**

(b) scale up drawing lengths by 1/k to get actual: actual base = 24.0 / k cm -> convert to metres **M1**

(b) actual base = 8.49 m to 3 s.f. and actual height = 6.36 m to 3 s.f. **A1**

(b) Answer: k = 0.0283, actual base = 8.49 m, actual height = 6.36 m

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