

Scale Drawings and Maps

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (2 marks)

Anwen draws a plan of a school field.

On her plan, 2 cm represents 15 m.

- (a) On the plan, the running track is 8 cm long.
Work out the real length of the running track.

2 cm represents 15 m, so 8 cm represents 4×15 m.

$$4 \times 15 = 60 \text{ m}$$

Answer: 60 m

- (b) The real width of the field is 45 m.
How wide is the field on the plan?

$45 \div 15 = 3$, so the width is 3 lots of 15 m.

Each 15 m is 2 cm on the plan.

$$3 \times 2 = 6 \text{ cm}$$

Answer: 6 cm

Tip: The scale is **2** cm to 15 m, not 1 cm to 15 m. An answer of 3 cm has forgotten this.

2 (2 marks)

A canal is shown on a map with a scale of 1 : 60 000

The canal is 4.5 cm long on the map.

Work out the real length of the canal.

Give your answer in kilometres.

The scale 1 : 60 000 means real lengths are 60 000 times the map lengths.

$$4.5 \times 60\,000 = 270\,000 \text{ cm}$$

$$\text{Change to metres: } 270\,000 \div 100 = 2700 \text{ m}$$

$$\text{Change to kilometres: } 2700 \div 1000 = 2.7 \text{ km}$$

Answer: 2.7 km

Tip: 270 000 is in **centimetres**, not metres. Divide by 100 to get metres, then by 1000 to get km. Dividing by 1000 only gives the wrong answer 270.

Marks: 1 mark for $4.5 \times 60\,000$ (or 270 000). 1 mark for 2.7.

3 (2 marks)

A scale drawing of a house is drawn using a scale of 1 : 50

The height of the house on the drawing is 16 cm.

Work out the real height of the house in metres.

Scale 1 : 50, so the real house is 50 times as tall as the drawing.

$$16 \times 50 = 800 \text{ cm}$$

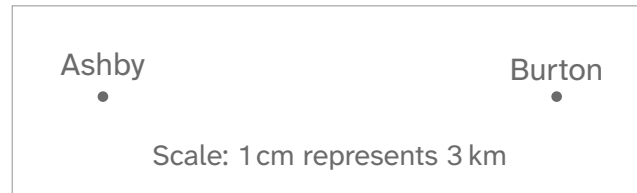
$$\text{Change to metres: } 800 \div 100 = 8 \text{ m}$$

Answer: 8 m

Marks: 1 mark for 16×50 (or 800). 1 mark for 8.

4 (2 marks)

The map shows the positions of two towns, Ashby and Burton.



Work out the real distance, in km, between Ashby and Burton.

Measure the distance on the map with a ruler: 6 cm

Each cm represents 3 km.

$$6 \times 3 = 18 \text{ km}$$

Any answer from 17.4 to 18.6 is fine.

Answer: 18 km

Tip: Write down your measurement (6 cm). If you make a slip later, you can still get a mark for it.

Marks: 1 mark for measuring 6 cm. 1 mark for 18 (anything from 17.4 to 18.6).

5 (2 marks)

The real distance between two schools is 4.5 km.

A map has a scale of 1 : 50 000

Work out the distance between the schools on the map.

Give your answer in centimetres.

Change the real distance to cm:

$$4.5 \text{ km} = 4500 \text{ m} = 450\,000 \text{ cm}$$

The map distance is 50 000 times smaller, so divide:

$$450\,000 \div 50\,000 = 9 \text{ cm}$$

Answer: 9 cm

Marks: 1 mark for changing 4.5 km to 450 000 cm. 1 mark for 9.

6 (3 marks)

A room is a rectangle 5.2 m long and 3.6 m wide.

Jo makes a scale drawing of the room using a scale of 1 : 40

Work out the length and the width of the room on Jo's scale drawing.

Change the real lengths to cm first:

$$5.2 \text{ m} = 520 \text{ cm}$$

$$3.6 \text{ m} = 360 \text{ cm}$$

Scale 1 : 40, so divide each length by 40:

$$\text{Length: } 520 \div 40 = 13 \text{ cm}$$

$$\text{Width: } 360 \div 40 = 9 \text{ cm}$$

Answer: Length 13 cm, width 9 cm

Tip: $5.2 \div 40 = 0.13$ is in metres, not cm. Change the lengths to cm first, so that your answers are in cm.

Marks: 1 mark for changing to cm. 1 mark for dividing by 40. 1 mark for both 13 and 9.

7 (2 marks)

A model boat is 45 cm long.

The real boat is 13.5 m long.

Write the scale of the model in the form 1 : n

Both lengths must be in the same units.

$$13.5 \text{ m} = 13.5 \times 100 = 1350 \text{ cm}$$

$$\text{Model : real} = 45:1350$$

Divide both parts by 45:

$1350 \div 45 = 30$, so the scale is 1 : 30

Answer: 1 : 30

Marks: 1 mark for $1350 \div 45$ (or $45 : 1350$). 1 mark for 1 : 30.

8 (3 marks)

A plan of a car park is drawn to scale.

The real car park is 75 m long. On the plan, it is 15 cm long.

Each parking space is 2.5 m wide in real life.

Work out the width of a parking space on the plan.

Give your answer in millimetres.

Use the length of the car park to find the scale.

15 cm represents 75 m.

1 cm represents $75 \div 15 = 5$ m

Width on the plan: $2.5 \div 5 = 0.5$ cm

0.5 cm = 5 mm

Answer: 5 mm

Tip: Going from real life to the plan, you **divide**. Remember 1 cm = 10 mm.

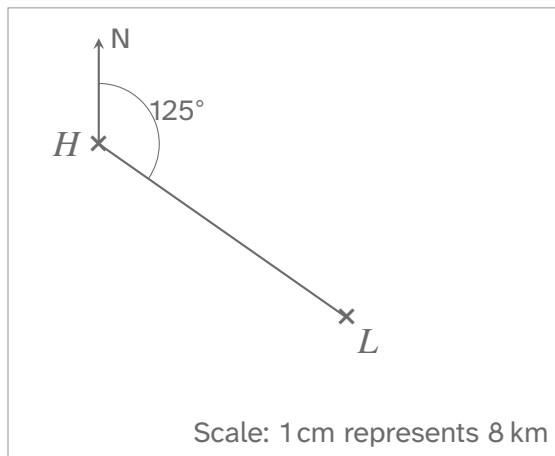
Marks: 1 mark for $75 \div 15$ (= 5). 1 mark for $2.5 \div 5$ (= 0.5 cm). 1 mark for 5.

9 (2 marks)

A lifeboat, L , is 32 km from a harbour, H , on a bearing of 125°

Use a scale of 1 cm to 8 km.

Mark the position of the lifeboat with a cross ($\times$) and label it L .



Distance on the map: $32 \div 8 = 4$ cm

Put the centre of your protractor on H , with 0° on the North line.

Measure 125° clockwise from North.

Mark L 4 cm from H along this line.

Answer: L 4 cm from H on a bearing of 125°

Tip: Bearings are always measured **clockwise** from North. A bearing more than 90° points below the East line.

Marks: 1 mark for L 4 cm from H (3.8 to 4.2 cm). 1 mark for a bearing of 125° (123° to 127°).

10 (4 marks)

A map has a scale of 1 : 200 000

A road on the map is 7.5 cm long.

A car travels along the road at an average speed of 50 km/h.

Work out how long it takes the car to travel along this road.

Give your answer in minutes.

Real length of the road: $7.5 \times 200\,000 = 1\,500\,000$ cm

$$1\,500\,000\text{ cm} = 15\,000\text{ m} = 15\text{ km}$$

$$\text{Time} = \text{distance} \div \text{speed}$$

$$\text{Time} = 15 \div 50 = 0.3\text{ hours}$$

$$\text{Change to minutes: } 0.3 \times 60 = 18\text{ minutes}$$

Answer: 18 minutes

Tip: 0.3 hours is **not** 30 minutes. Multiply by 60 to change hours to minutes.

Marks: 1 mark for $7.5 \times 200\,000$. 1 mark for 15 km. 1 mark for $15 \div 50$. 1 mark for 18.
