

Bearings

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)

Write down the three-figure bearing for each direction.

(a) East

Bearings are measured clockwise from North, using three figures.

East is a quarter turn clockwise from North: 90° .

Write it with three figures: 090° .

Answer: 090°

(b) South-West

South is 180° .

South-West is halfway between South (180°) and West (270°).

$$180 + 45 = 225$$

Answer: 225°

2 (2 marks)

The bearing of P from Q is 125°

Work out the bearing of Q from P .

To go back the opposite way, turn through 180° .

The bearing is less than 180° , so add 180° :

$$125 + 180 = 305$$

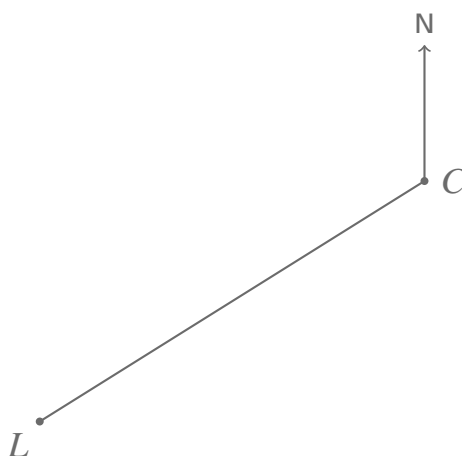
Answer: 305°

Tip: For a back bearing, add or subtract 180° . $360 - 125 = 235$ is a common wrong answer. Sketch the two points with North lines to check.

Marks: 1 mark for $125 + 180$. 1 mark for 305.

3 (3 marks)

The accurately drawn map shows the positions of a campsite C and a lake L .



- (a) Measure the bearing of the lake L from the campsite C .

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

L is to the South-West of C , so the bearing is between 180° and 270° .

Measure 180° round to South, then the extra angle from South to CL : 58° .

$$180 + 58 = 238^\circ$$

Answer: 238° (accept 236 to 240)

Tip: For a bearing more than 180° , measure the angle from South (or West) and add it on, or measure the anticlockwise angle from North and subtract it from 360° .

- (b) The scale of the map is 1 : 40 000
Work out the real distance from C to L .
Give your answer in kilometres.

Measure CL with a ruler: 6 cm.

A scale of 1 : 40 000 means 1 cm on the map is 40 000 cm in real life.

$$6 \times 40\,000 = 240\,000 \text{ cm}$$

Change to metres (divide by 100): 2400 m

Change to kilometres (divide by 1000): 2.4 km

Answer: 2.4 km (accept 2.36 to 2.44)

Tip: Change centimetres to kilometres in two steps: $\div 100$ for metres, then $\div 1000$ for kilometres.

Marks: 1 mark for $6 \times 40\,000$ (with CL measured as 5.9 to 6.1 cm). 1 mark for 2.4.

4 (2 marks)

The diagram shows the position of a ship, S .



The lighthouse L is 6 km from S on a bearing of 110°

The scale is 1 cm represents 1 km.

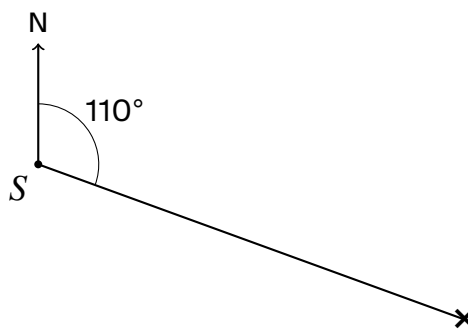
Mark the position of L with a cross ($\times$).

Use the scale: 6 km is 6 cm.

Put the protractor on S and measure 110° clockwise from North.

Draw a line from S in this direction.

Mark a cross 6 cm along the line.

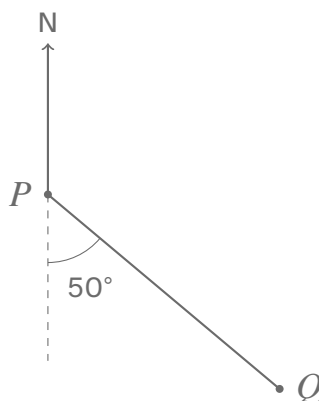


Answer: Cross 6 cm from S on a bearing of 110°

Marks: 1 mark for the correct bearing. 1 mark for the correct distance.

5 (1 mark)

The diagram shows the positions of two trees, P and Q .



Kofi says,

“The bearing of Q from P is 050° ”

Kofi is wrong.

Explain why.

Bearings are measured clockwise from **North**.

The 50° on the diagram is measured from South, not from North.

So the bearing is $180 - 50 = 130^\circ$.

Answer: The 50° is measured from South, not North; the bearing is 130°

Tip: Always start at the North line. Here the angle from North, clockwise, is $180^\circ - 50^\circ = 130^\circ$.

6 (3 marks)

The bearing of B from A is 080°

The bearing of C from B is 200°

Work out the size of angle ABC .

Draw a sketch with a North line at A and at B .

The bearing of B from A is 080° .

So the bearing of A from B is $80 + 180 = 260^\circ$.

The bearing of C from B is 200° .

Angle ABC is the angle between these two directions at B :

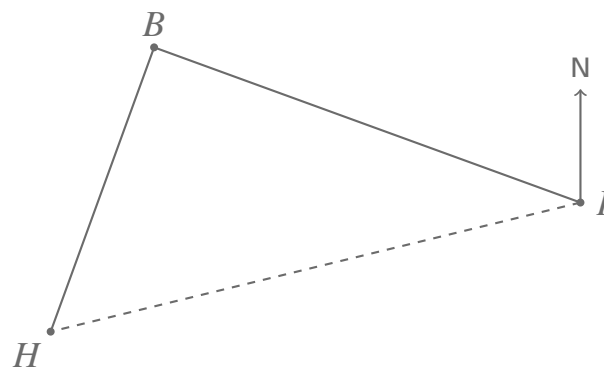
$$260 - 200 = 60^\circ$$

Answer: 60°

Marks: 1 mark for 260. 1 mark for $260 - 200$. 1 mark for 60.

7 (4 marks)

The accurately drawn map shows a harbour H , a buoy B and an island I .



Scale: 1 cm represents 200 m

- (a) A kayaker paddles in a straight line from H to B .
She then paddles in a straight line from B to I .
She paddles at an average speed of 4 km/h.
How many minutes does her trip take?

Measure each line with a ruler: $HB = 4$ cm and $BI = 6$ cm.

Total on the map: $4 + 6 = 10$ cm

Use the scale: $10 \times 200 = 2000$ m = 2 km

Time = distance $\div$ speed = $2 \div 4 = 0.5$ hours

0.5 hours = 30 minutes

Answer: 30 minutes (accept 27 to 33)

Tip: Change metres to kilometres before you divide by the speed in km/h. 0.5 hours is 30 minutes, not 50 minutes.

Marks: 1 mark for measuring HB and BI (each within 0.2 cm). 1 mark for using the scale to get 2 km. 1 mark for 30.

- (b) Find by measurement the bearing of H from I .

Put the protractor on I , with 0° on the North line at I .

Measure clockwise from North round to the line IH (draw it in first).

H is to the West of I and a little South, so the bearing is a bit less than 270° .

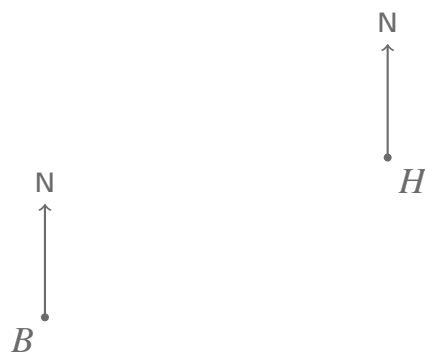
It measures 256° .

Answer: 256° (accept 254 to 258)

Tip: " H from I " means stand at I . Measure at I , not at H .

8 (5 marks)

The accurately drawn map shows the positions of a helicopter base B and a hospital H .



Scale: 1 cm represents 4 km

- (a) The helicopter flies in a straight line from B to H in 10 minutes.
Work out its average speed in km/h.

Measure BH with a ruler: 5 cm.

Use the scale: $5 \times 4 = 20$ km

10 minutes = $\frac{10}{60} = \frac{1}{6}$ of an hour.

Speed = distance $\div$ time = $20 \div \frac{1}{6} = 20 \times 6$

= 120 km/h

Answer: 120 km/h (accept 115 to 125)

Tip: Change 10 minutes into hours before you divide. $20 \div 10 = 2$ is a speed in km per minute, not km/h.

Marks: 1 mark for BH measured (4.9 to 5.1 cm) and multiplied by 4. 1 mark for dividing by $\frac{1}{6}$ (or multiplying by 6). 1 mark for 120.

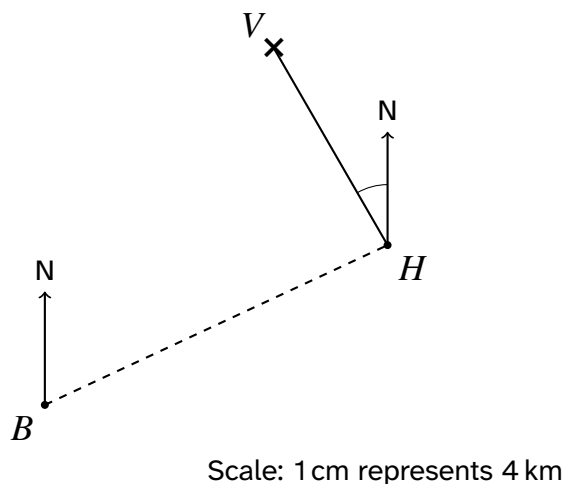
- (b) From H , the helicopter flies 12 km on a bearing of 330° to a village V . Mark the position of V with a cross ($\times$).

Use the scale: $12 \div 4 = 3$ cm on the map.

Put the protractor on H , with 0° on the North line at H .

Measure 330° clockwise (or 30° anticlockwise from North).

Mark a cross 3 cm from H in this direction.



Answer: Cross 3 cm from H on a bearing of 330°

Tip: 330° is 30° anticlockwise from North. Use the North line at H , not at B .

Marks: 1 mark for the correct bearing. 1 mark for the correct distance (3 cm).