GCSE · Edexcel · Maths

3 hours 46 questions

Exam Questions

Bearings, Scale Drawing, Constructions & Loci

Bearings / Scale / Constructing Triangles / Constructions / Loci

Easy (15 questions)	/39
Medium (16 questions)	/56
Hard (15 questions)	/64
Total Marks	**/159**

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Easy Questions

1 The bearing of a ship from a lighthouse is $050°$.

Work out the bearing of the lighthouse from the ship.

(2 marks)

2 (a) Manchester airport is on a bearing of $330°$ from a London airport.

Find the bearing of the London airport from Manchester airport.

(2 marks)

(b) The London airport is 200 miles from Manchester airport.

A plane leaves Manchester airport at 10 am to fly to the London airport.
The plane flies at an average speed of 120 mph.

What time does the plane arrive at the London airport?

(4 marks)

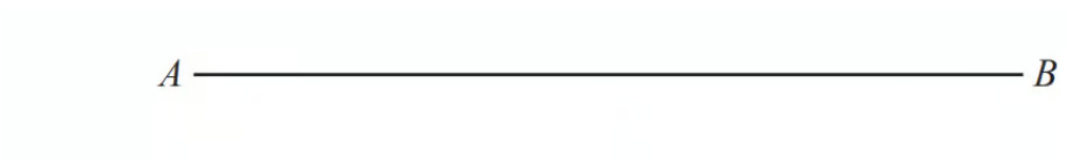
3 Martin and Janet are in an orienteering race.

Martin runs from checkpoint A to checkpoint B, on a bearing of $065°$.
Janet is going to run from checkpoint B to checkpoint A.

Work out the bearing of A from B.

(2 marks)

4



Use ruler and compasses to **construct** the perpendicular bisector of the line segment AB.
You must show all your construction lines.

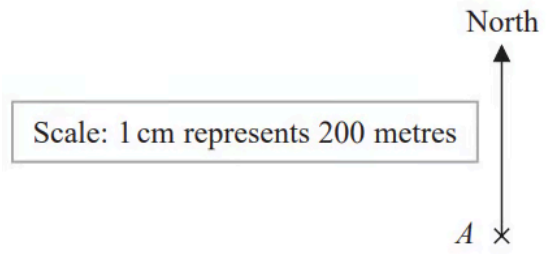
(2 marks)

5 The bearing of Paris from London is 149°.

Work out the bearing of London from Paris.

(2 marks)

6 (a) The scale diagram shows the position on a map of a house, A



House C is on a bearing of 110° from A.
The distance from A to C is 700 m.
Mark the position of C on the diagram with a cross (×). Label your cross C.

(3 marks)

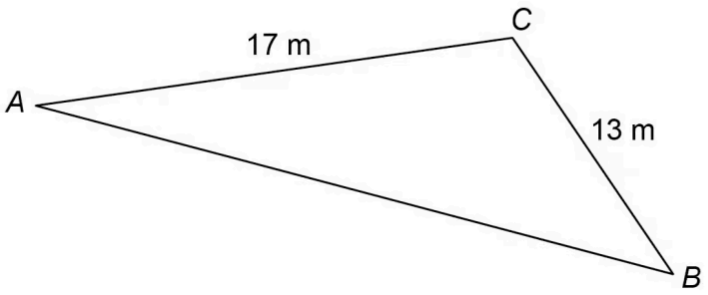
(b) Write the scale of the map in the form $1:n$

1 : .....

(1 mark)

7 Here is a triangle.

Not drawn accurately



Give a reason why the length of side AB **cannot** be 35 m

(1 mark)

8 The bearing of A from B is 310°

Choose the bearing of B from A.

A. 050°

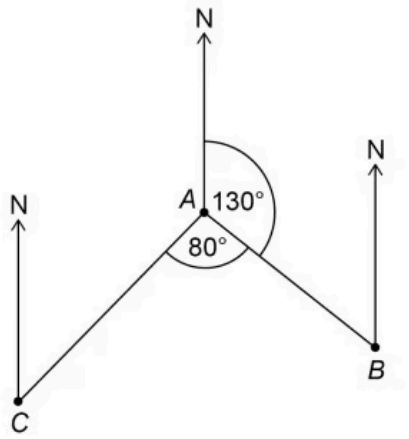
B. 110°

C. 130°

D. 220°

(1 mark)

9



Not drawn accurately

Work out the bearing of C from A.

A. 030°

B. 130°

C. 150°

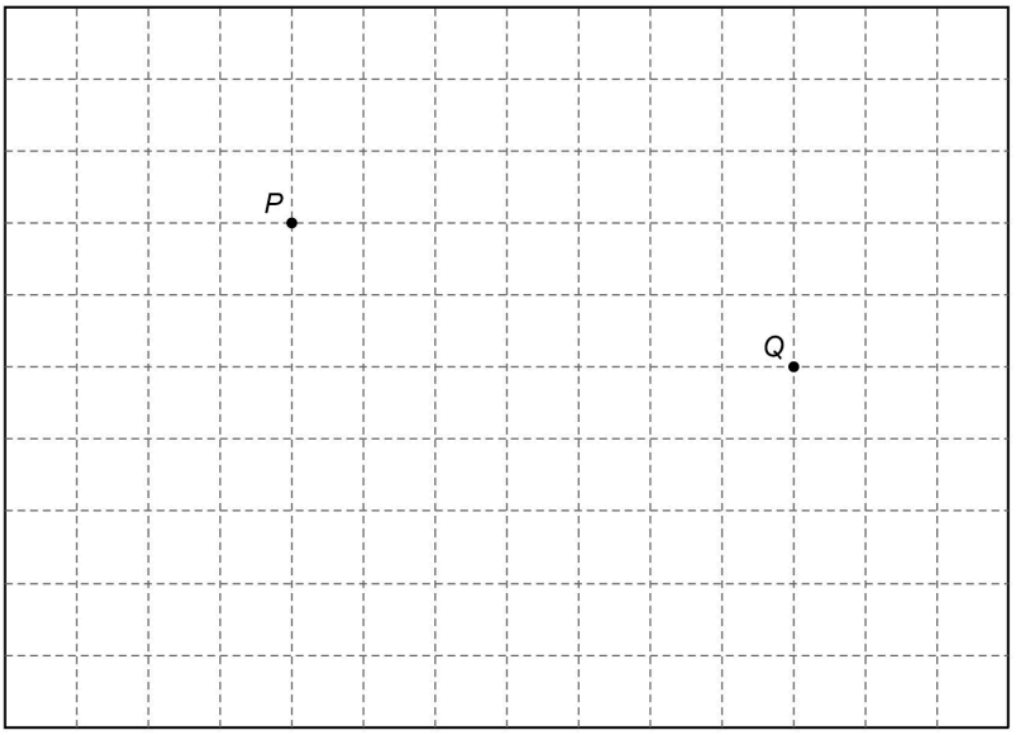
D. 210°

(1 mark)

10 The scale drawing represents a garden.

Water from a sprinkler at P reaches up to 20 metres from P. Water from a sprinkler at Q reaches up to 25 metres from Q.

Scale: 1 cm represents 5 m



Using a pair of compasses,
show the region that water from **both** sprinklers reaches.

(2 marks)

11 An equilateral triangle has side length 16 metres.

Using ruler and compasses only, construct a scale drawing of the triangle.
Use the scale 1 centimetre represents 2 metres.

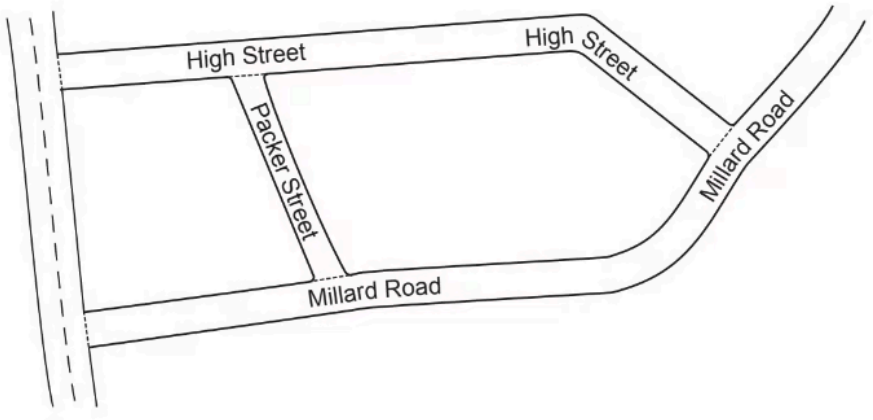
Scale: 1 cm represents 2 m

(3 marks)

12 Construct a locus of points that are the same distance from points A and B.

(2 marks)

13 (a) This map shows part of a village.



Neil knows that Packer Street is 180m long in real life.

i) Neil measures the map.
He says

Packer Street is 3.5cm long.
High Street is 11.2cm long.

Therefore, I calculate that High Street is 576m long in real life.

Use Neil's figures to show that the answer to his calculation is correct.

[3]

ii) Jodie measures the same map.

She says

I think Packer Street is longer than Neil's measurement of 3.5cm.
Therefore, High Street must be longer than 576m in real life.

Is Jodie's reasoning correct?
Show how you decide.

[2]

(5 marks)

(b) On another map, Packer Street is 2.4cm long.

Express the scale of this map in the form 1 : n.

1 : .....

(2 marks)

14 A model railway is built using the scale 1 : 87.

On the model railway, the distance between the rails is 16.5 mm.

Calculate, in metres, the distance between the rails for a full-size train.

..... metres

(2 marks)

15 The scale of a map is 1 cm represents 25 m.

i) The length of a path is 240 m.

Work out the length, in centimetres, of the path on the map.

..... cm [1]

ii) The scale 1 cm represents 25 m can be written in the form 1: k.

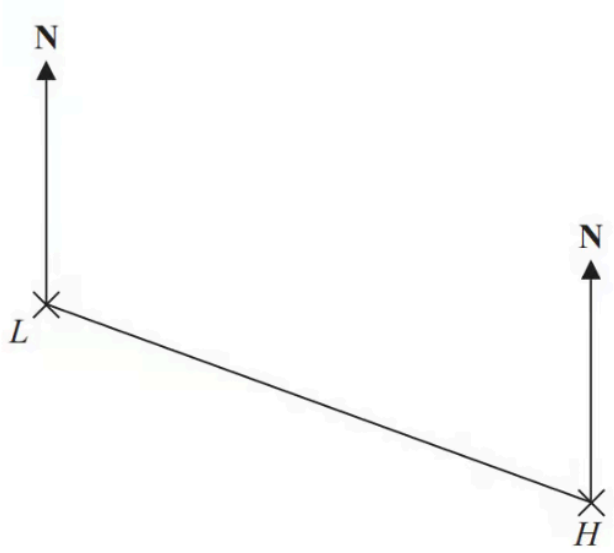
Find the value of k.

k = ... [1]

(2 marks)

Medium Questions

1 (a) The diagram shows the position of a lighthouse L and a harbour H.



The scale of the diagram is 1 cm represents 5 km.

Work out the real distance between L and H.

(1 mark)

(b) Measure the bearing of H from L.

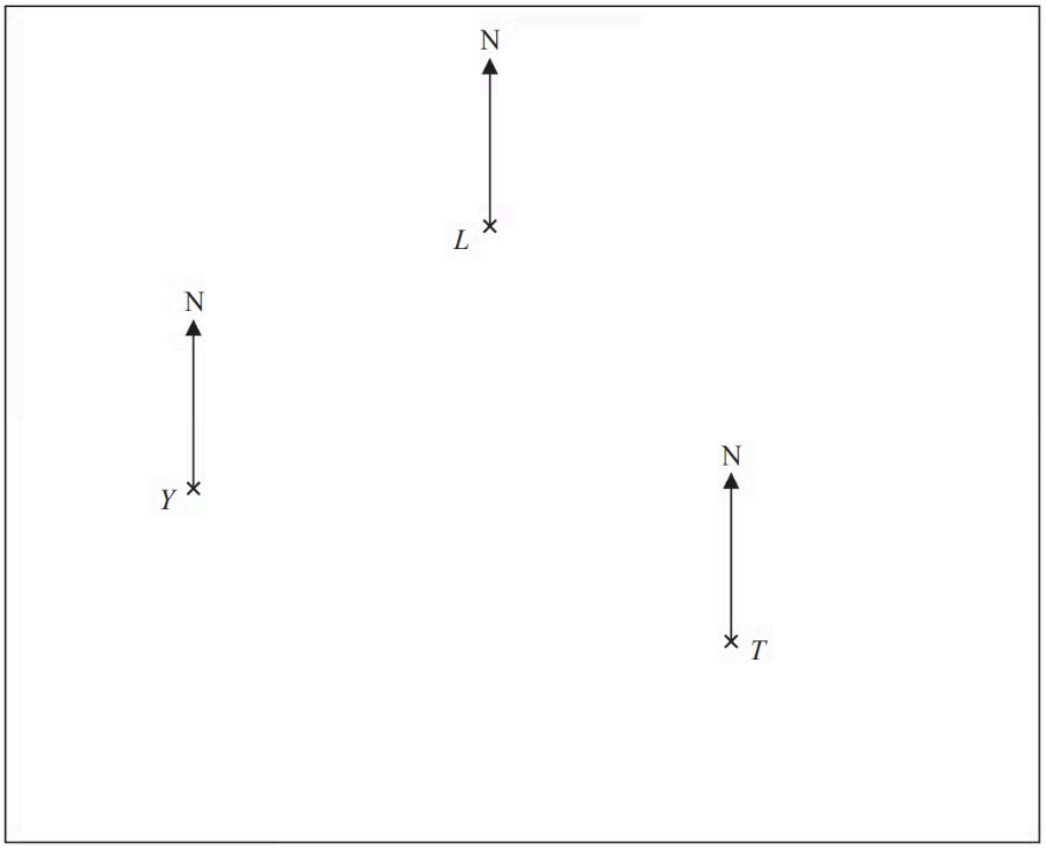
(1 mark)

(c) A boat B is 20km from H on a bearing of $040°$.

On the diagram, mark the position of boat B with a cross (x). Label it B.

(2 marks)

2 (a) The diagram shows the positions of a lighthouse L, a yacht Y and a tanker T on a map.



Scale 1 cm represents 10 km

Measure the bearing of L from Y.

(1 mark)

(b) The tanker, T, sails 80km on a bearing of $320°$.

Find the distance, in km, between the tanker and the lighthouse when the tanker is closest to the lighthouse.

(2 marks)

3 The diagram shows the position of two churches, A and B.

Church C is on a bearing of $130°$ from church A.
Church C is on a bearing of $245°$ from church B.

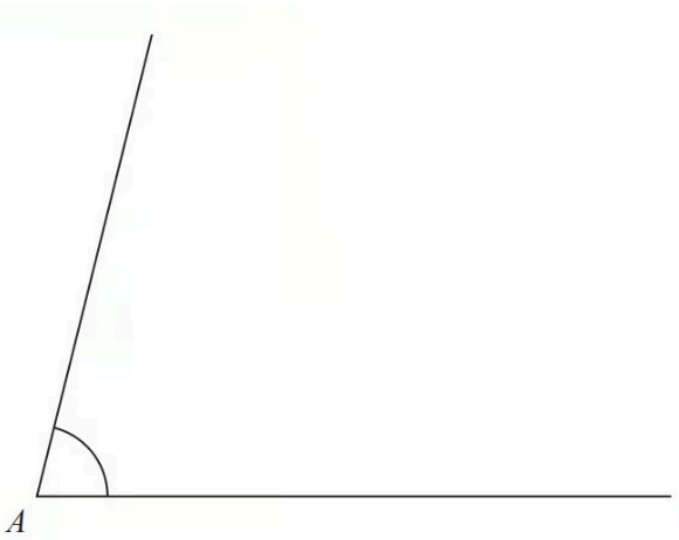
In the space above, draw an accurate diagram to show the position of church C.

Mark the position of church C with a cross ($\times$).
Label it C.

(3 marks)

4 (a) Use ruler and compasses to bisect the angle at A. You must show all your construction

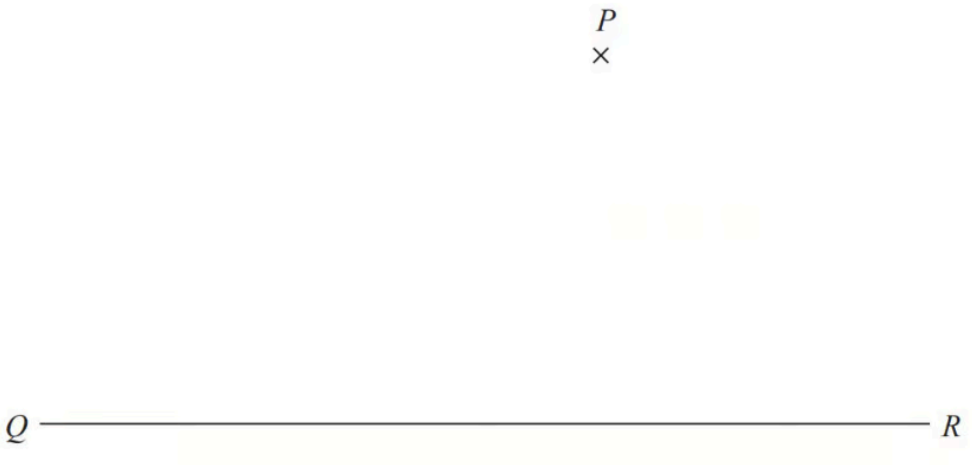
lines.



(2 marks)

(b) Use ruler and compasses to construct the perpendicular from the point P to the line QR.

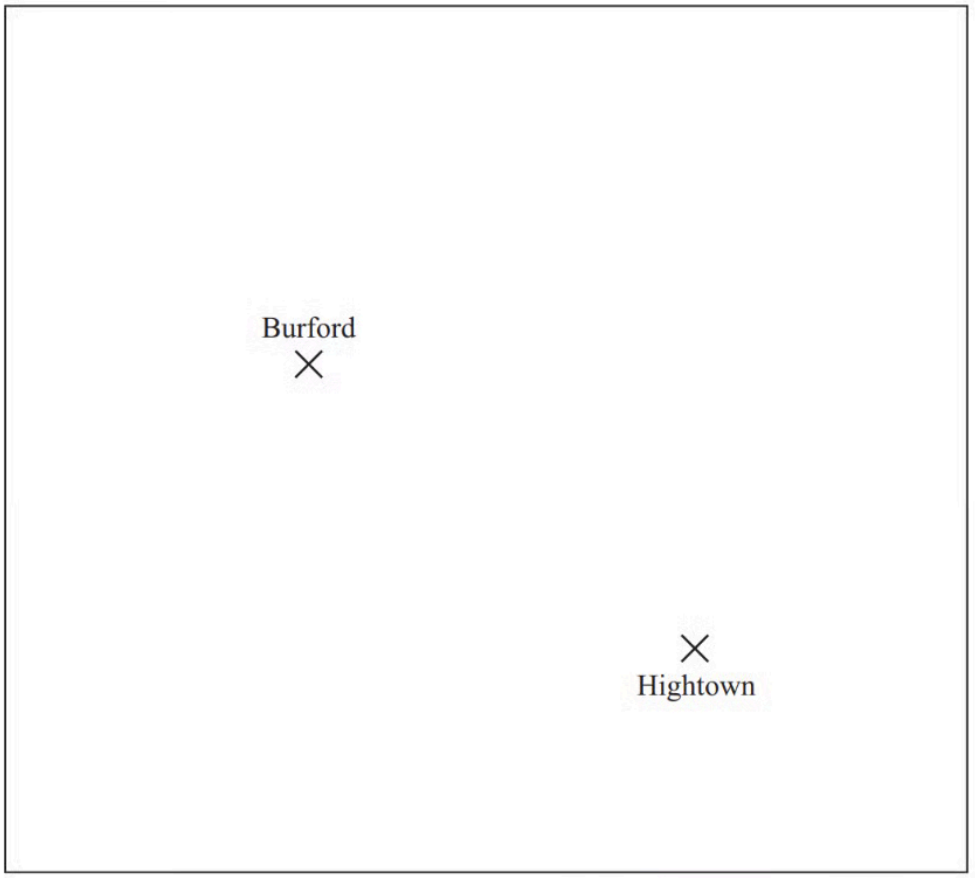
You must show all your construction lines.



(2 marks)

5 Here is a map.

The map shows two towns, Burford and Hightown.



A company is going to build a warehouse.

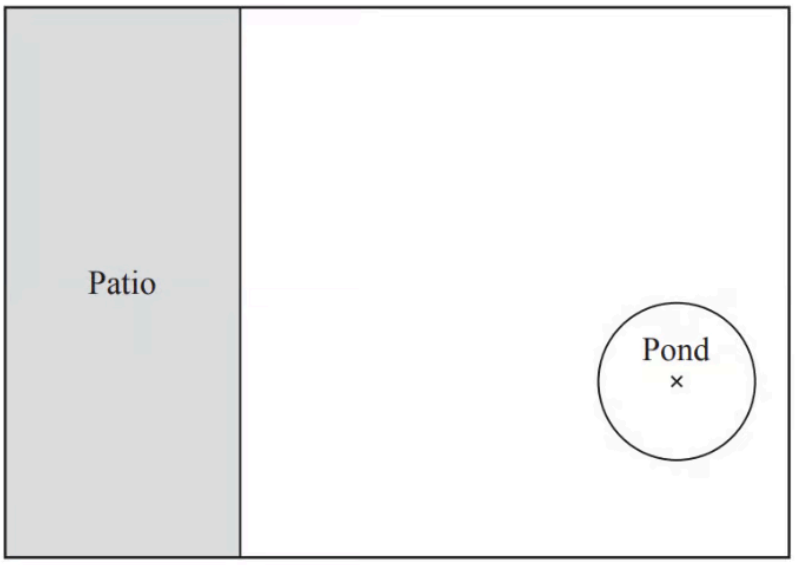
The warehouse will be less than 30 km from Burford **and** less than 50 km from Hightown.

Shade the region on the map where the company can build the warehouse.

(3 marks)

6 The diagram shows a garden in the shape of a rectangle.

The scale of the diagram is 1 cm represents 2m.



Scale: 1 cm represents 2 m

Irfan is going to plant a tree in the garden.
The tree must be

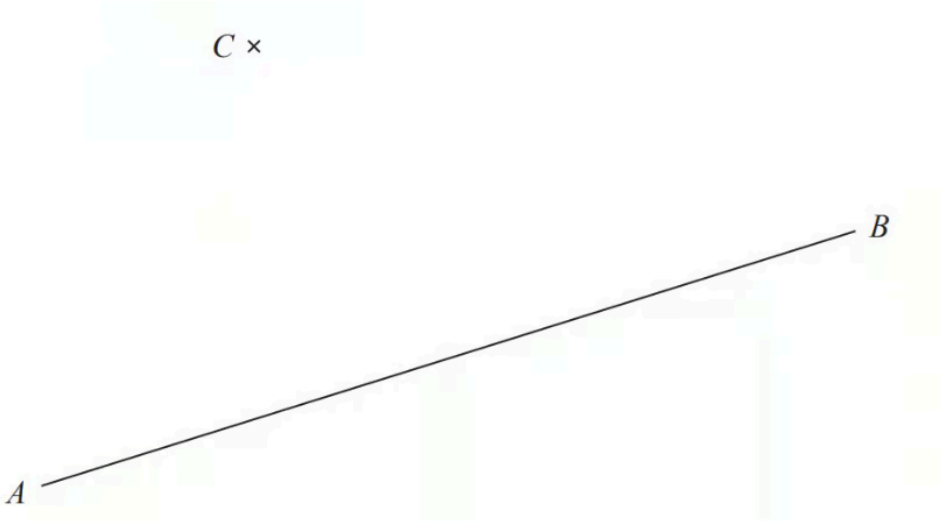
- more than 3 metres from the patio
- **and** more than 6 metres from the centre of the pond.

On the diagram, shade the region where Irfan can plant the tree.

(3 marks)

7 Use ruler and compasses to **construct** the perpendicular from point C to the line AB.

You must show all your construction lines.



(2 marks)

8 Here is a scale drawing of an office.

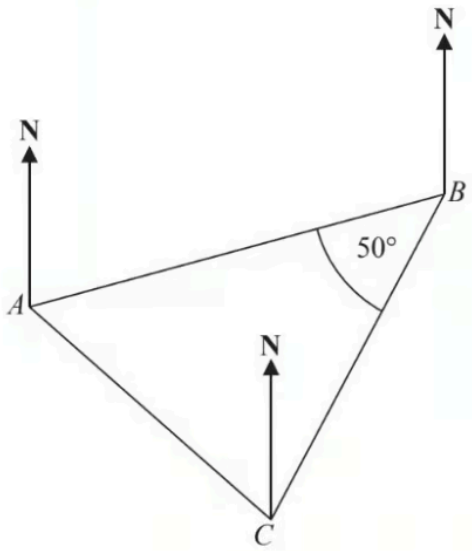
The scale is 1 cm to 2 metres.

A photocopier is going to be put in the office.
The photocopier has to be closer to B than it is to A.
The photocopier also has to be less than 8 metres from C.

Show, by shading, the region where the photocopier can be put.

(3 marks)

9 The diagram shows the positions of three points, A, B and C, on a map.



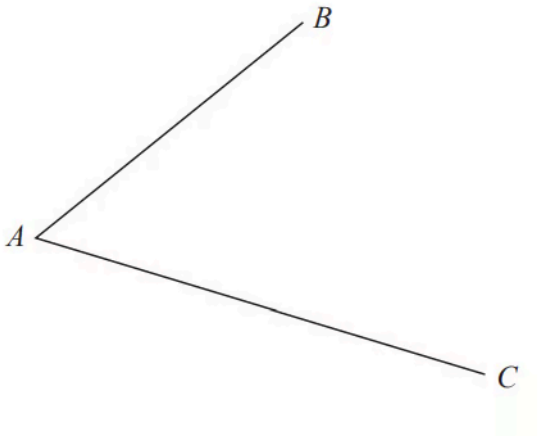
The bearing of B from A is $070°$.
Angle ABC is $50°$.
$AB = CB$

Work out the bearing of C from A.

(3 marks)

10 Use ruler and compasses to construct the bisector of angle BACYou must show all your

construction lines.



(2 marks)

11 (a) The scale drawing shows the position of a hall and the position of a library.

Scale: 1cm represents 20 metres

A post box is 140 metres from the library on a bearing of $220°$

Show the position of the post box on the scale drawing.
Mark the position with a cross $(\times)$ and label it P.

(2 marks)

(b) Use your scale drawing to find

i) the real distance, in metres, of the hall from the post box,

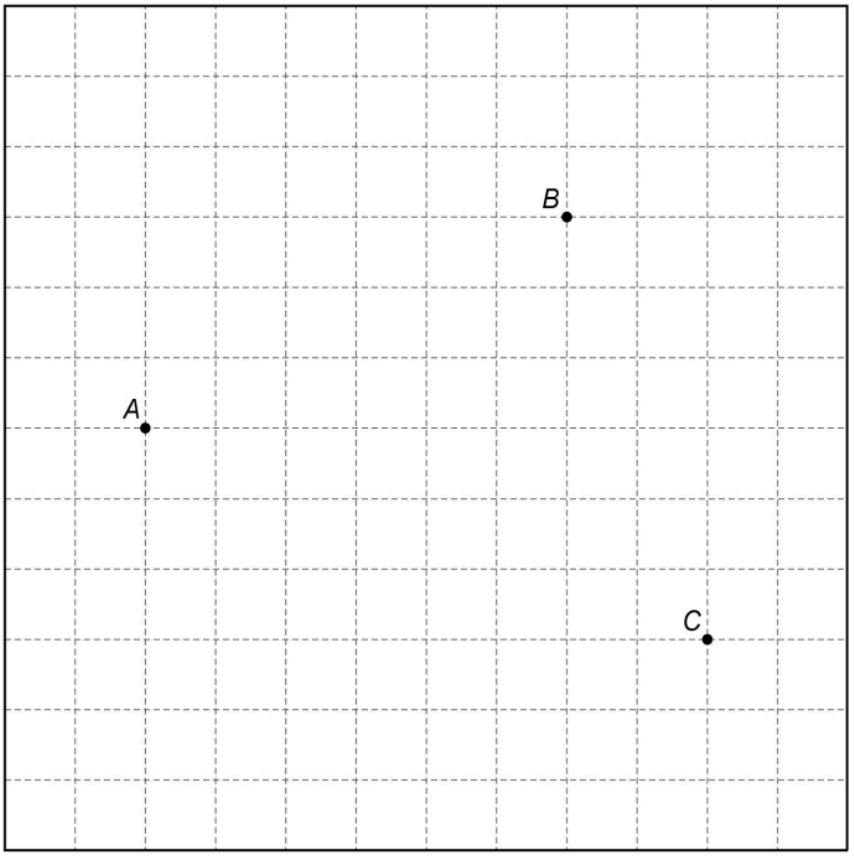
ii) the bearing of the hall from the post box.

[2]
(2 marks)

12 Using ruler and compasses, show the region inside the grid that is

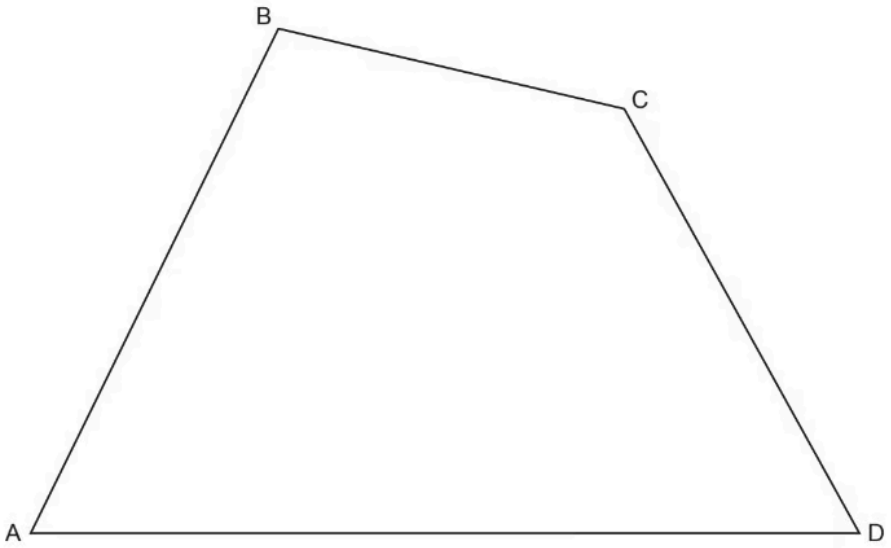
- less than 4 cm from A
- and nearer to B than to C.

Label the region R.
Show all your construction lines.



(3 marks)

13 (a) ABCD is a quadrilateral.



Construct the bisector of angle ABC.
Show all your construction lines.

(2 marks)

(b) Construct the perpendicular bisector of BC.

Show all your construction lines.

(2 marks)

(c) Shade the region which is

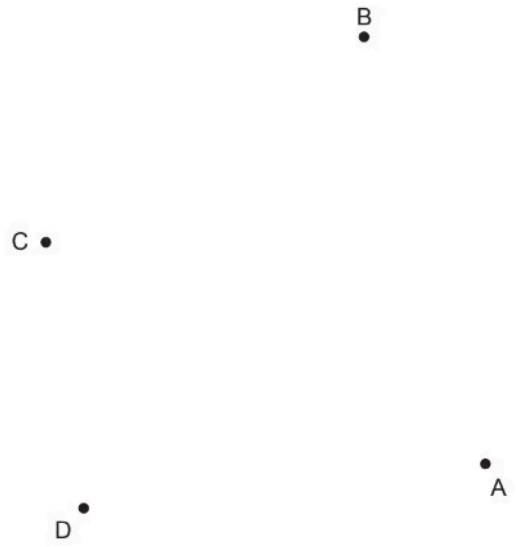
- nearer to BC than to AB

and

- nearer to B than to C.

(1 mark)

14 (a) Four points A, B, C and D are shown on the scale diagram below.



Scale: 1 cm represents 5 m

On the diagram, construct and mark the two points that are

- the same distance from A and B

and

- 15 m from C.

Show all your construction lines.

(5 marks)

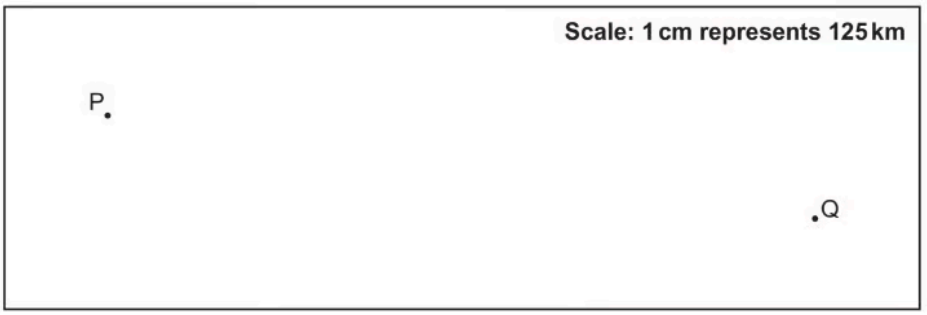
(b) The points A, B, C and D represent the four corners of Monty's garden.
His garden is bounded by four straight fences A to B, B to C, C to D and D to A.

Monty wants to plant a tree in his garden at a place that satisfies the two conditions in part **(a)**.

Explain why there is only one position where Monty can plant his tree.

(1 mark)

15 (a) The scale diagram below shows two cities, P and Q.



A plane departs from P at 09 47 and arrives at Q at 12 07.

Work out the average speed, in kilometres per hour, of the plane.

..... km/h

(5 marks)

(b) Give one reason why your answer may be inaccurate.

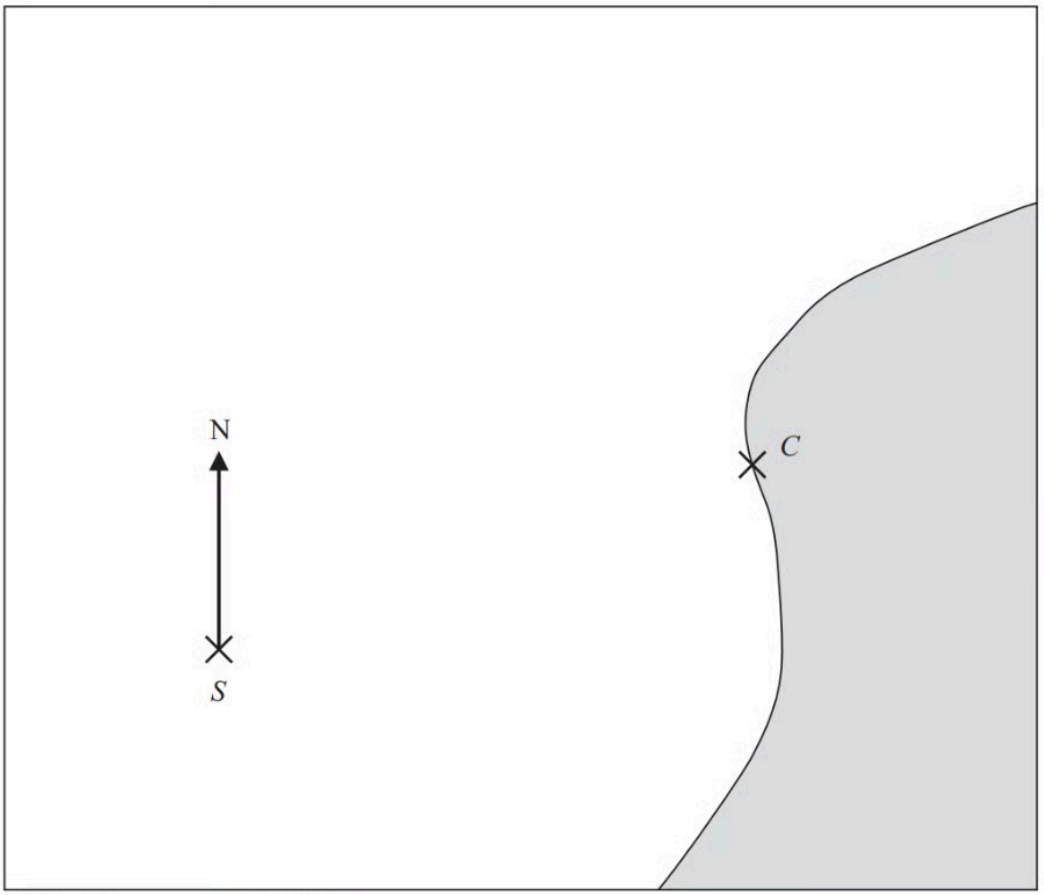
(1 mark)

16 The bearing of A from B is 097°. Find the bearing of B from A.

(2 marks)

Hard Questions

1 Here is a map.
The position of a ship, S, is marked on the map.



Scale 1 cm represents 100 m

Point C is on the coast.
Ships must not sail closer than 500 m to point C.

The ship sails on a bearing of $037°$

Will the ship sail closer than 500 m to point C?
You must explain your answer.

(3 marks)

2 Here is a scale drawing of a rectangular garden $ABCD$.

Scale: 1 cm represents 1 metre.

Jane wants to plant a tree in the garden

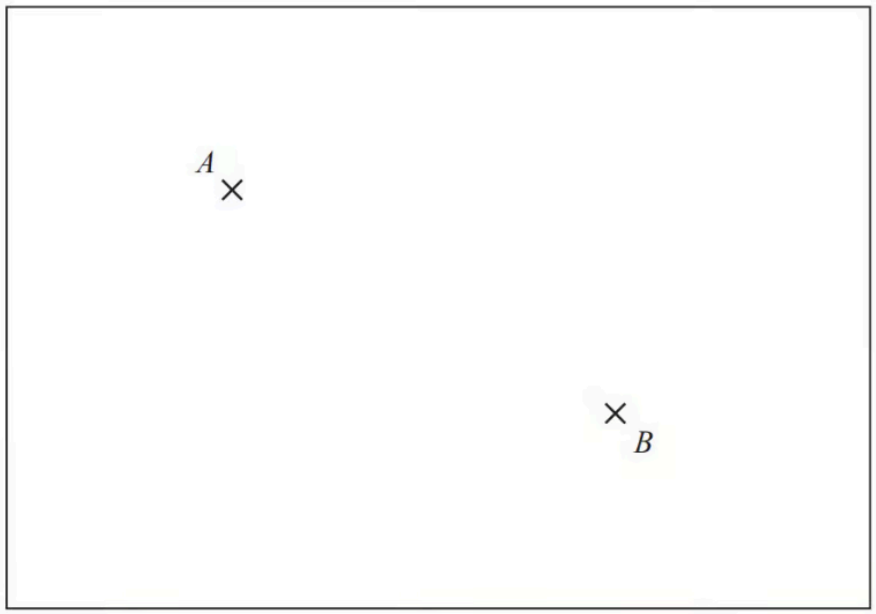
- at least 5m from point C,
- nearer to AB than to AD
- and less than 3m from DC.

On the diagram, shade the region where Jane can plant the tree.

(4 marks)

3 Here is a map.

The map shows two airports, A and B.



Sophie is going to have a hotel built.

The hotel

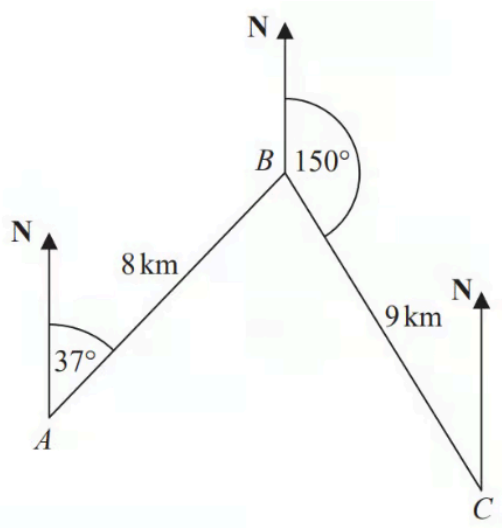
- will be closer to airport A than to airport B.
- will be less than 40km from airport B.

On the map, shade the region where the hotel can be built.

(3 marks)

4 The diagram shows the positions of three towns, Acton (A), Barston (B) and Chorlton (C

).



Barston is 8 km from Acton on a bearing of $037°$.
Chorlton is 9km from Barston on a bearing of $150°$.

Find the bearing of Chorlton from Acton.
Give your answer correct to 1 decimal place.
You must show all your working.

(5 marks)

5 The diagram shows the positions of three ships, A, B and C.

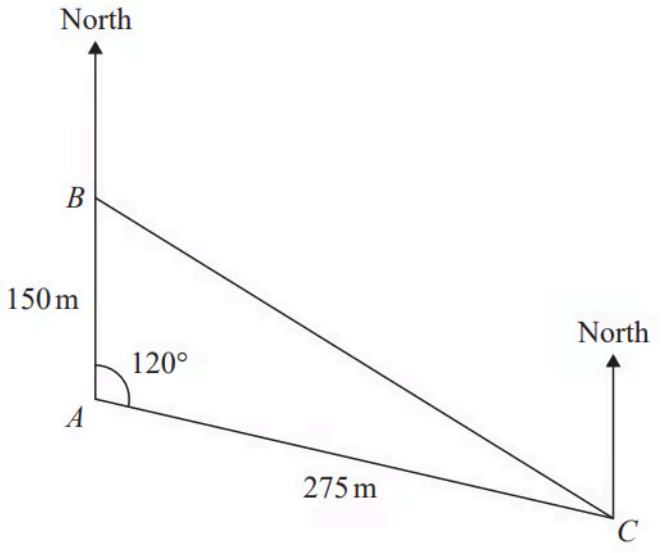


Diagram **NOT** accurately drawn

Ship B is due north of ship A.

The bearing of ship C from ship A is 120°

Calculate the bearing of ship C from ship B.
Give your answer correct to the nearest degree.

(5 marks)

6 A, B and C are three towns.

The bearing of B from A is 105°
The bearing of C from B is 230°

The distance of C from A is 180 km.
The distance of C from B is 95 km.

Calculate the distance of B from A.
Give your answer correct to 3 significant figures.

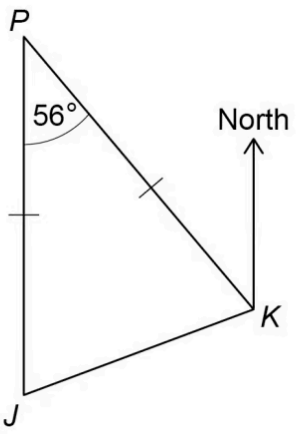
.....km

(5 marks)

7 J and K are ships.

P is a port.

J is due South of P.
Angle $JPK = 56°$
$JP = KP$



Not drawn accurately

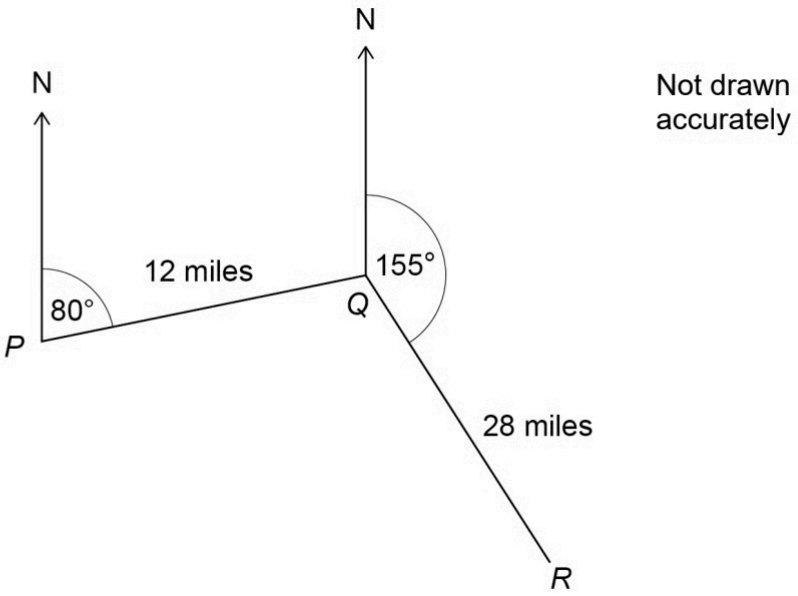
Work out the bearing of J from K.

(3 marks)

8 A ship sails from P to Q and then from Q to R.

Q is 12 miles from P, on a bearing of 080°

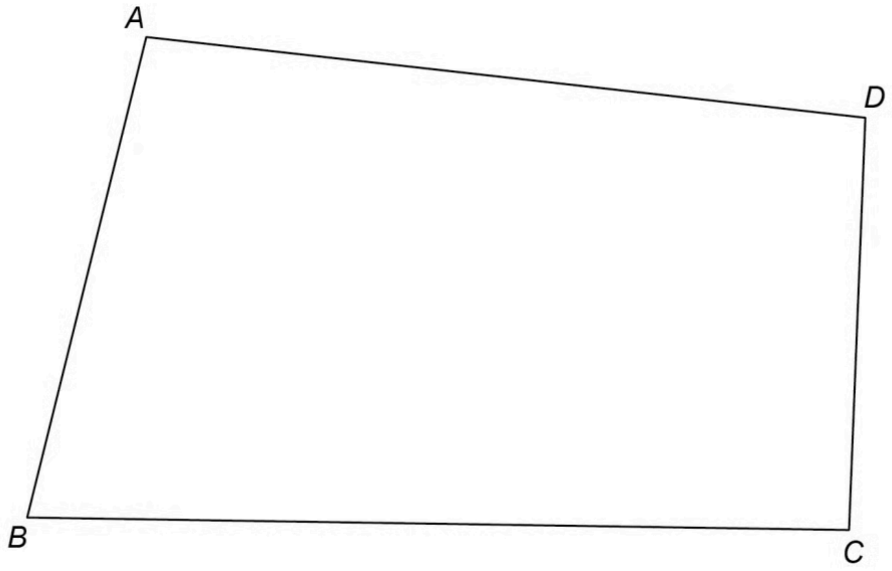
R is 28 miles from Q, on a bearing of 155°



Work out the direct distance from P to R.

(4 marks)

9 $ABCD$ represents the plan of a field.



There is a path across the field that

- starts at B
- is the same distance from BA and BC.

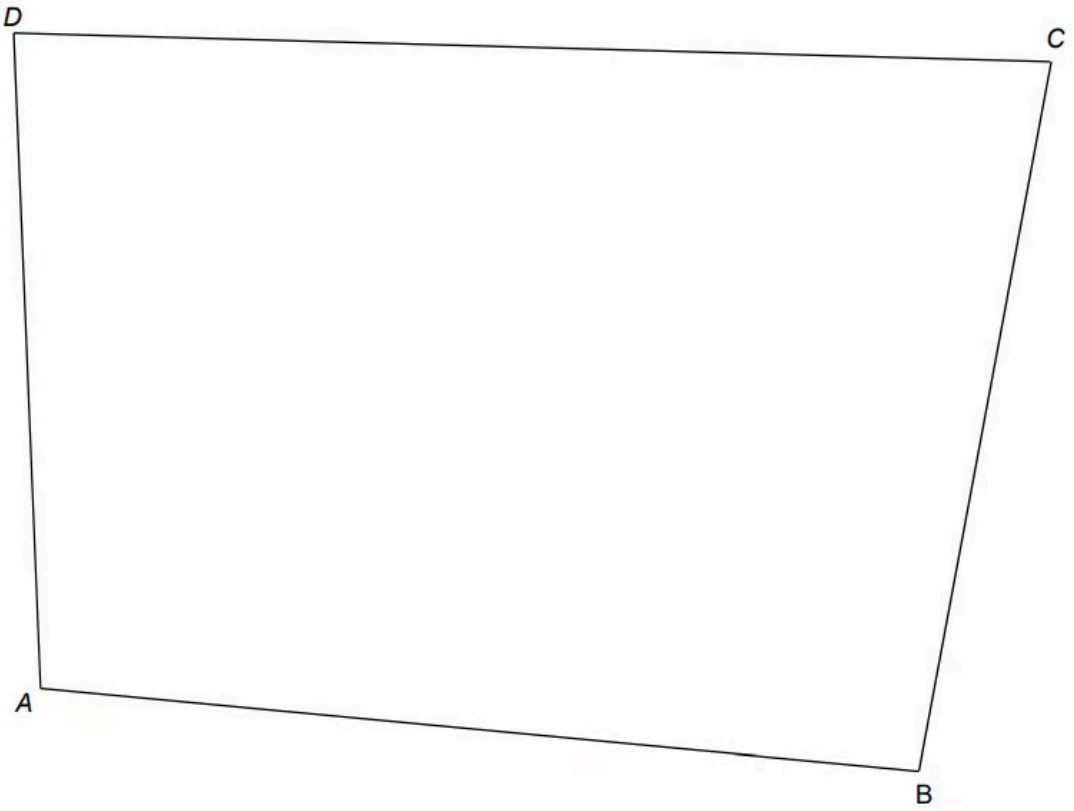
Using ruler and compasses, show the position of the path.

(2 marks)

10 Use ruler and compasses to answer this question.

Point P is

- the same distance from AB and AD
- 6 cm from C.



Show the position of P on the diagram.

(3 marks)

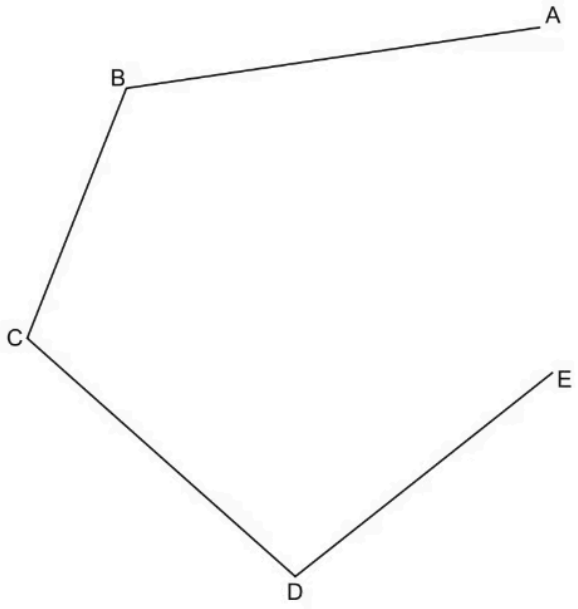
11 (a) The scale 1 cm represents 25 m can be written in the form 1 : *k*. Find the value of *k*.

k = ...

(1 mark)

(b) The scale drawing represents a harbour.

Scale: 1 cm represents 25 m



A boat leaves the harbour from point C and sails on a path that is equidistant from BC and CD.
The harbour rules do not allow boats to sail within 75 m of point E.

Find by construction whether the path of the boat will follow the harbour rules.
Show all your construction lines.

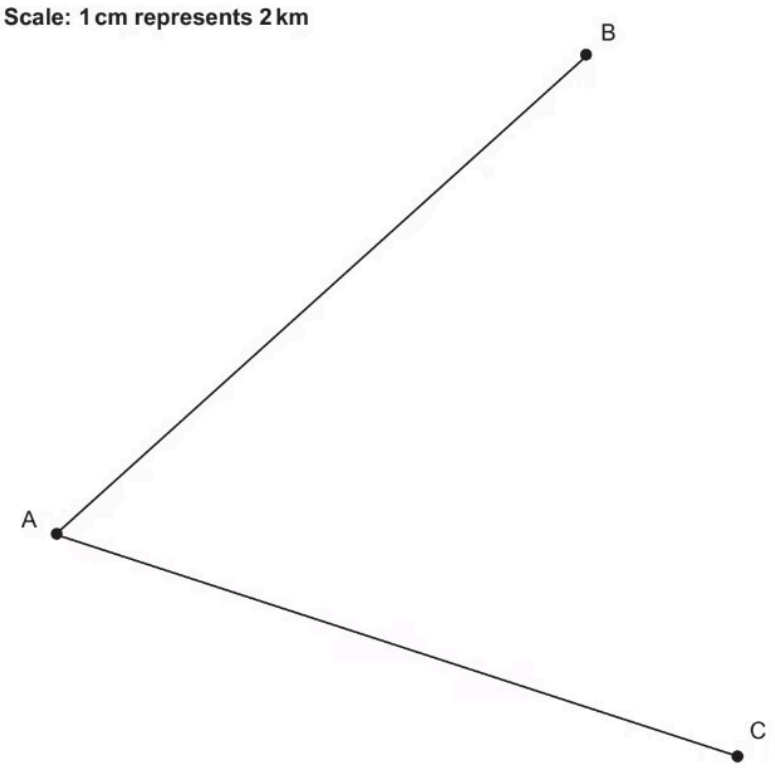
(5 marks)

12 (a) The scale diagram below shows towns, A, B and C.
Line AB represents the road from A to B and line AC represents the road from A to C.

A shopping centre is to be built so that it is

- nearer to the road from A to B than the road from A to C,
- less than 14 km from town C.

Using construction, shade the region where the shopping centre could be built.
Show all your construction lines.

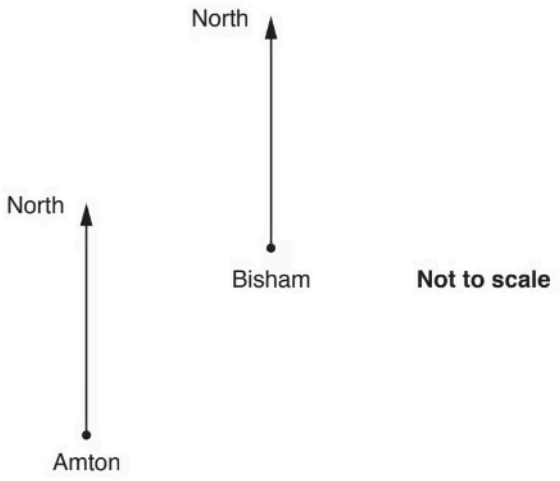


(5 marks)

(b) Explain why the region found in part **(a)** may not be an appropriate site for the shopping centre.

(1 mark)

13 The diagram shows the positions of two towns, Amton and Bisham.



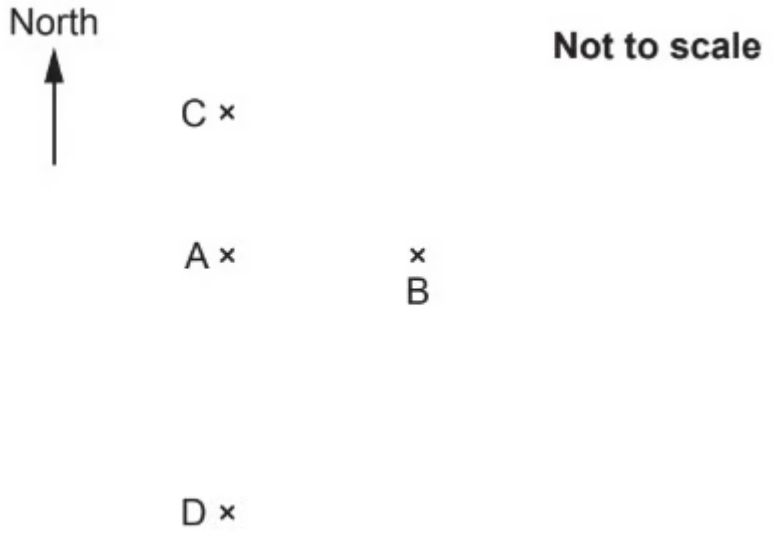
The bearing of Bisham from Amton is $b°$.
The bearing of Amton from Bisham is $6b°$.

Calculate the 3-figure bearing of Amton from Bisham.

(4 marks)

14 (a) A, B, C and D are four towns.

B is 25 kilometres due East of A.
C is 25 kilometres due North of A.
D is 45 kilometres due South of A.



Work out the bearing of B from C.

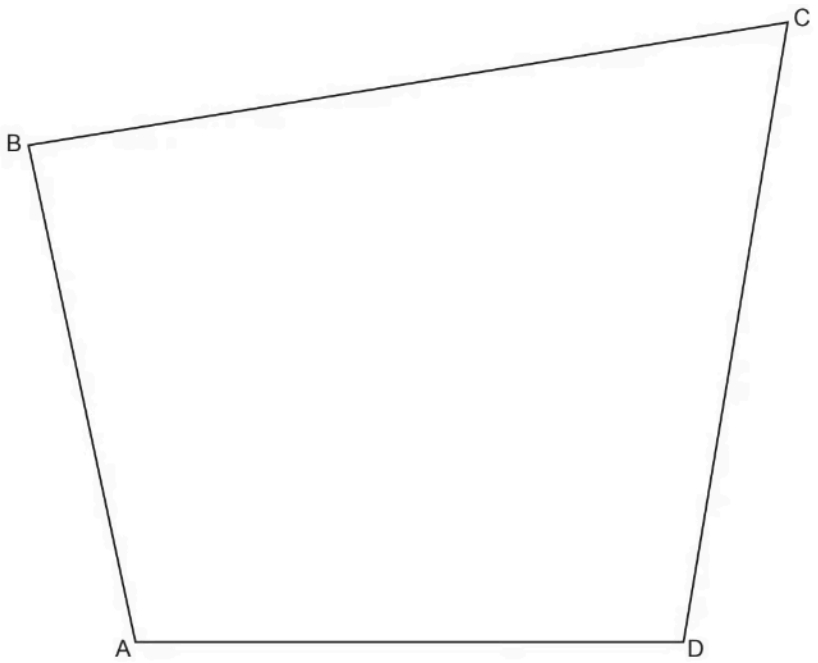
(2 marks)

(b) Calculate the bearing of D from B.

(4 marks)

15 The scale drawing represents a park.

Scale: 1 cm represents 25m



A new play area must be

- no more than 150 m from B
- closer to AD than to CD.

Construct and shade the region where the play area can be positioned.

Show all your construction lines.

(5 marks)