Loci

22

B
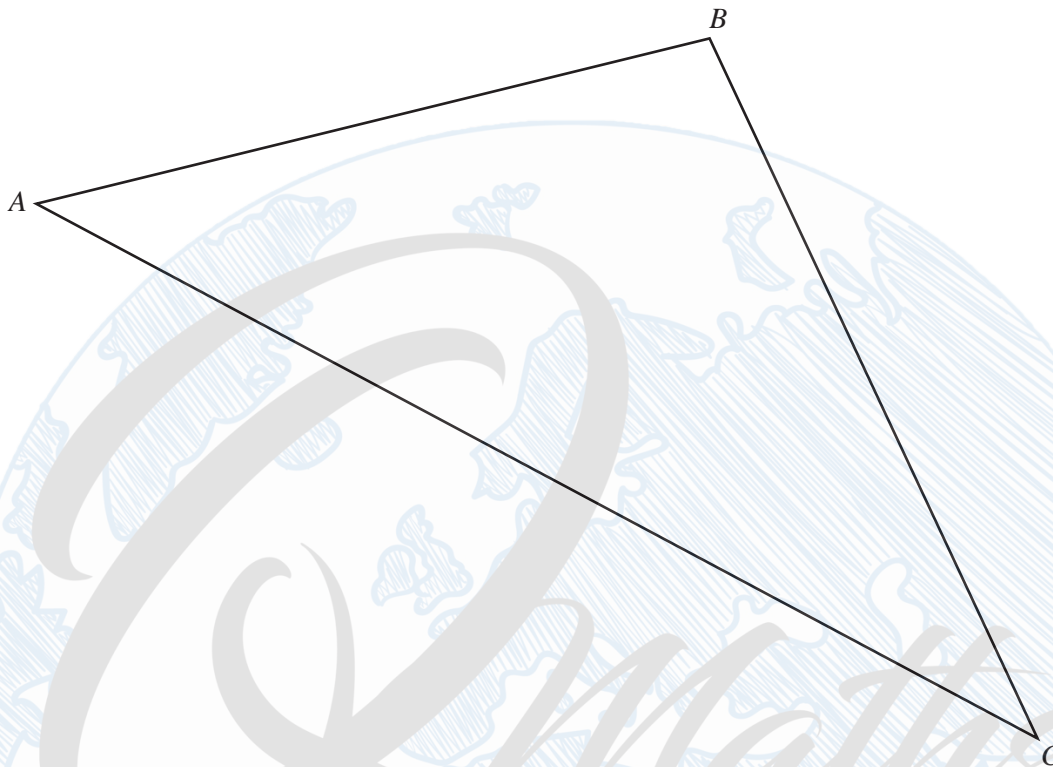
A

C

The diagram shows a farmer's field *ABC*.

The farmer decides to grow potatoes in the region of the field which is

- nearer to *A* than to *C*

and

- nearer to *AB* than to *AC*

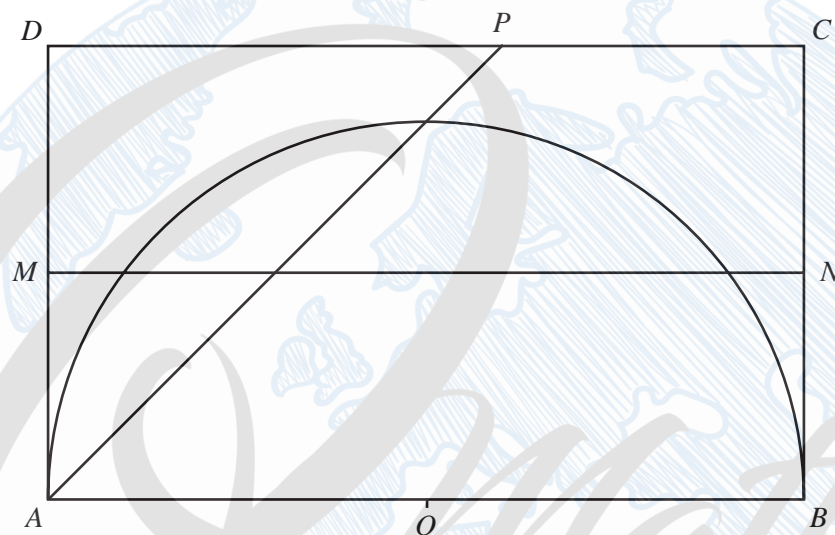Using **a straight edge and compasses only**, construct two loci accurately and shade this region on the diagram.

[5]

11 *ABCD* is a rectangle with *AB* = 10 cm and *BC* = 6 cm. *MN* is the perpendicular bisector of *BC*.

AP is the bisector of angle *BAD*.

O is the midpoint of *AB* and also the centre of the semicircle, radius 5 cm.

Write the letter *R* in the region which satisfies **all** three of the following conditions.

- nearer to *AB* than to *AD*
- nearer to *C* than to *B*
- less than 5 cm from *O*

[3]

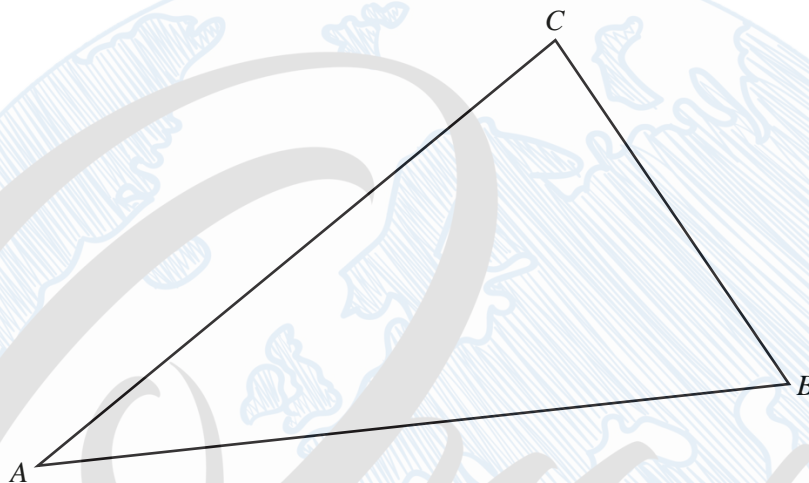**14**

Draw, accurately, the locus of all the points **outside** the triangle which are 3 centimetres away from the triangle. [3]

20
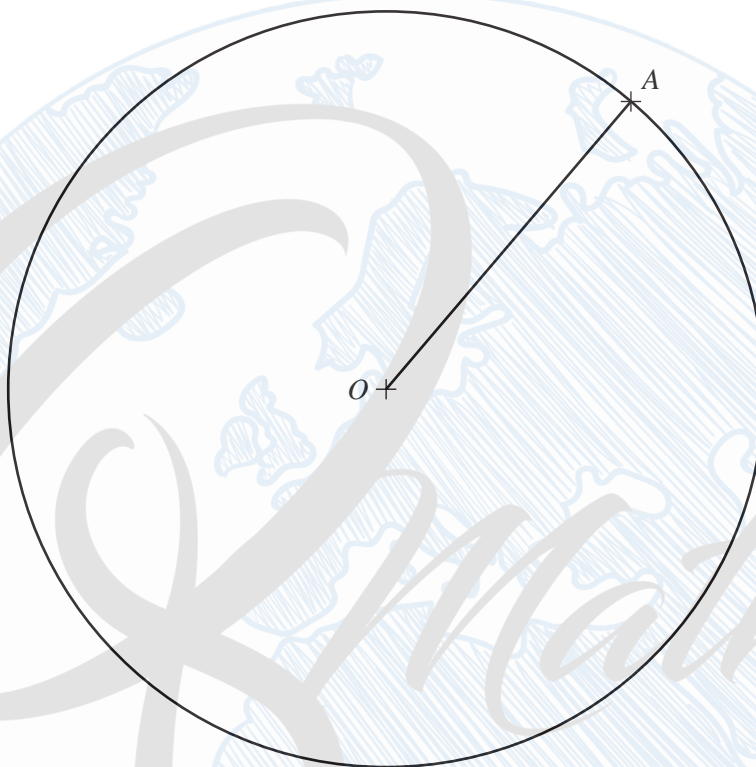

(a) On the diagram above, **using a straight edge and compasses only**, construct

    (i) the bisector of angle *ABC*,   [2]

    (ii) the locus of points which are equidistant from *A* and from *B*.   [2]

(b) Shade the region inside the triangle which is nearer to *A* than to *B* **and** nearer to *AB* than to *BC*.

                                                                                   [1]

9

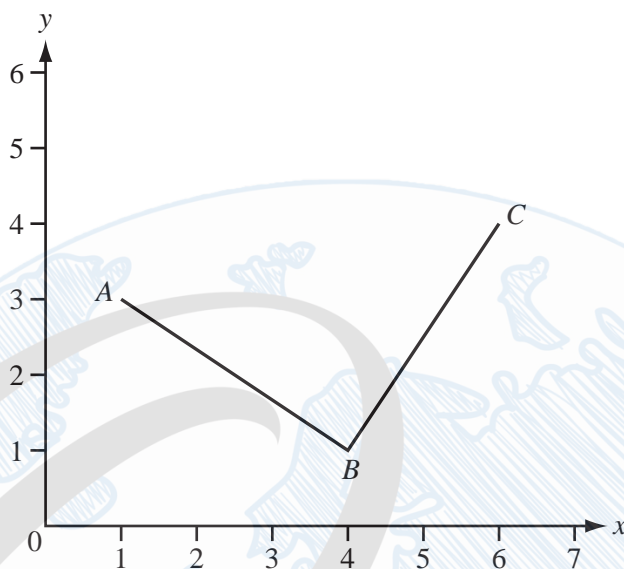The point A lies on the circle centre O, radius 5 cm.

(a) **Using a straight edge and compasses only,** construct the perpendicular bisector of the line OA.

[2]

(b) The perpendicular bisector meets the circle at the points C and D.

Measure and write down the size of the angle AOD.

Answer(b) Angle $AOD =$ .... [1]

19

$A(1, 3)$, $B(4, 1)$ and $C(6, 4)$ are shown on the diagram.

(a) Using a straight edge and compasses only, construct the angle bisector of angle ABC. [2]

(b) Work out the equation of the line BC.
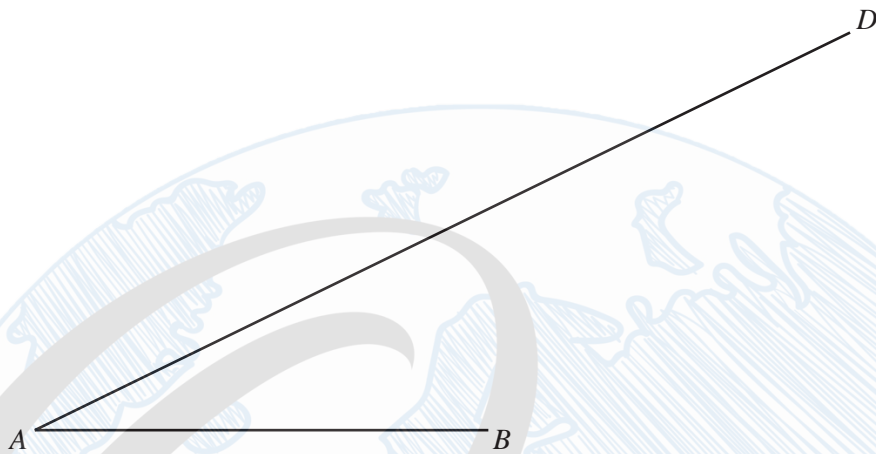
Answer(b) .... [3]

(c) ABC forms a **right-angled isosceles** triangle of area $6.5 \, \text{cm}^2$.

Calculate the length of AB.

Answer(c) AB = ... cm [2]

9

(a) The point C lies on AD and angle $ABC = 67°$.
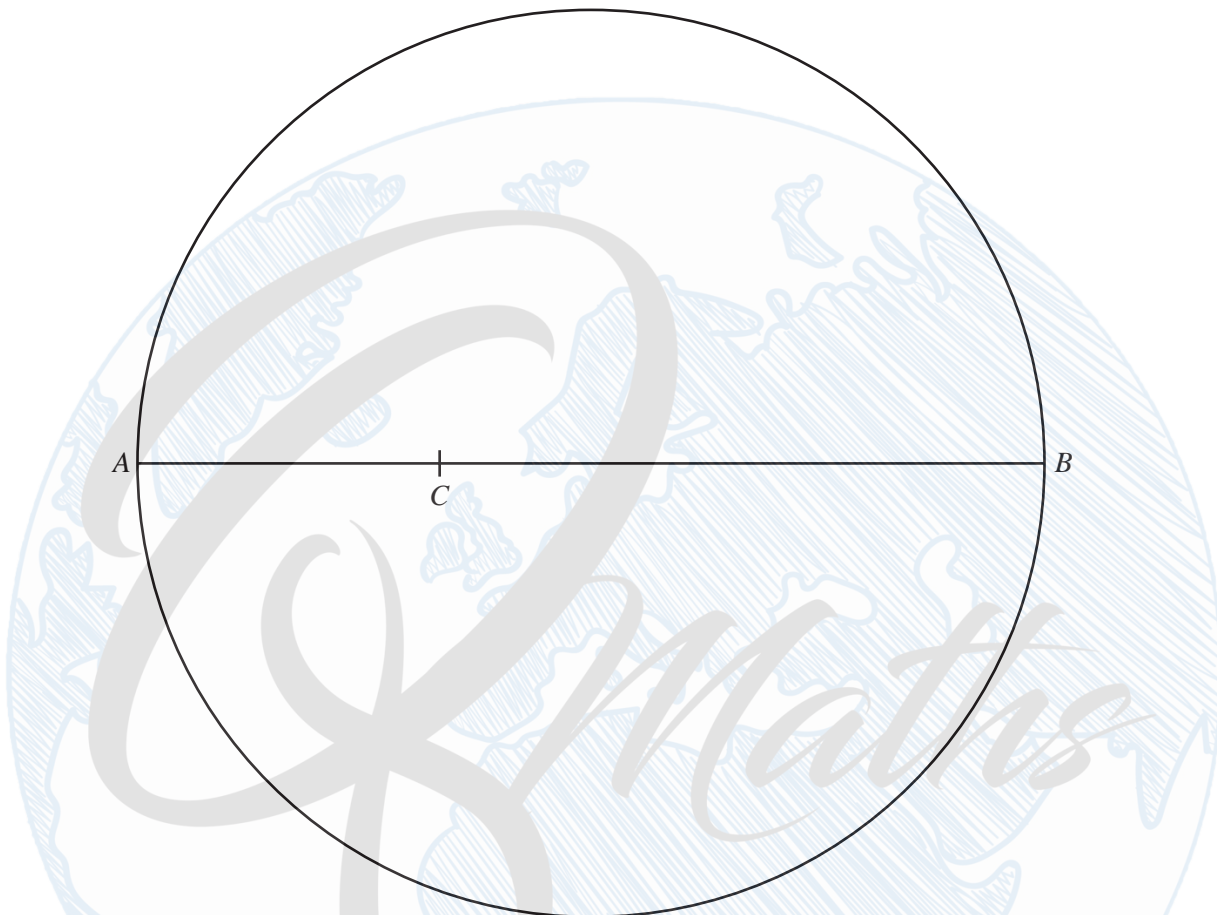
Draw accurately the line BC. [1]

(b) **Using a straight edge and compasses only**, construct the perpendicular bisector of AB. **Show clearly all your construction arcs**. [2]

17

AB is the diameter of a circle.
C is a point on AB such that $AC = 4$ cm.

(a) Using a straight edge and compasses only, construct

    (i) the locus of points which are equidistant from A and from B, [2]

    (ii) the locus of points which are 4 cm from C. [1]

(b) Shade the region in the diagram which is

                •   nearer to B than to A
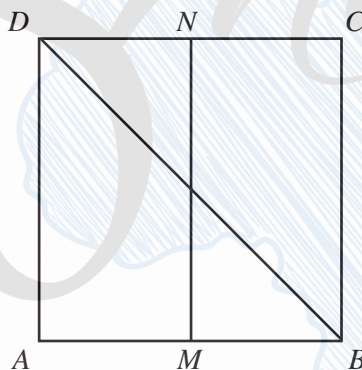
     and

                •   less than 4 cm from C. [1]

6

×R

×
T

Using a straight edge and compasses only, construct the locus of points which are equidistant from R and from T. [2]

7

The diagram shows a square $ABCD$.
M is the midpoint of AB and N is the midpoint of CD.

(a) Complete the statement.

The line MN is the locus of points inside the square which are

.... [1]

(b) Shade the region inside the square containing points which are
nearer to AB than to BC **and** nearer to A than to B. [1]

19

Scale: 1 cm to 8 m

The rectangle *ABCD* is a scale drawing of a rectangular football pitch.
The scale used is 1 centimetre to represent 8 metres.

(a) Construct the locus of points 40 m from *A* and inside the rectangle. [2]

(b) Using a straight edge and compasses only, construct the perpendicular bisector of *DB*. [2]

(c) Shade the region on the football pitch which is more than 40 m from *A* **and** nearer to *D* than to *B*. [1]

20
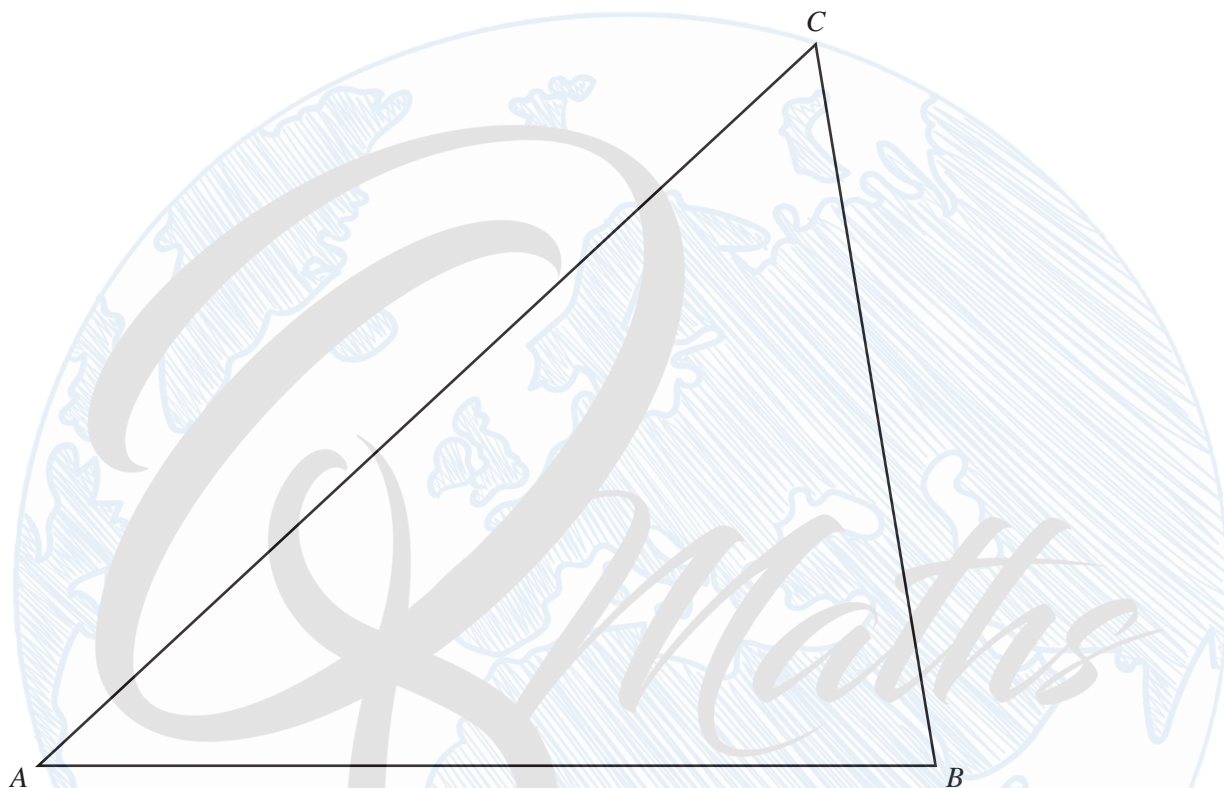
(a) **In this part, use a straight edge and compasses only and show your construction arcs.**
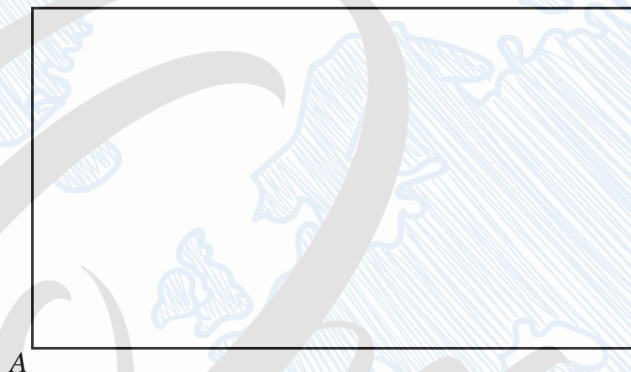
Construct accurately

(i) the bisector of angle *B*, [2]

(ii) the locus of points equidistant from *B* and from *C*. [2]

(b) Shade the region inside triangle *ABC* containing the points which are

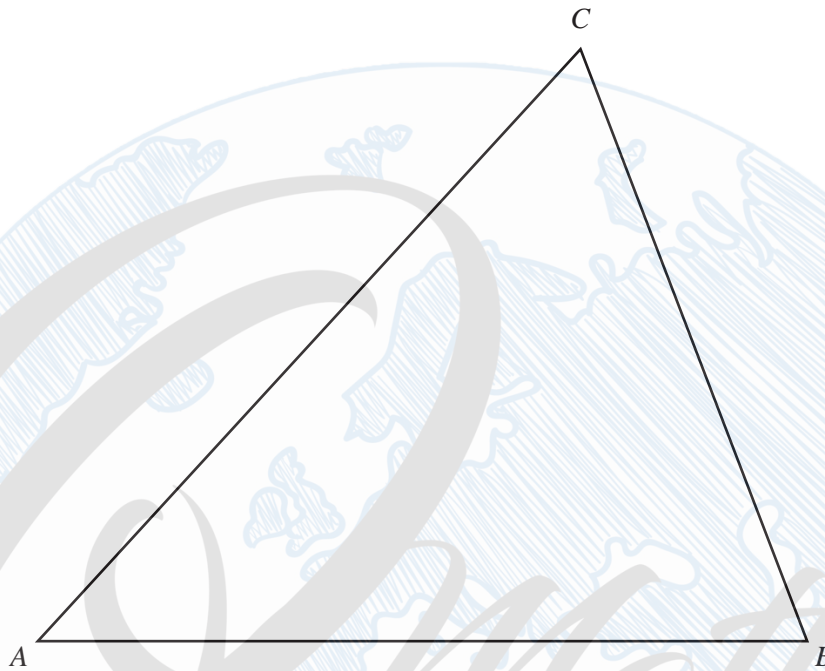nearer to *BC* than to *BA* **and** nearer to *C* than to *B*. [1]

15

(a) Construct the locus of all the points which are 3 cm from vertex *A* **and** outside the rectangle. [2]

(b) Construct, **using a straight edge and compasses only**, one of the lines of symmetry of the rectangle. [2]

15

C

A   B

(a) **Using compasses and straight edge only**, construct

  (i) the perpendicular bisector of AC,   [2]
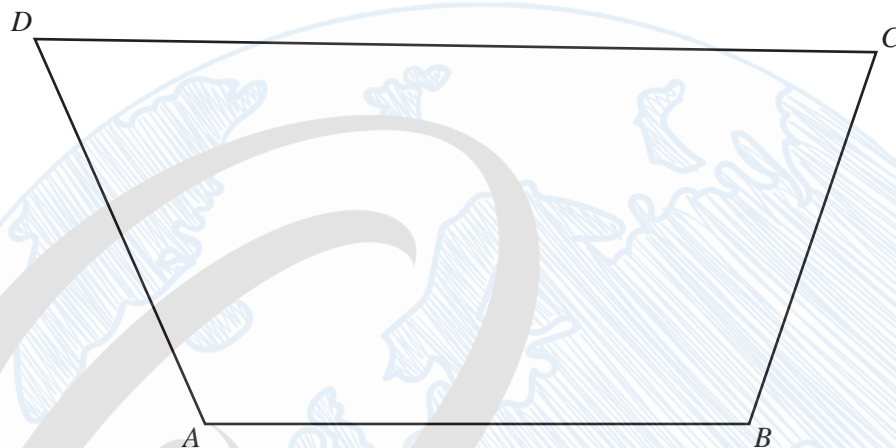
  (ii) the bisector of angle ACB.   [2]

(b) Shade the region inside the triangle which is

      •   nearer to A than to C

and

      •   nearer to AC than to BC.   [1]

20 The diagram shows the plan, *ABCD*, of a park.
The scale is 1 centimetre represents 20 metres.

D   C

A   B

Scale: 1 cm to 20 m

(a) Find the actual distance *BC*.

Answer(a) .... m [2]

(b) A fountain, *F*, is to be placed

- 160 m from *C*

and

- equidistant from *AB* and *AD*

On the diagram, **using a ruler and compasses only**, construct and mark the position of *F*
Leave in all your construction lines.   [5]

12

D   C

E.

A   B

(a) Draw the locus of the points which are 3 cm from E.   [1]

(b) **Using a straight edge and compasses only**, construct the bisector of angle DCB.   [2]

(c) Shade the region which is

    ●   less than 3 cm from E

and

    ●   nearer to CB than to CD.   [1]

19 The diagram shows the positions of three points A, B and C.

(a) Draw the locus of points which are 4 cm from C. [1]
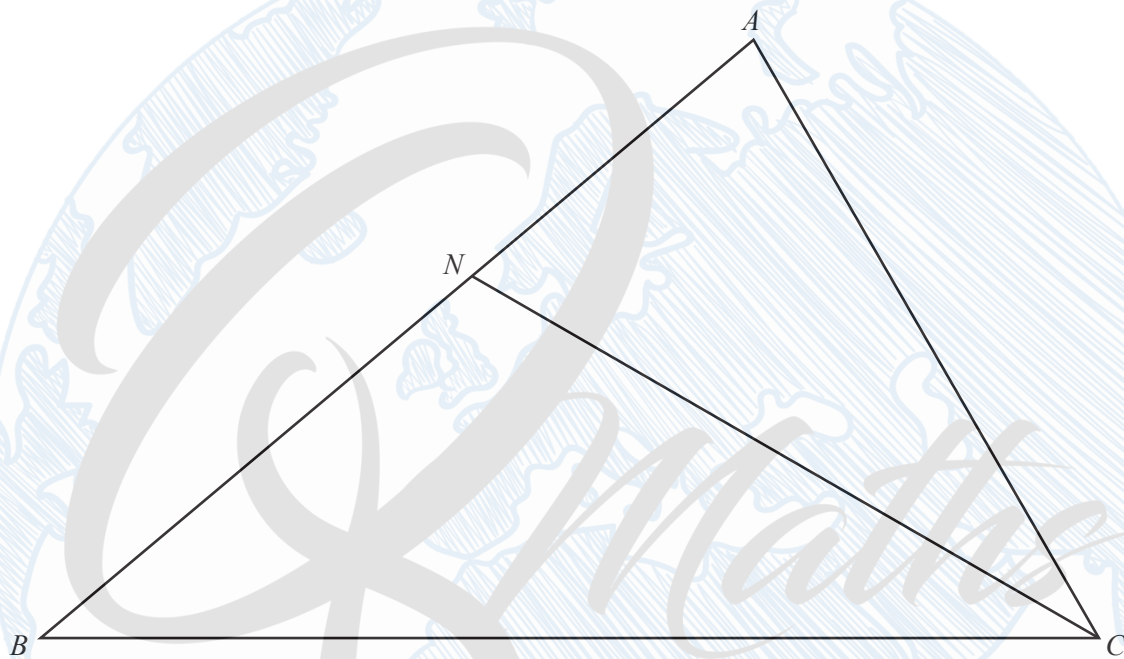
(b) **Using a straight edge and compasses only**, construct the locus of points which are equidistant from A and B. [2]

(c) Shade the region which is

- less than 4 cm from C

and
- nearer to B than to A. [1]

6

In triangle *ABC*, *CN* is the bisector of angle *ACB*.

(a) **Using a ruler and compasses only**, construct the locus of points inside triangle *ABC* that
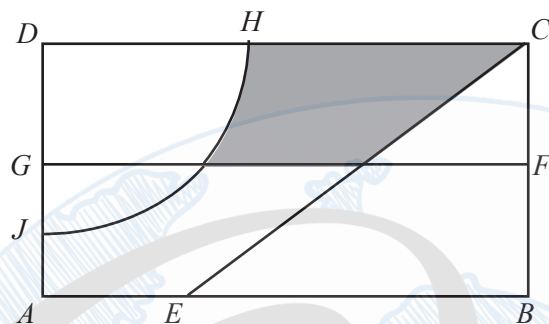are 5.7 cm from *B*.   [1]

(b) Shade the region inside triangle *ABC* that is

- more than 5.7 cm from *B*

and
- nearer to *BC* than to *AC*.   [1]

14

The diagram shows a rectangular garden divided into different areas.
FG is the perpendicular bisector of *BC*.
The arc *HJ* has centre *D* and radius 20m.
CE is the bisector of angle *DCB*.

Write down two more statements using loci to describe the shaded region inside the garden.
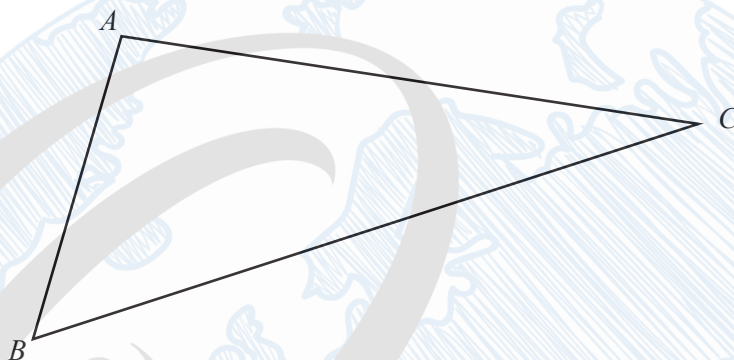
The shaded region is

• nearer to *C* than to *B*

• ....

• .... [2]
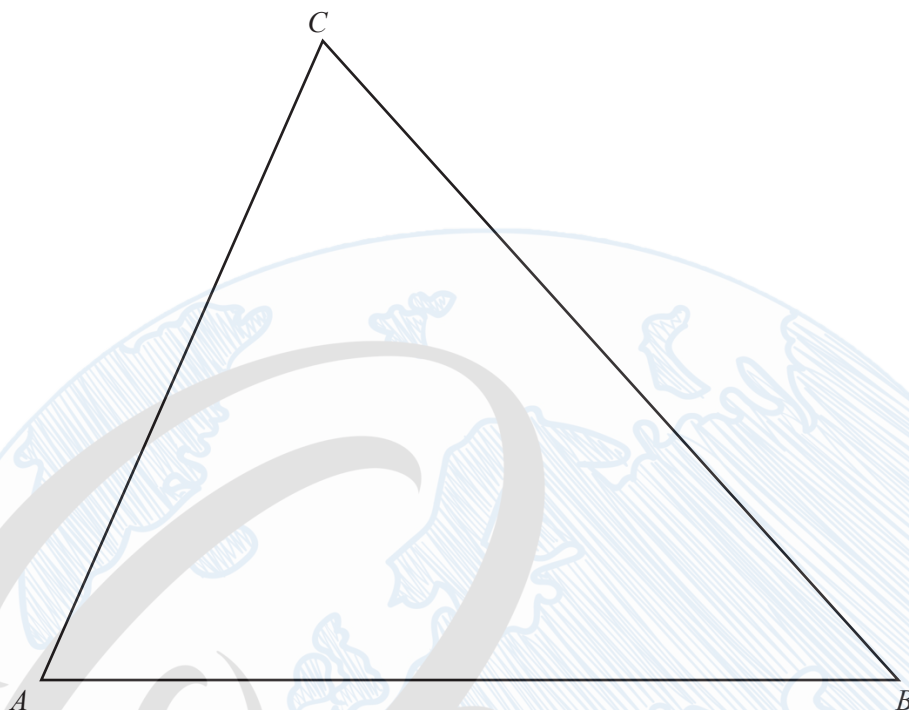
17 The diagram shows triangle *ABC*.

(a) **Using a straight edge and compasses only**, construct the bisector of angle *ABC*. [2]

(b) Draw the locus of points **inside** the triangle that are 3 cm from *AC*. [1]

6   **Using a straight edge and compasses only**, construct the perpendicular bisector of the line *AB*.
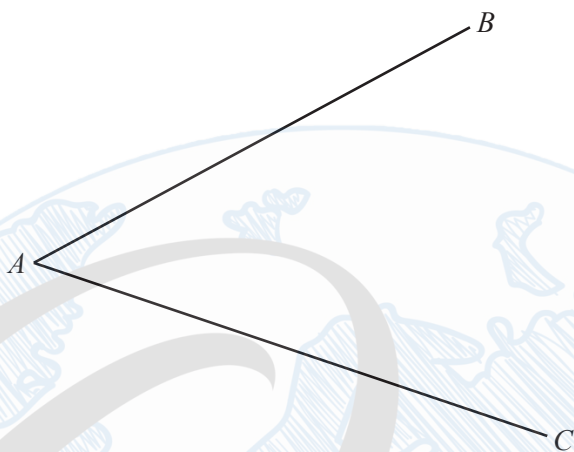
A

B

[2]

17

(a) Construct the locus of points, inside the triangle, that are 5 cm from *B*. [1]

(b) Construct the locus of points, inside the triangle, that are equidistant from *AB* and *BC*. [2]

(c) Shade the region, inside the triangle, containing points that are

  • more than 5 cm from *B*
and
  • nearer to *AB* than to *BC*. [1]

11

(a) **Using compasses and a straight edge only**, construct the bisector of angle *BAC*. [2]

(b) Complete the statement.

The bisector of angle *BAC* is the locus of points that are ....

.... [1]

9 **Using a straight edge and compasses only**, construct the locus of points that are equidistant from *A* and *B*.

A •

• *B*

[2]