Loci

- Constructing the locus of points from a fixed point
- Constructing the locus of points from a line
- Knowing when to use solid or dashed lines in locus diagrams
- Constructing the locus of points equidistant from a pair of fixed points or lines

Keywords

You should know

explanation 1a   explanation 1b

1 Using a pair of compasses, construct the locus of all the points 5 cm from a point X.

2 Using a pair of compasses, construct the locus of all the points no more than 3 cm from a point O.

3 Construct the locus of all the points at least 2 cm, but less than 5 cm, from a point A. Use a pair of compasses.

4 Using a ruler, draw a rectangle ABCD so that AB = 4 cm and AD = 7 cm as shown.

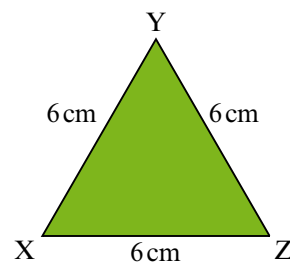Shade the locus of all the points in the rectangle that are at least 3 cm from A and C.

B ⎯⎯⎯⎯⎯ C

4 cm

A ⎯ 7 cm ⎯ D
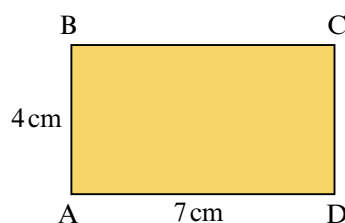
5 Using a ruler, draw a rectangle PQRS, so that PQ = 3 cm and QR = 8 cm.

Q ⎯ 8 cm ⎯ R

3 cm

P ⎯⎯⎯ S
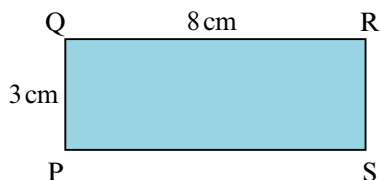
a Mark the midpoint of PS. Label it X.

b Shade the locus of all the points in the rectangle that are more than 2 cm from X and at least 1 cm from both Q and R.

6 You need a pair of compasses and a ruler for this question.

   a Construct an equilateral triangle XYZ of side length 6 cm as shown.

   b Shade the region within the triangle that is at least 3 cm from X, Y and Z.
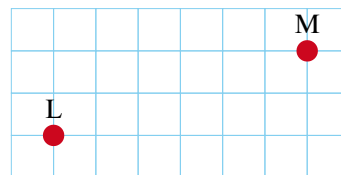
explanation 2

7 Copy the diagram onto squared paper. Construct the locus of all the points equidistant from P and Q.
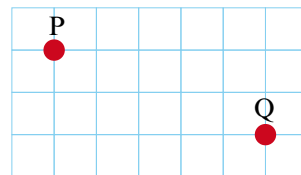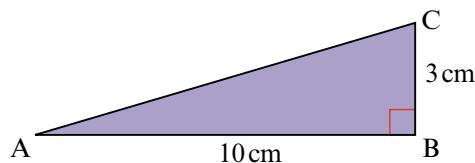
8 Copy the diagram onto squared paper. Shade the locus of all the points closer to L than M.

9 The diagram shows triangle ABC.

   a Copy the diagram. Construct the locus of points equidistant from A and B.

   b On the same diagram, construct the locus of points equidistant from A and C.

   **c** What do you notice about the point where both loci intersect?

10 Mark a point O.

   a Draw the locus of points 4 cm from O.

   b Mark a point A on this locus.

   c Construct part of a locus of points 4 cm from A, such that it intersects with the original locus. Label the point of intersection B.

   d Using a ruler, draw the lines OA, AB and OB.

   e Describe the shape drawn.

explanation 3

11 Lines OA and OB are both 7 cm and form an angle of 60° as shown.

Copy the diagram and construct the locus of points equidistant from OA and OB.

O

7 cm   60°

7 cm

A

B
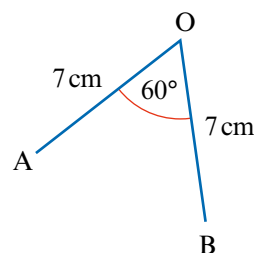
12 A rectangle ABCD has dimensions as shown.

B   7 cm   C

4 cm

A   D

   a Using a ruler, copy the diagram.

   b Construct the locus of points that are equidistant from edges BA and BC. Mark the point of intersection of the locus with side AD as X.

   c Measure the distance XD.

   d Construct the locus of points equidistant from BX and BC.

   e Mark the point of intersection of this locus with the edge of the rectangle Y.

   f Measure the distance YD.
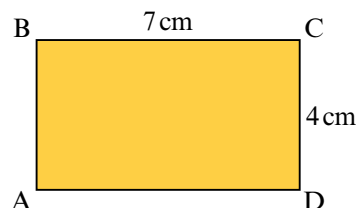
13 A goat is tethered to a post by a rope 9 m long. Draw a diagram of the locus of points in the field that the goat can reach. Use a scale of $1 : 180$.

9 m
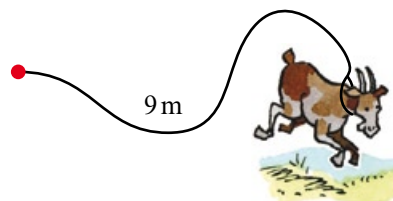
14 A metal rail 4 m long is fixed to a long wall as shown.
A horse is tethered to the rail by a rope 2 m long.
The rope can run freely along the full length of the rail.

4 m

2 m
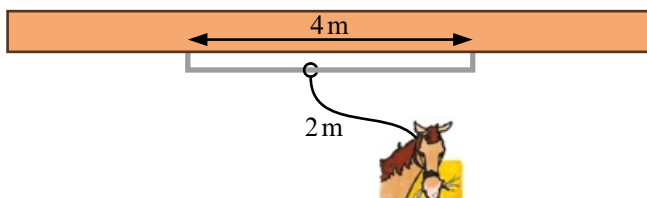
Using a scale of $1 : 50$, draw a diagram showing the locus of points that the horse can reach.

15 The diagram shows a courtyard.

   a A dog is tethered to a hook at corner X
by a chain 5 m long.

     Using a scale of 1 : 80, draw a scale diagram.
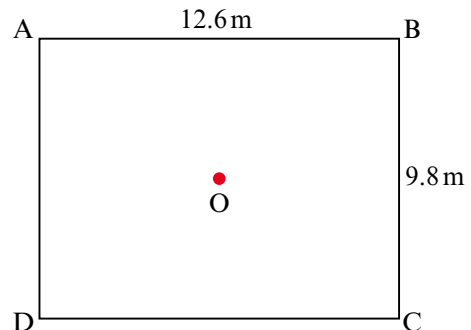Shade the locus of all the points that the dog
can reach.

   b Using a scale of 1 : 80, draw another scale
diagram. Shade the locus of all the points
that the dog can reach when it is tethered to
the hook at corner Y by the same chain.
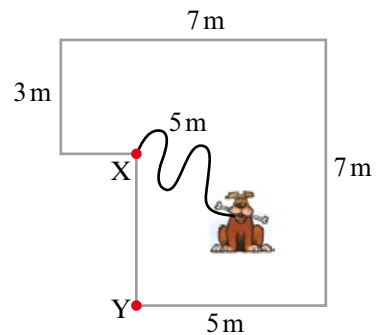
16 The diagram shows a bare rectangular
garden ABCD.
The owner wishes to plant grass in the
garden according to these rules.

   • It must be further than 2.8 m from the
tree planted in the centre of the garden
at O.

   • It must be at least 2.1 m from the edge
of the garden.

   a Draw a scale diagram of the garden. Use a scale of 1 : 140.

   b Shade the locus of all the points where the grass can be planted.

17 The diagram shows part of a garden.
The line AB represents a tall wall, 6 m long.
Point O lies on the perpendicular bisector of AB.
The shortest distance from O to the wall is 4 m.

   a Construct the diagram accurately. Use a scale
of 1 : 200.

   b A snail is placed at point O.
At top speed, it can travel 8 m in an hour.
Shade the locus of all the points the snail could reach in 1 hour.