



Loci

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

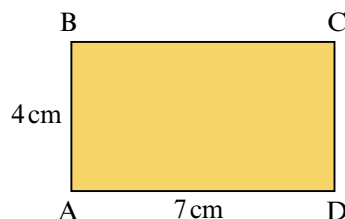
Keywords

You should know

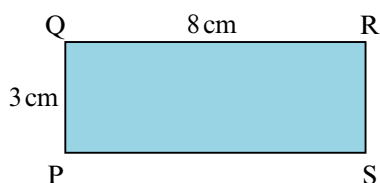
explanation 1a

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 $AB = 4\text{ cm}$ and $AD = 7\text{ cm}$ as shown.
Shade the locus of all the points in the rectangle that are at least 3 cm from A and C.

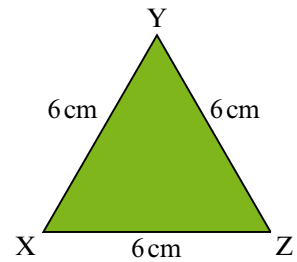


- 5 Using a ruler, draw a rectangle PQRS, so that $PQ = 3\text{ cm}$ and $QR = 8\text{ cm}$.



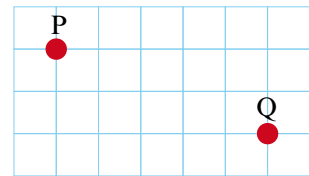
- a Mark the midpoint of PS. Label it X.
- b Shade the locus of all the points in the rectangle that are more than 2 cm from X and at least 1 cm from both Q and R.

- 6** You need a pair of compasses and a ruler for this question.
- Construct an equilateral triangle XYZ of side length 6 cm as shown.
 - Shade the region within the triangle that is at least 3 cm from X, Y and Z.

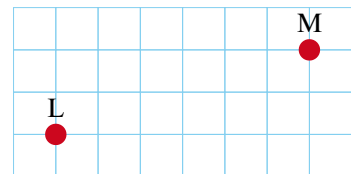


explanation 2

- 7** Copy the diagram onto squared paper. Construct the locus of the points equidistant from P and Q.

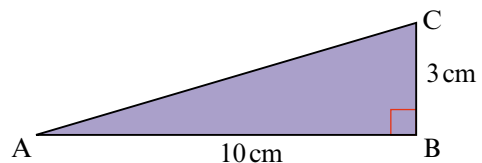


- 8** Copy the diagram onto squared paper. Shade the locus of the points closer to L than M.



- 9** The diagram shows triangle ABC.

- Copy the diagram. Construct the locus of points equidistant from A and B.
- On the same diagram, construct the locus of points equidistant from A and C.
- What do you notice about the point where both loci intersect?



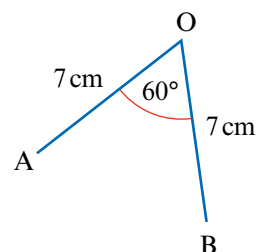
- 10** Mark a point O.
- Draw the locus of points 4 cm from O.
 - Mark a point A on this locus.
 - Construct part of a locus of points 4 cm from A, such that it intersects with the original locus. Label the point of intersection B.
 - Using a ruler, draw the lines OA, AB and OB.
 - Describe the shape drawn.

- 11** Use a similar method to that in the previous question to construct a regular hexagon.

explanation 3

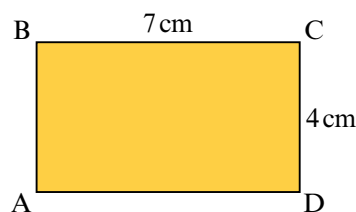
- 12** Lines OA and OB are both 7 cm long and form an angle of 60° as shown.

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

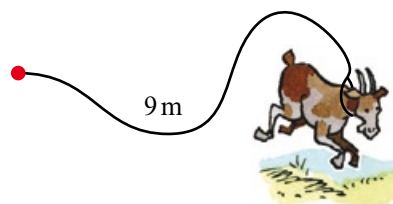


- 13** A rectangle ABCD has dimensions as shown.

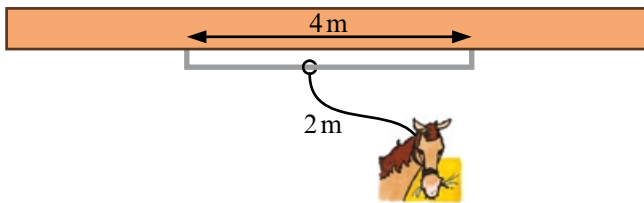
- Using a ruler, copy the diagram.
- Construct the locus of points that are equidistant from edges BA and BC. Mark the point of intersection of the locus with side AD as X.
- Measure the distance XD.
- Construct the locus of points equidistant from BX and BC.
- Mark the point of intersection of this locus with the edge of the rectangle Y.
- Measure the distance YD.



- 14** 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.



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



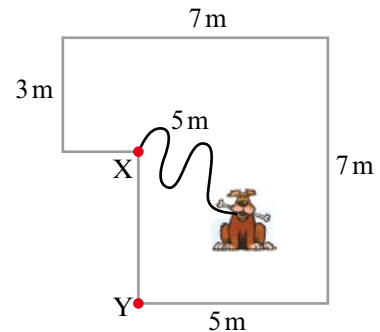
Using a scale of 1 : 100, draw a diagram showing the locus of points that the horse can reach.

- 16** 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 : 100, draw a scale diagram. Shade the locus of all the points that the dog can reach.

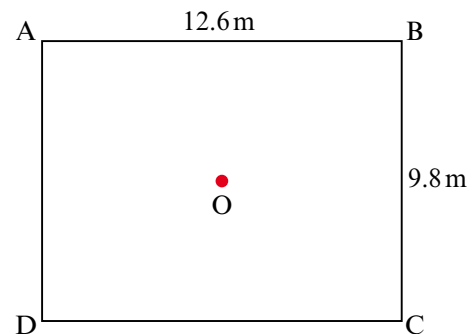
- b** Using a scale of 1 : 100, draw another scale diagram. Shade the locus of all the points that the dog can reach when it is tethered to the hook at corner Y by the same chain.



- 17** The diagram shows a bare rectangular garden ABCD.

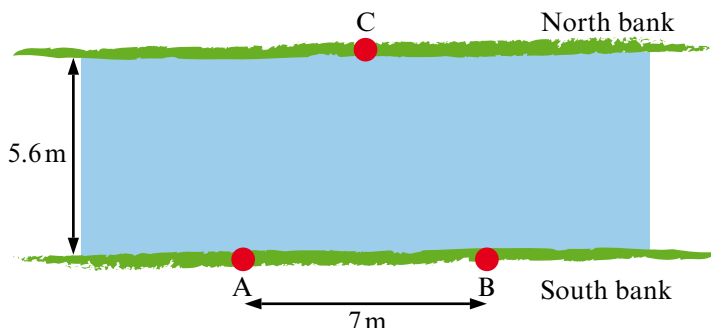
The owner wishes to plant grass in the garden according to these rules.

- It must be further than 2.8m from the tree planted in the centre of the garden at O.
- It must be at least 2.1m 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.

- 18** A river has parallel banks 5.6 m apart. Two points A and B are 7 m apart on the south bank as shown.



A dog swims across the river to a point C on the north bank, in such a way that he is always equidistant from A and B.

- a** Draw a scale diagram of the river using a scale of 1 : 140 .
 - b** Using a pair of compasses, construct the locus of points represented by the dog's path across the river.
 - c** By measuring, calculate the real distance of point C from B.
- 19** Points T and R are 8 km apart.
There is a radio transmitter at T and a receiver at R. The transmitter's range is 6 km (its signal cannot be received more than 6 km from T).
- a** Make a scale drawing showing the positions of T and R.
Use a scale of 1 : 200 000.
 - b** A relay station at P receives the radio signal from T and re-transmits it to R.
 - i** Explain why the distance PT cannot be more than 6 km.
 - ii** The range of the relay station's transmitter is 4.8 km.
What is the greatest possible distance between P and R?
 - iii** On your diagram, shade the locus of possible positions of P.
 - c** The relay station at P is demolished and a new transmitter is built at a point S. The range of the new transmitter is 10 km.
 - i** The receiver at R must be able to receive signals from S.
What is the greatest allowable distance between R and S?
 - ii** To avoid interference, no point should receive signals from both T and S.
What is the smallest allowable distance between S and T?
 - iii** On your diagram, shade the locus of the possible positions of S.