Planner

# Loci

- Finding the locus of a set of points
- Solving simple problems involving loci

Keywords

You should know

explanation 1a | explanation 1b | explanation 1c

**1** The point P is a fixed point.
On separate diagrams on plain paper, draw these loci.

**a** Locus of points that are 3 cm from P

**b** Locus of points that are less than 1.5 cm from P

**c** Locus of points that are less than or equal to 4 cm, but greater than 2.5 cm, from P

**2** Two health centres, A and B, are 5 km apart. Health centre A will only accept people who live within a radius of 2.5 km, whereas health centre B will accept people who live within 3 km of the centre.

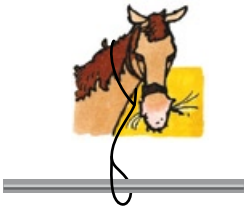
**a** Draw a scale diagram showing the two health centres, using a scale of 1 cm to 1 km.

**b** Shade the region where people could go to either health centre.

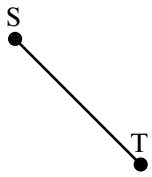
**3** The line PQ is 6 cm long. On separate diagrams on plain paper, draw the loci of points that are these distances from the line PQ.

**a** Exactly 3 cm **b** Less than 2 cm **c** Greater than 1.5 cm

**4** A rail is 3.5 m long. It runs along the ground.
A horse is tethered to the rail by a rope that is 3 m long and that can move up and down the rail.
Draw a plan view of a scale diagram that shows the grass that the horse can reach. (Use a scale of 1 cm to 1 m.)



**5** The diagram shows the line ST.



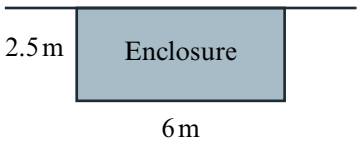

**a** On plain paper, draw the line ST 4.5 cm long.

**b** Draw the locus of points that are exactly 3 cm from the point S.

**c** Draw the locus of points that are 2 cm from the line ST.

**d** Shade the locus of points that are at least 3 cm from S and that are also 2 cm or less from the line ST.

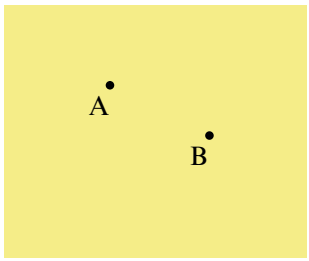
**6** The diagram shows a new enclosure at a zoo.




Visitors must not be within 1.2 metres of the enclosure. Draw a scale diagram of the enclosure. Use a dashed line to mark the boundary for visitors. (Use a scale of 1 cm to 1 m.)

explanation 2a explanation 2b

**7** Two points, A and B, are 7 cm apart.
Draw each of these loci on a separate diagram.



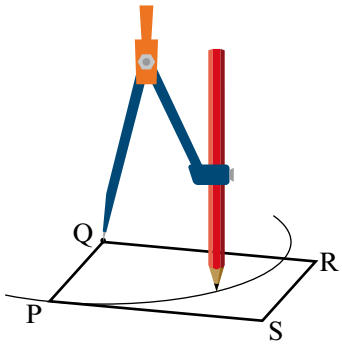

**a** Locus of points equidistant from A and B

**b** Locus of points closer to A than to B

**c** Locus of points closer to B and 4 cm or less from A

**d** Locus of points equidistant from A and B but less than 5 cm from A

**8** George draws a rectangle 6 cm by 3 cm and labels it PQRS. He then starts to construct the perpendicular bisector of QS. He puts the point of his compasses at Q and draws an arc but is unsure what to do next.

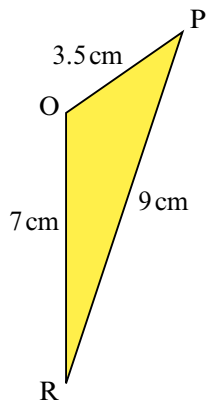



**a** Draw the rectangle and complete the construction of the perpendicular bisector of QS. Draw a dashed line for the perpendicular bisector.

**b** Shade the region inside the rectangle where points are closer to S than to Q.

explanation 3a | explanation 3b | explanation 3c | explanation 3d | online

**9**




**a** Use a ruler and compasses to construct this triangle.

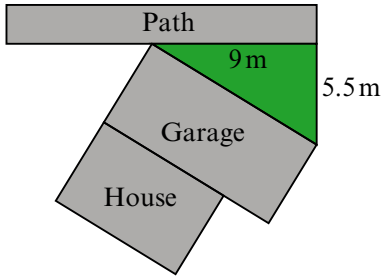
**b** Use a dashed line to show the locus of points that are equidistant from the sides OP and OR.

**c** Shade the locus of points in the triangle that are closer to OP than to OR.

**10** Leon has a path running down the side of his house.

The council tells him that part of the grass verge is his land.

All the grass that is closer to the side of his garage than to the edge of the path is his land.




**a** Draw a scale diagram of the grass verge. Use a scale of 1 cm to 1 m.

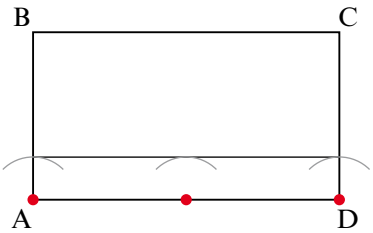
**b** Explain how to find the boundary of Leon's land on the grass verge.

**c** Shade the land that belongs to Leon.

**d** Leon intends to put a fence along the boundary.
Estimate from your scale drawing the length of fencing that he needs.

explanation 4 online

**11** Megan draws a rectangle 11 cm by 6 cm and labels the vertices ABCD.
She opens the compasses to a radius of 1.5 cm and draws three arcs with centres at A, D, and halfway between A and D.
She joins the tops of the arcs with a line.



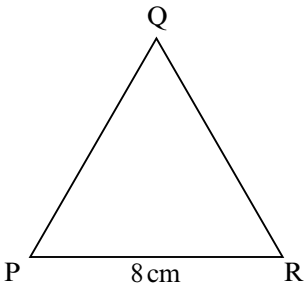

**a** What does Megan's line represent?

**b** Copy the diagram including the line and arcs. Using a dashed line, draw the locus of points within the rectangle that are 6 cm from C.

**c** Shade the region in the rectangle that is above the line and to the right of the dashed line.

**d** Describe the locus of the points in the shaded region.

**12** **a** Draw an equilateral triangle PQR with side 8 cm.

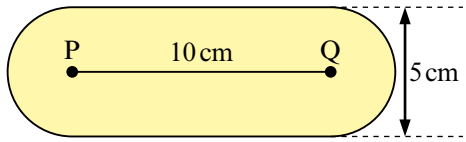



**b** Construct the locus of points inside the triangle that are exactly 3 cm from the side PQ. Use a dashed line. Use a similar method to Megan's in question **11**.

**c** Construct the locus of points that are equidistant from the sides PR and RQ. Use a dashed line.

**d** Shade the points that are more than 3 cm from PQ but nearer to PR than to QR.

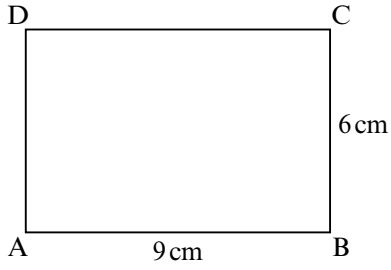
**13** **a** Describe the locus of points in the yellow region of this diagram.




**b** Draw the two points P and Q and show the locus of points that are equidistant from P and Q.

**c** Draw the points P and Q on another diagram and indicate the locus of points that are equidistant from P and Q but more than 6 cm from P.

**14** This question is about the rectangle ABCD. Draw a new rectangle when answering each part.




Find the loci of these points that lie inside the rectangle.

**a** Points less than 7 cm from A and less than 7 cm from C

**b** Points more than 6 cm from B and more than 3 cm from D

**c** Points closer to AB than CD and less than 7 cm from B

**d** Points equidistant from A and C and more than 5 cm from D

**e** Points more than 1.5 cm from the diagonal BD

**f** Points less than 2.5 cm from AD and less than 8 cm from C

**g** Points closer to AB than AD and closer to B than A

**h** Points less than 2 cm from the diagonal AC and closer to AD than BC