Planner

Loci and constructions

- Constructing the locus of points from a line
- Constructing the locus of points from a fixed point
- Constructing a triangle given the lengths of all three sides

Keywords

You should know

explanation 1a | explanation 1b | explanation 1c | online

1 Rectangle ABCD has length 6 cm and width 4 cm.

Look at the four diagrams below. They are drawn on a centimetre square grid.

Diagram 1

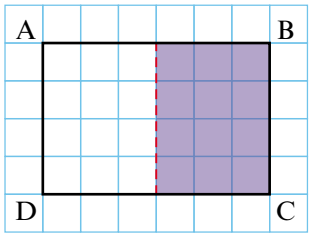


Diagram 2

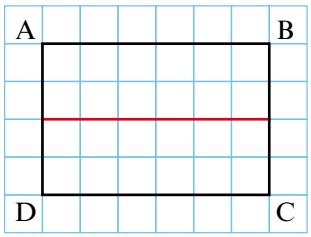


Diagram 3

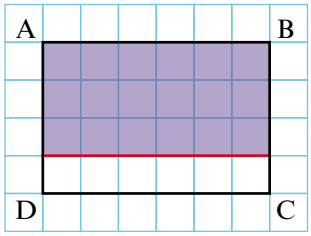
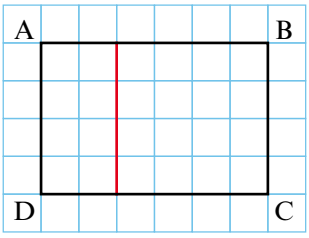


Diagram 4



Points P, Q, R and S are all inside rectangle ABCD.

a Point P is 2 cm from AD.
Which diagram shows all the possible positions of P?

b Point Q closer to BC than to AD.
Which diagram shows all the possible positions of Q?

c Point R is the same distance from AB as it is from CD.
Which diagram shows all the possible positions of R?

d **i** Point S is *at least* 1 cm from CD.
Which diagram shows all the possible positions of S?

ii Jal draws a diagram showing all points that are *more than* 1 cm from CD.
What is the difference between his diagram and the answer to part **d i**?

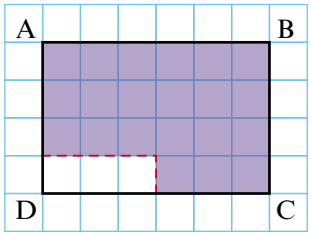
2 Rectangle ABCD has length 6 cm and width 4 cm.
Point T is inside rectangle ABCD.

Point T is closer to BC than to AD *and* at least 1 cm from CD.
Eric and Fred draw these diagrams to show all the possible positions of T.

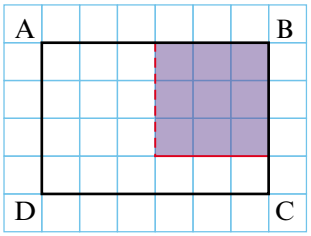
Which of the diagrams is correct?

Explain your answer.

Eric



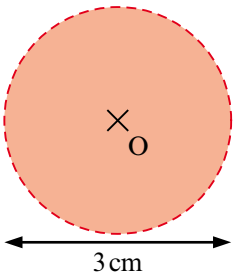
Fred



3 Bert has drawn this locus.

a He says that it shows all the points that are more than 3 cm from O.
What *two* mistakes has Bert made?

b Write down the correct rule shown by the shaded area of the diagram.



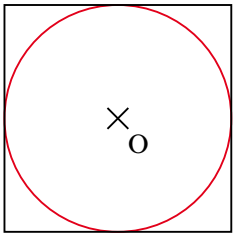
4 Point O is at the centre of a 4 cm square.

a Look at the three locus diagrams below.

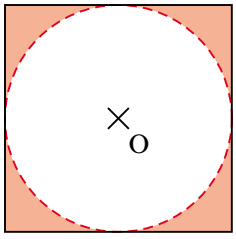
For each diagram, choose the correct rule from the list.

A The set of all points inside the square that are *more than* 2 cm from O
B The set of all points inside the square that are *exactly* 2 cm from O
C The set of all points inside the square that are *at least* 2 cm from O
D The set of all points inside the square that are 2 cm *or less* from O

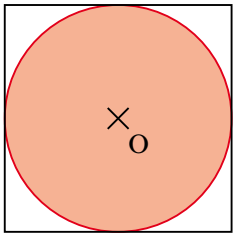
i



ii



iii



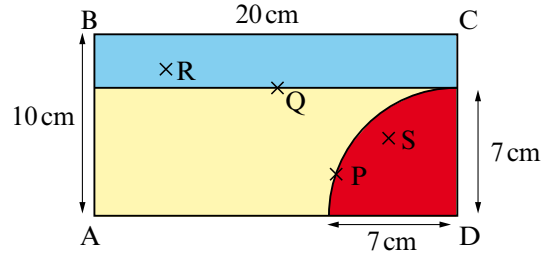
b Draw a 4 cm square and mark point O at the centre.
Use a pair of compasses to draw the locus to show the rule from part **a** that you did not use.

c Draw another 4 cm square and mark point O at the centre.
Draw the locus of all the points inside the square that are *2.5 cm or more* from O.

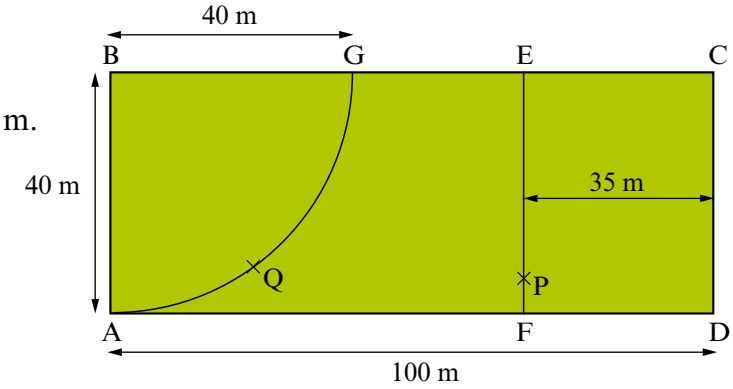
5 The diagram shows rectangle ABCD.
AB = 10 cm and BC = 20 cm.

Match the points P, Q, R and S to the rules below.

Rule 1: The point must be 7 cm from the line AD.
Rule 2: The point must be more than 7 cm from the line AD.
Rule 3: The point must be 7 cm from D.
Rule 4: The point must be less than 7 cm less from D.



6 The diagram shows a rectangular park ABCD.
AB = 40 m and AD = 100 m.



a The line EF shows all of the possible positions of point P. Describe the rule that point P has to follow.

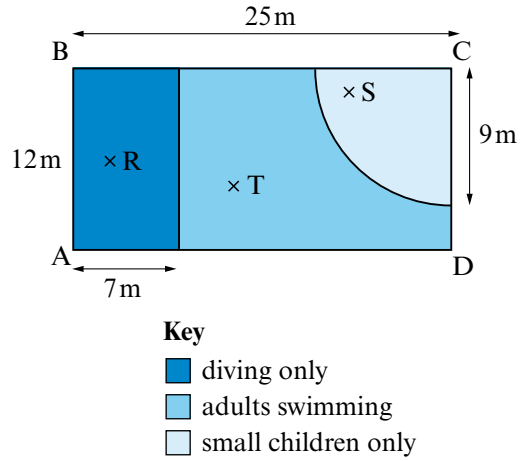
b The arc AG shows all of the possible positions of point Q. Describe the rule that point Q has to follow.

7 The diagram shows the plan of an outdoor swimming pool ABCD.

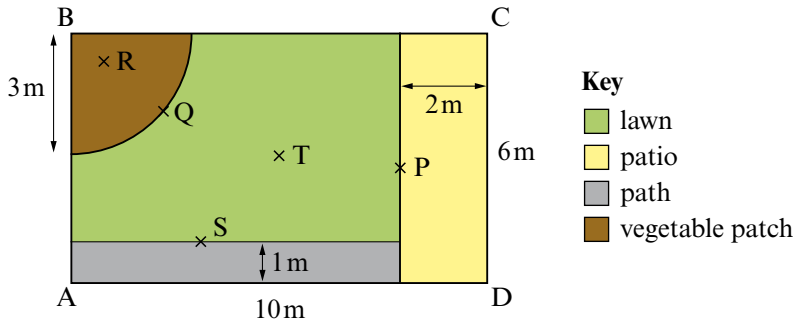
a Point R is in the deep end of the pool that is for diving only. Describe the rule that point R has to follow.

b Point S is in the shallow part of the pool that is for small children only. Describe the rule that point S has to follow.

***c** Point T is in the region where adults can swim. Describe the rules that point T has to follow.



8 The diagram shows a rectangular garden ABCD with a lawn, patio, path and vegetable patch.



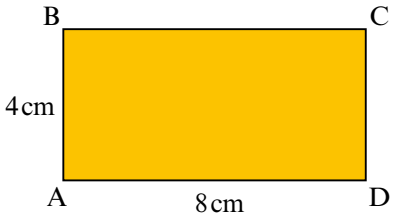
P is a point on the edge of the patio.
Q is a point on the edge of the vegetable patch.
R is a point in the vegetable patch.

a Describe the rule that each of the points P, Q and R have to follow.

***b** S is a point on the edge of the path. Describe the rules that S has to follow.

***c** T is a point on the grass. Describe the rules that T has to follow.

9 Using a ruler, draw a rectangle ABCD so that AB = 4 cm and AD = 8 cm as shown.



a P is a point inside the rectangle ABCD.

P has to be exactly 2 cm from the line AB.

Draw a line to show all the possible positions of point P.

b Q is another point inside the rectangle ABCD.

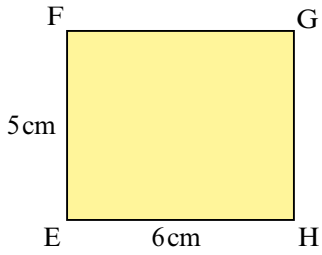
Q has to be exactly 1 cm from the line AD.

Show all the possible positions of point Q.

c Point R is exactly 2 cm from the line AB *and* 1 cm from the line AD. Label the point R on your diagram.

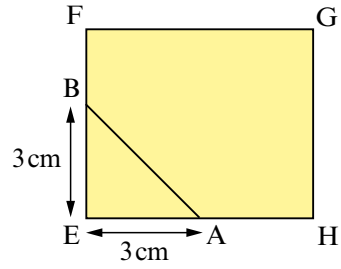
d S is a point that is 2 cm or more from the line AB *and* 1 cm or less from the line AD. Shade the region where S could be on your diagram.

10 Using a ruler, draw rectangle EFGH so that EF = 5 cm and EH = 6 cm as shown.



P is a point inside the rectangle EFGH.

P has to be exactly 3 cm from the point E.

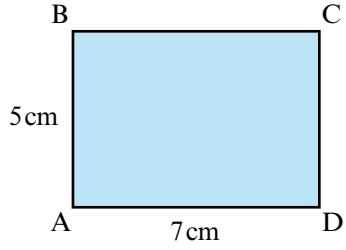


a Daniel drew line AB to show all the possible positions of point P. Explain why his answer is not correct.

b What shape should the locus be? Draw the locus of point P accurately.

***c** Q is a point that is 3 cm or more from point E. It is also closer to the line EF than to the line GH. Shade the region where Q could be.

11 Using a ruler, draw a rectangle ABCD, so that AB = 5 cm and AD = 7 cm as shown.



a P is a point inside the rectangle ABCD. P has to be exactly 5 cm from the point A. Draw the locus of point P accurately.

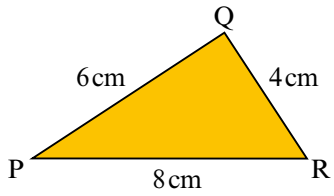
b Q is a point inside the rectangle ABCD. Q has to be exactly 4 cm from the point D. Draw the locus of point Q accurately.

c Point X is 5 cm from point A *and* 4 cm from point D. Mark point X on your diagram.

d Draw the triangle AXD.

explanation 2 online

12 This is a sketch of triangle PQR.

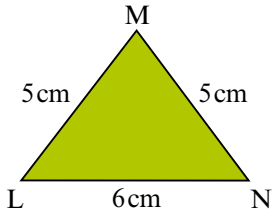


a Use a ruler and a pair of compasses to construct triangle PQR, where PR = 8 cm, PQ = 6 cm and QR = 4 cm.

b **i** Use a protractor to check that the angle PQR is 104°. Mark this on your diagram.

ii What is the size of angle RPQ?

13 This is a sketch of triangle LMN.



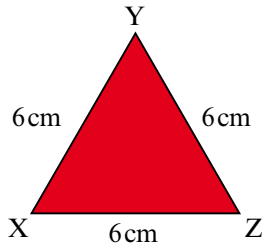
a Use a ruler and a pair of compasses to construct triangle LMN, where LN = 6 cm, LM = 5 cm and MN = 5 cm.

b **i** Use a protractor to check that the angle MLN is 53°. Mark this on your diagram.

ii What is the size of angle NML?

14 This is a sketch of triangle XYZ.

a Use a ruler and a pair of compasses to construct triangle XYZ, where XZ = 6 cm, XY = 6 cm and YZ = 6 cm



b **i** What type of triangle is XYZ?

ii What should the size of each angle in the triangle be?

iii Measure the angles in the triangle to check the accuracy of your diagram.