Loci

Notes

A locus is a point, a set of points (e.g. a line) or a region which satisfies a given rule.
Locus — singular
Loci — plural (pronounced "low-sigh")
N.B. A point is denoted by a single letter, e.g. P or A
A line is denoted by two letters e.g. PQ or AB

There are 4 basic loci that you need to know and they are all connected with points being ***equidistant*** from 1 point, 2 points, 1 line or 2 lines.

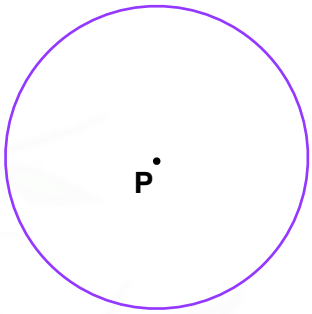
1. Equidistant from 1 point

Draw a point and label it P. Draw the locus of the points that are all 2 cm from P.

The first 4 ***points*** of the locus are easy to draw

As we draw more ***points*** a shape starts to emerge

It's a ***circle***



The locus of all points ***equidistant from one point*** is a ***circle***.

2. Equidistant from 2 points

Draw two points about 6 cm apart and label them P and Q.
Draw the locus of the points that are equidistant from the two points.

The first ***point*** is easy to draw — exactly half-way between the 2 points ***perpendicular bisector***.

As we draw ***more points***, a shapes starts to form — a line.

You might recognise the line from last lesson — a

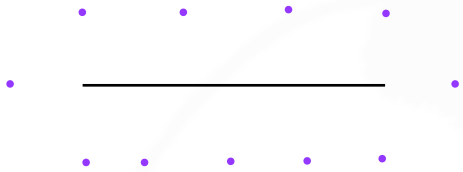
The locus of all points ***equidistant from two points*** is a ***perpendicular bisector***.
In questions, you will be expected to construct the perpendicular bisector using a maths compass — make you you leave the construction arcs on your diagram.

3. *Equidistant from 1 line segment*

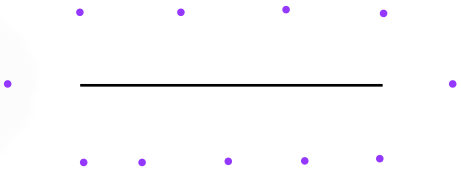
N.B. A line segment is a line which has finite length. If it was written "equidistant from 1 line, it would technically mean an infinite line.

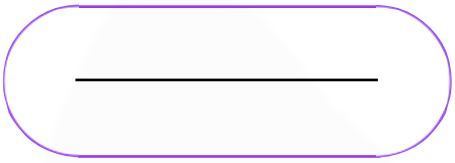
Draw a line about 4 cm long. Draw the locus of the points that are all 1 cm from the line.

The ***points*** above and below the line are easy. Even the ends of the are not too difficult.



At the end of the line we need to be careful not to draw straight lines. Again the shape starts to emerge





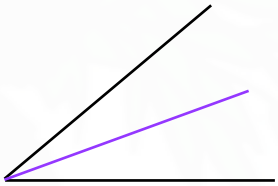
This shape is given the highly technical name "sausage".
The locus of all points ***equidistant from a line segment*** is a ***sausage***.

4. *Equidistant from 2 line segments*

Draw two inserting line segments. Draw the locus of points that are equidistance from the two line segments.

As we draw some ***points*** the shape of a line starts to emerge.

You might recognise the line from last lesson — it's an ***angle bisector***.



The locus of all points ***equidistant from two intersecting line segments*** is an ***angle bisector***.
Again, in questions, you will be expected to construct the angle bisector using a maths compass — make sure you leave the construction arcs on your diagram.

Regions in loci

Some questions will ask you to ***shade*** the locus of all points which are less than or less than or equal to… — in such cases we need to be able to distinguish between including and not including the line.

Less than or greater than (< or >) — the line is not included so draw a dotted line
Less than or equal to or greater than or equal to (≤ or ≥) — the line is included so draw a solid line

E.g. 1 Shade the region that is less than 1 cm from a point, P

Video 1: Loci (part 1)
Video 2: Loci (part 2)
Video 3: Loci (part 3)

Solutions to Starter and E.g.s

Before doing the exercise, have a look at these loci examples.

Exercise

Worksheet:	Loci worksheet
9-1 class textbook:	p542 M17.4 Qu 1-7, 9-10; p543 M17.5 Qu 1-3, 5-8
A*-G class textbook:	p499 M17.4 Qu 1-7, 9-10; p501 M17.5 Qu 1-3, 5-8
9-1 homework book:	p182 M17.4 Qu 1-7; p184 M17.5 Qu 1-7
A*-G homework book:	p138 M17.4 Qu 1-7; p139 M17.5 Qu 1-7

Summary

The 4 loci are:

1. Equidistant from 1 point — circle
2. Equidistant from 2 points — perpendicular bisector (or line bisector)
3. Equidistant from 1 line — sausage
4. Equidistant from 2 intersecting lines — angle bisector

Loci worksheet SOLUTIONS

Homework book answers (only available during a lockdown)