Construction (H&F) – Y11 – Unit 4

What do I need to be able to do?

By the end of this unit you should be able to:

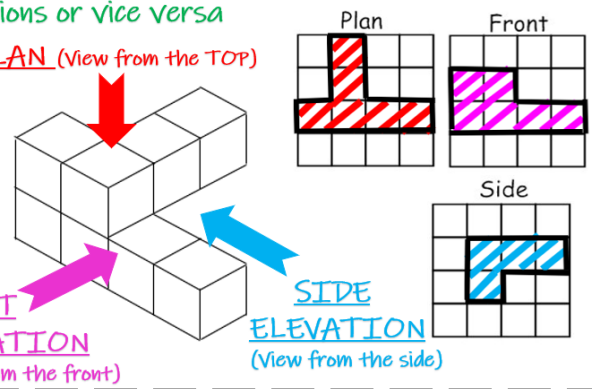
- Use a ruler and protractor to construct polygons
- Use ruler and compasses to construct….
  - triangles when all three sides known
  - the perpendicular bisector of a line segment
  - a perpendicular to a line from a point
  - a perpendicular to a line at a point
- Use ruler and compasses to bisect an angle
- Solve simple problems involving loci
- Combine techniques to solve more complex loci problems
- Construct a shape from its plans and elevations
- Construct the plan and elevations of a given shape

Vocabulary

Bisect: To divide into two equal parts
Arc: Part of the circumference of a circle
Region: A given or defined area.
Equidistant: The same distance from
Plan: The view of an object from above
Front Elevation: The view of an object from the front.
Side Elevation: The view of an object from the side.
Angle: The point at which two lines meet

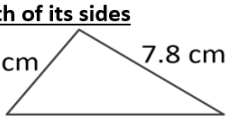
Understanding the link between shape and its plans and elevations

We can construct a shape from it's plans and elevations or vice versa



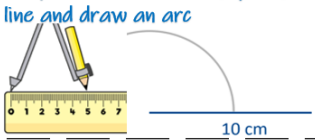
Construct a triangle when you know the length of its sides

We can construct a triangle if we know the length of all of its sides

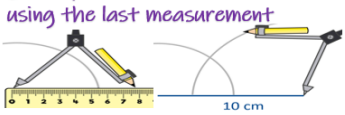


1 – Draw a line the length of one side (10cm)

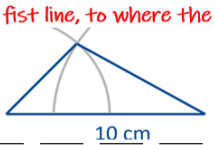
2 – Use your ruler to set your compasses to the length of the next side (5cm). Put the tip of the compass at that end of your first line and draw an arc



3 – Repeat this at the other end using the last measurement



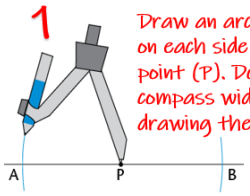
4 – Draw lines, from either end of your fist line, to where the arcs cross



Draw a perpendicular line at a given point on another line

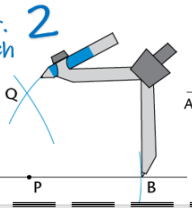
We can construct this by using our compass and ruler

1



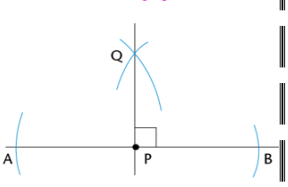
Draw an arc across the line on each side of the given point (P). Do not adjust the compass width when drawing the second arc.

2



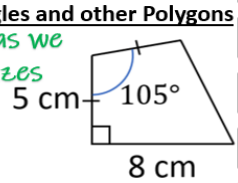
Open your compass wider. Place the compass on each arc and draw an arc above or below the point P. The two new arcs will intersect.

3 Use your ruler to join the given point (P) and the point where the arcs intersect (Q).

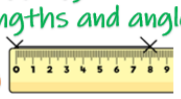


Use a ruler and protractor to construct triangles and other Polygons

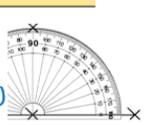
We can construct any polygon as long as we know enough side lengths and angle sizes



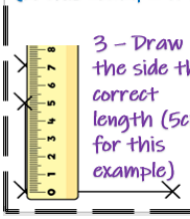
1 – Draw a line the length of one side (8cm)



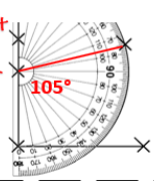
2 – Use your protractor to draw the angle at one end of the line (in this example it's a right angle)



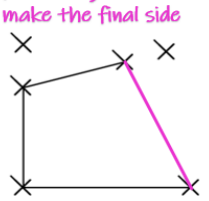
3 – Draw the side the correct length (5cm for this example)



4 – Repeat this process for the next angle and sides

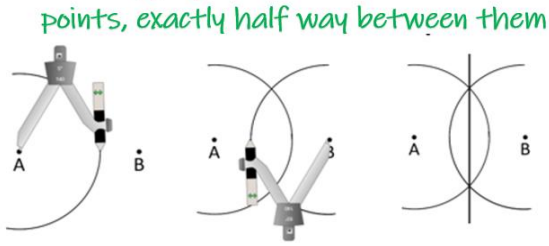


5 – Join your last two points together to make the final side



Construct the perpendicular bisector

This is a line, perpendicular to the line between 2 points, exactly half way between them



1) Open your compasses past halfway between the two points and draw an arc.

2) Keep your compasses at the same width and repeat from the other point.

3) Draw a line joining the two points where the arcs cross

Use a ruler and compass to bisect an angle

We can split a larger angle into two equally sized smaller angles by bisecting it

1) Open your compasses and draw an arc over both lines from the angle

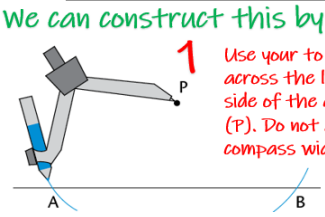
2) Keep your compasses at the same width and draw two further arcs with the point of your compasses at the intersections.

3) Draw a line joining the two points where the arcs cross and the angle point

Construct a perpendicular line from a given point

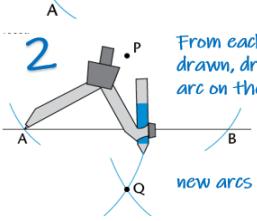
We can construct this by using our compass and ruler

1



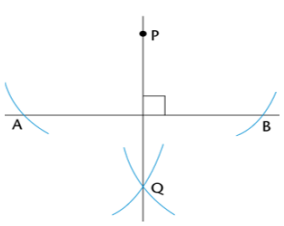
Use your to draw an arc across the line on each side of the given point (P). Do not adjust the compass width

2



From each arc you've drawn, draw another arc on the opposite side of the line. The two new arcs will intersect.

3 Use your ruler to join the given point (P) to the point where the arcs intersect (Q).



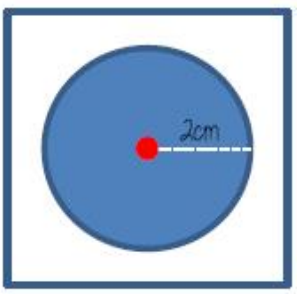
Notes

Understanding questions involving Loci

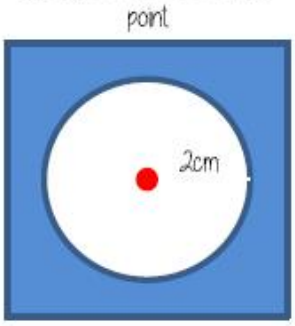
We may need to use multiple constructions for loci questions!

Distance from a point

Think radius of a circle



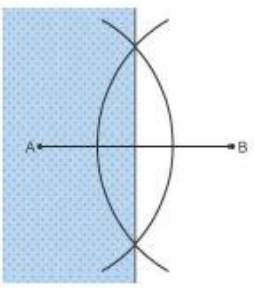
The shaded region represents the region within 2cm of the point



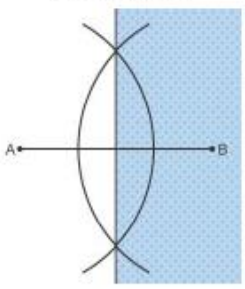
The shaded region represents the region further than 2cm from the point

Distance between two points

Think perpendicular bisector



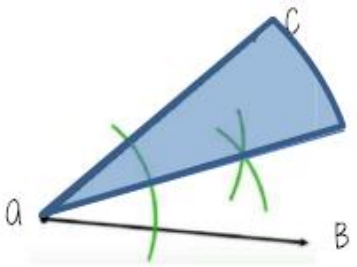
The shaded region represents the region that is closer to point A than point B.



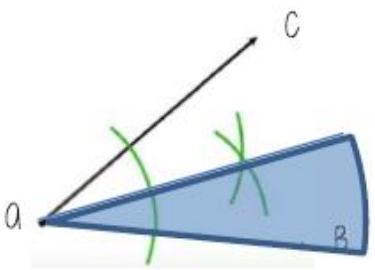
The shaded region represents the region that is closer to point B than point A.

Distance between two lines

Think angle bisector



The shaded region represents the region that is closer to AC than AB.



The shaded region represents the region that is closer to AB than AC.

Notes