**Section 11.1a Constructing a Triangle given 3 sides (sss)**

Construct triangle PQR where PQ = 8 cm, PR = 7 cm and QR = 6 cm.

1. Draw the longest line PQ 8 cm long.

2. Opening your compasses to 7 cm, place the point on P and draw an arc above the line.

3. Opening your compasses to 6 cm, place the point on Q and draw an arc that cuts the first arc.

4. Label the point of intersection R and join up the points.

Leave enough room above the line to complete the shape.

Do not rub out your construction lines. They show your method.
**Section 11.1b Constructing a triangle given 1 side and 2 angles (ASA)**

1. **Two angles and the included side (ASA)** You need a ruler and protractor.
   Construct the triangle ABC where AC = 5 cm, BAC = 40° and BCA = 30°.
   - First sketch the triangle
   - Draw the base AC with a ruler
   - Draw angle BAC at A
   - Draw angle BCA at C

**Section 11.1c Constructing a triangle given 2 sides and 1 angle (SAS)**

2. **Two sides and the included angle (SAS)** You need a ruler and protractor.
   Construct the triangle PQR, where PQ = 6 cm, \(\angle P = 50°\) and PR = 4 cm.
   - First sketch the triangle
   - Make the longest side PQ the base
   - Draw an angle of 50° at P
   - Mark R, 4 cm from P

**Support Exercise** Handout Constructing Triangles
Section 11.2 Angle of 60° and bisector of 30°

**Drawing an angle of 60°**

- Draw the base line PQ.

- Set the compass on P and open it at any setting.

- Draw an arc across PQ and up over above the point P.

- *Without changing the compass width*, move the compass to the point where the arc crosses PQ, and make an arc that crosses the first one.
• Draw a line from P, through the intersection of the two arcs.

• Done. The angle is 60°. Check your construction with the protractor.

**Angle Bisector of 30°**

• Start by drawing an angle of 60°

• Put the sharp end of your compasses at point B and make one arc on the line BC (point S) and another arc on line AB (point T).

• Without changing the width of your compasses, put the sharp end of the compasses at S and make an arc within the lines AB and BC. Do the same at T and make sure that the second arc intersects the first arc.
• Draw a line from point $B$ to the points of intersection of the 2 arcs. This line bisects $\angle ABC$.

Section 11.3 Angle of $90^\circ$ and bisector of $45^\circ$

• Draw a horizontal line and mark the point where the angle will be.
• Put the point of the compass on the given point.

• Open the compass and put the same arc through the line on both sides of the point.
• Put the point of the compass on one of the places the arc crossed the line.

• Open the compass wider, and then make an arc above the point.

• Make the same arc with the point of the compass on the other side.

• Draw a line through the point and the intersection of the two arcs.

**Example 1**

*To draw an angle of 45° first draw an angle of 90° and after bisect it using the method used for the angle bisector of 60°.*
Consolidation

1. Construct a triangle $ABC$, given that $BC$ is 5 cm, $\angle ABC = 60^\circ$ and $\angle BCA = 45^\circ$.

2. Construct triangle $ABC$ in which $AB = 7$ cm, $BC = 3$ cm and angle $B = 60^\circ$.

Support Exercise Handout
Section 11.4 Perpendicular Bisector and Dropping a Perpendicular from a Point

Example: Bisect line PQ

1. Place the compass on one end of the line segment.

2. Set the compass width to approximately two thirds the line length. The actual width does not matter.

3. Without changing the compass width, draw an arc on each side of the line.
4. Again without changing the compass width, place the compass point on the other end of the line. Draw an arc on each side of the line so that the arcs cross the first two.

5. Using a ruler, draw a line between the points where the arcs intersect.

6. Done. This line is perpendicular to the first line and bisects it (cuts it at the exact midpoint of the line).

1. Place the compass on point R
2. Adjust the size of the compass to go beyond the line and draw two arcs across the line.

3. From each arc draw an arc below the line so they cross.

4. Join point R to the cross with a ruler.
Section 11.5 Locus

A **locus** is a path. The path is formed by a point which moves according to some rule. The plural of locus is **loci**.

Every point on a locus must obey the given conditions or rule and every point that obeys the rule lies on the locus.

**Rule 1 Locus of Points Equidistant from a Point**

Consider the rule that a point P on a sheet of paper is to be 3cm from a fixed point O. A few possible positions can be marked to give an idea of the shape of the complete locus. Mark as many positions of P as you need to deduce the shape of the locus. The first one has been done for you.

It can now be seen that the locus is the circle, centre O, radius 3 cm.

It is sometimes helpful to think of a locus as the path traced out by a moving point.
Example 1

Suppose that a dog is tied by a rope with one end fixed at O. If the dog moves so that the rope is always taut, the path is a circle.

Example 2

A point that is equidistant from two fixed points A and B. A and B are 6 cm apart. Find the locus of points which is 4 cm from A and 5 cm from B.

Rule 2 The locus of Points Equidistant from two points

The locus of points keeping a constant distance from two fixed points is the perpendicular bisector of the line joining the two fixed points.
Example 3

Construct the triangle ABC in which AB = 9 cm, BC = 7 cm and CA = 8.5 cm. On this same diagram

a) Draw a perpendicular bisector of BC

b) mark a point P within the triangle and on the same perpendicular bisector of BC which is 4 cm away from B

c) with centre P and radius 4 cm draw a circle to pass through B and C.

Support Exercise Handout
Section 11.6 Further Loci

**Rule 3:** The locus of points keeping a constant distance from a fixed line is a pair of parallel lines.

**Rule 4:** The locus of points equidistant (keeping a constant distance) from two lines forming an angle is the angle bisector.

There are two variations to this locus of points. You can either have an angle or two intersecting lines.
**Rule 5: The locus of points which are equidistant from one straight line**

The same distance is calculated all around the line in order to create a path always 2cm away from the line.

**Consolidation**

1. Draw the line AB, 8cm in length. Construct the locus of points 3cm away from the line AB.
2. Construct an equilateral triangle $ABC$ with sides 8cm in length.
   a. Construct the locus of points equidistant from $AB$ and $BC$.
   b. Construct the locus of points equidistant from $AC$ and $BC$.
   c. Mark the point $P$ where these 2 loci meet. With centre $P$ draw the circle to touch the 3 sides of triangle $ABC$.