Practical Geometry

Basic Constructions

The tools in our geometry box are:

- Ruler
- Compass
- Divider
- Set squares
- Protractor

The description of each tool and its uses are given below:

Ruler:

A ruler is a flat and straight-edged strip, whose one side is graduated into centimetres and the other into inches. A ruler is commonly called a scale. It is the most essential tool in geometry. It is used in all constructions.
The basic uses of a ruler are:

Measuring lengths of line segments

Drawing line segments

Compass:

A compass has two ends. One end holds a pointer, while the other end holds a pencil. It is also called a pair of compasses.

The basic uses of a compass are:

- Marking off equal lengths
- Drawing arcs
- Drawing circle

Divider:

A divider is a tool similar in shape to a compass. It has a pair of pointer ends.

The basic uses of a divider are:

- Comparing lengths of line segments
- Helping avoid positioning errors

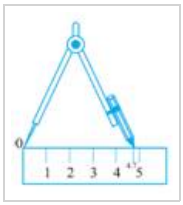
Construction of Lines And Angels

Construction of Lines

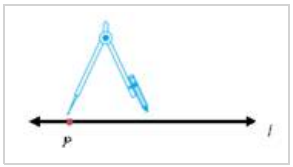
Steps to construct a line segment of length 5 cm:

1.Draw line l.

2.Mark a point on line and name it P.

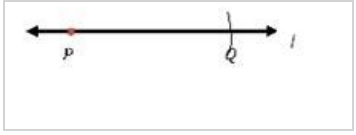


3.Open the compass to measure the length of the line segment by placing the pointer on the 0 mark of the ruler and the pencil point on the 5 cm mark.

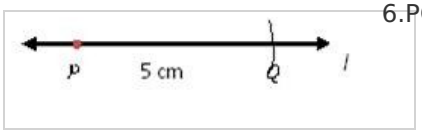


4.Place the pointer of the compass on point P.

5.Swing an arc on the line to cut it at Q.



6.PQ is the required line segment of length 5 cm.



Two lines are said to be perpendicular when they intersect each other at an angle of 90o.

The perpendicular bisector is a perpendicular line that bisects another line into two equal parts.

Constructing of Angles

An exact copy of a line segment can be constructed using a ruler and a compass.

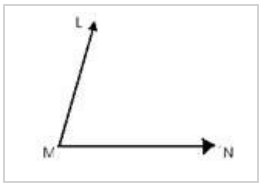
To construct a copy of an angle:

- Draw a line AB.
- Mark any point O on AB.
- Place the compass pointer at vertex X of the given figure and draw an arc with a convenient radius, cutting rays XY and XZ at points E and F, respectively.
- Without changing the compass settings, draw an arc on line AB from point O. It cuts line AB at P.
- Set the compass to length EF.
- Without changing the compass settings, draw an arc from P cutting the previous arc at point Q.
- Join points O and Q.
- Hence, ∠POQ is the required copy of ∠YXZ.

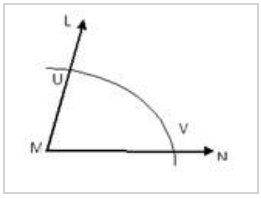
To construct the bisector of an angle:

Let the given angle be LMN.

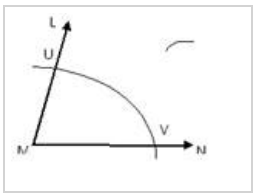
Place the compass pointer at vertex M of the given angle.



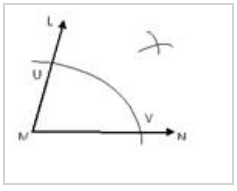
Draw an arc cutting rays ML and MN at U and V, respectively



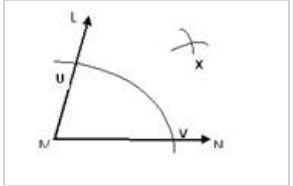
Draw an arc with V as the centre and a radius more than half the length of UV in the interior of ∠LMN.



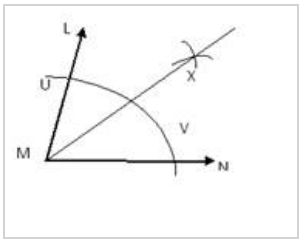
Draw another arc with U as the centre and the same radius intersecting the previous arc.



Name the point of intersection of the arcs as X.



Join points M and X.



Thus, the ray MX is the required bisector of ∠LMN

Steps to construct a 60° angle:

- Draw a line.
- Mark point P on the line.
- Draw an arc from point P with a convenient radius cutting the line at a point.
- Name the point of intersection of the arc and the line as Q.
- Draw another arc with Q as the centre and the same radius so that it passes through point P.
- Name the point of intersection of the two arcs as R.
- Join points P and R.

In a similar way, we can construct:
A 900 angle without using the protractor
A 1200 angle without using the protractor