# Handout-2/4

In this module, let us know how to construct a triangle. First of all, recall what is a Triangle, its classification, properties etc.

**What are Triangles?**

A triangle is a simple closed curve or polygon which is created by three line-segments. In geometry, any three points, specifically non-collinear, form a unique triangle

A Traingle has **SIX**(6) elements i.e. three **sides** and three **angles**

Triangles are classified based on sides and angles

**On the basis of SIDES:**

Equilateral triangle: All three sides are equal in measure.

Isosceles triangle: Two sides have equal measure.

Scalene triangle: All three sides have different measures.

**On the basis of ANGLES:**

Acute triangle: All angles measure less than 90.

Obtuse triangle: One angle is greater than 90.

Right triangle: One angle is 90.

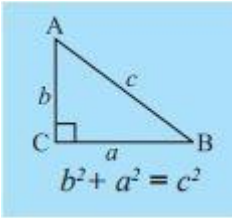
**Important properties of triangles**

1) The exterior angle is equal to the sum of interior opposite angles
**(Exterior angle Property)**

2) The sum of all interior angles is 180°
**(Angle sum property)**

3) Sum of the lengths of any two sides is greater than the length of the third side
**(Inequality Property)**

4): In any right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides
**(Pythagoras property)**




**Triangles can be constructed if any of the following measurements are given**

a) Three sides.

b) Two sides and an angle between them.

c) Two angles and a side between them.

d) The hypotenuse and a leg in case of a right-angled triangle.

## CONSTRUCTION OF TRAINGLES

A triangle can be constructed if and only if the following conditions are satisfied

**I) PROPERTIES OF TRIANGLES**

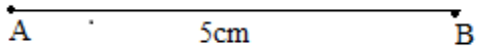
**II) ANY OF THE THREE ELEMENTS OUT OF SIX ARE GIVEN**

**Let us construct some triangles with respect to their sides:**

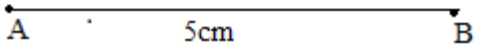
## I) CONSTRUCTION OF AN EQUILATERAL TRIANGLE

**Example**: Construct an equilateral triangle ΔABC with each side of 5cm.

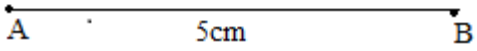
Step:1) Draw a line segment AB of length 5cm



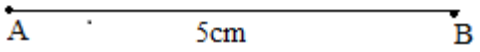

Step:2) Draw an arc of radius 5cm with ‘A’ as the centre



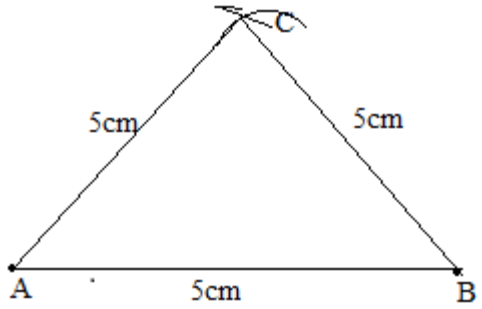

Step:3) Draw an arc of radius 5cm with ‘A’ as the centre




Step:4) Mark the point ‘C’ at the point of intersection of these two arcs.




Step:5) Join AC and BC



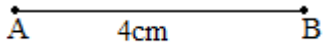

ΔABC is the required equilateral triangle

**II) CONSTRUCTION OF AN ISOSCELES TRIANGLE**

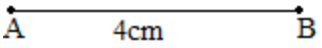
**Example:**

Construct an isosceles triangle whose base is 4cm and each equal side is of length 5cm.

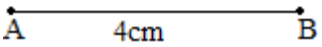
**Step:1) Draw a line segment AB of length 4cm with the ruler.**



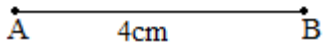

**Step:2) Draw an arc of radius 5cm with 'A' as the centre.**



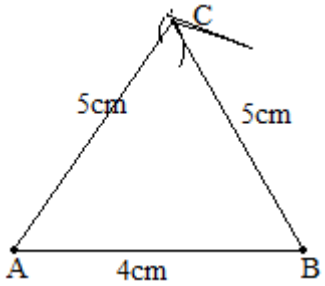

Step:3) Draw another arc of radius 5cm with 'B' as the centre




Step:4) Mark the point 'C' at the point of intersection of the arcs


Step:5) Join AC and BC




ΔABC is the required isosceles triangle

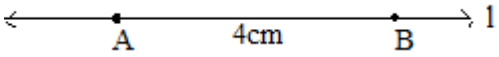
**III) CONSTRUCTION OF A RIGHT ANGLED TRIANGLE**

**Example:**

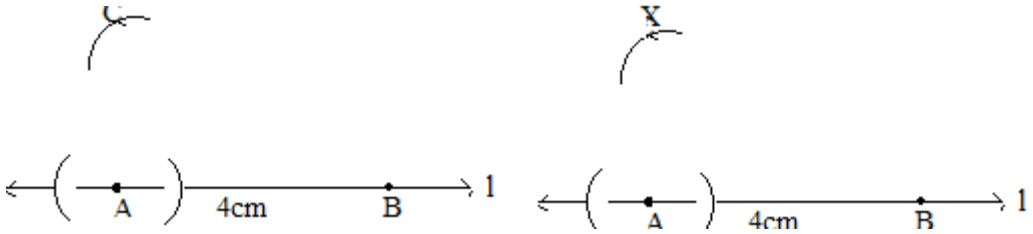
Construct a right angled triangle whose hypotenuse is 5cm and one of its legs is 4cm.

Step:1) Draw a line 'l'

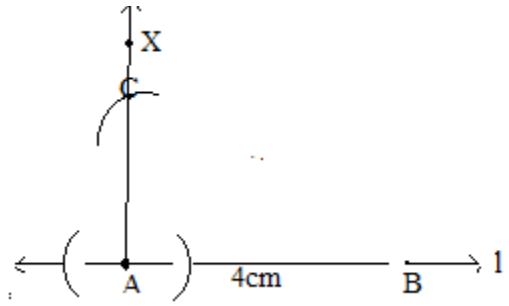

Step:2) Mark a point 'A' on it and with the help of ruler or with the compasses of radius, take a point 'B' on it at a distance of 4cm



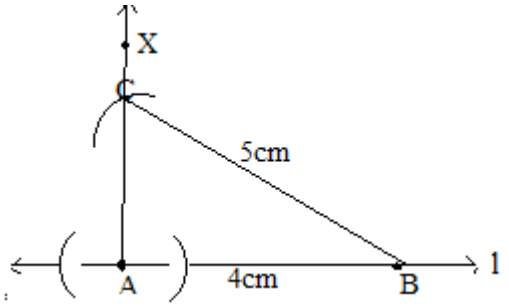

Step:3) Draw two arcs on either sides of the point 'A' of any radius and the with more than half the length between the arcs, draw two arcs with the point of intersection of the line with the arcs, Let the arcs are meeting at a point 'X'




Step:4) Draw a perpendicular through ‘A’ and ‘X’ to the line ‘l’




Step:5) With the centre ‘B’ and radius 5cm, draw an arc so that the arc cuts the perpendicular at the point ‘C’



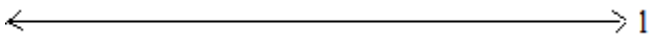

Step:6) Join BC

ΔABC is the required right angled triangle

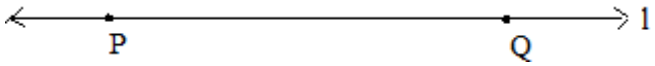
**IV) CONSTRUCTION OF A TRIANGLE WITH THE GIVEN THREE MEARURES OF ANGLES**

**Example:** Construct a triangle with measures 50°, 60° and 70°

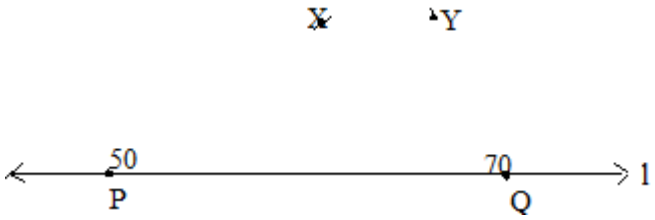
Step: 1) Draw a line ‘l’



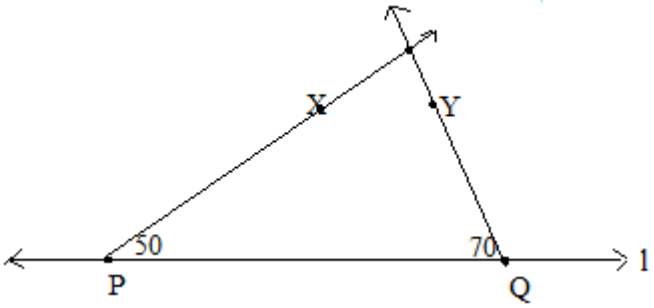
Step:2) Mark two points ‘P’ and ‘Q’on it



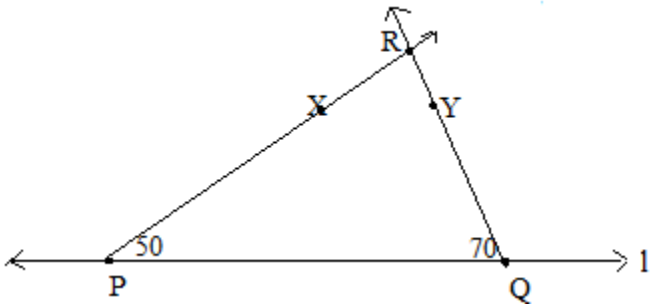

Step: 3) With the help of protractor, take $50^0$ from point ‘P’ and $70^0$ from ‘Q’




Step: 4) Draw the rays PX and QY through the angles taken respectively




Step:5) Mark ‘R’ at the point of intersection of the rays.




$\Delta PQR$ is the required triangle

**Note:**

1) Any angles of the given three angles can be taken from the points marked on the line.

2) If the given angle is multiple of 15, compasses are to be used but not the protractor.

**V) Construction of a triangle whether possible or not**

**Before construction of a triangle, the suitable property of triangles on the given data must be verified.**

**Example:**

Examine whether ΔDEF such that EF=7.2cm, m∠E=$110^0$and m∠F=$80^0$ Justify your answer.

**Answer:** m∠$E$ + m∠F=110°+80°=190° , so as the given data is not satisfying the angle sum property of the triangle, the construction is not possible

**Example:**

Examine whether ΔABC such that BC=2cm AB=4cm and AC=2cm. Justify your answer.

**Answer:** 2+4=6> 2 , 4+2=6> 2 but 2+2=4 so, as the given data is not satisfying the triangle inequality property, it is not possible to construct the triangle.

**Note:** The construction of a triangle is possible **if and only if** the given data satisfies any of the properties of triangles

*****

**PRESENTED BY G.L. KUMAR, TGT(SS), AECS-MNGR**