CHAPTER-11
CONSTRUCTIONS

INTRODUCTION

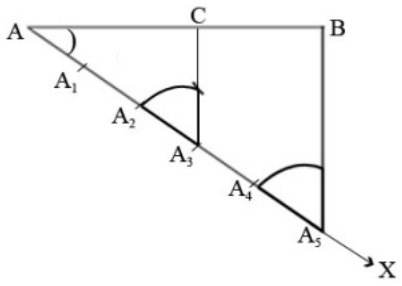
In the previous class, we have done certain constructions by using ruler and compass. In the previous chapter we learn about similar triangles and tangent to a circle. In this chapter we shall learn how to (i) Divide a line segment in the given ratio (ii) draw a triangle similar to a triangle when the scale factor is given and (iii) draw a tangent to a circle from a given point outside the circle.

Division of a line segment in a Given Ratio (Internally) :-

1. Draw a line segment 4.5cm long and divide it in ratio 2:3. Measure each part.

Sol: -

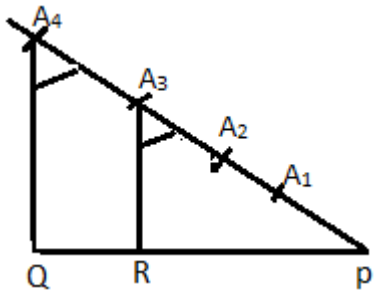
- Draw AB = 4.5 cm
- Construct any acute angle ∠BAX.
- Draw $2 + 3 = 5$ equal arcs on AX.
- Join points A_5 and B
- From A_2, Draw a line segment $A_2P \| A_5B$
- Then AB is divided internally at P in the ratio 2:3 i.e. AP: PB = 2: 3
- On measurement, AP =1.8cm and PB = 2.7 cm.



2. Draw a line segment PQ=6.8cm locate a point R on PQ such that PR = ¾ of PQ and justify your answer.

Sol:- Step of construction

1. Draw PQ = 6.8
2. Construct any acute ∠QPX.
3. Draw $1 + 3 = 4$ arcs at A_1, A_2, A_3, A_4 on PX with any convenient radius such that $PA_1 = A_1A_2 = A_2A_3 = A_3A_4$
4. Join QA_4 and through the point A_3, draw $A_3R \| A_4Q$ which meets PQ at R.
   Now R is the point on PQ such that PR = ¾ PQ



Justification:-

In ΔPQA₄, $RA_3 \| QA_4$

$\therefore \frac{QR}{RP} = \frac{A_4A_3}{PA_3}$ (By B.P.T.)

Or $\frac{QR}{RP} + 1 = \frac{A_4A_3}{PA_3} + 1$ Or $\frac{QR+RP}{RP} = \frac{A_4A_3+PA_3}{PA_3}$

Or $\frac{QP}{RP} = \frac{PA_3}{PA_3} = \frac{4}{3}$ [.....By construction]

Or $\frac{RP}{QP} = \frac{3}{4}$ Hence R is the point on PQ such that PR = ¾ PQ

EXERCISE

1. Draw a line segment 7.6 cm long and divide it in the ratio 5:8. Measure each part.
2. Draw a line segment 8.4 cm long and divide it in the ratio 3:2. Measure each part.
3. Draw a line segment 10.2 cm long and divide it in the ratio 3:5. Measure each part.

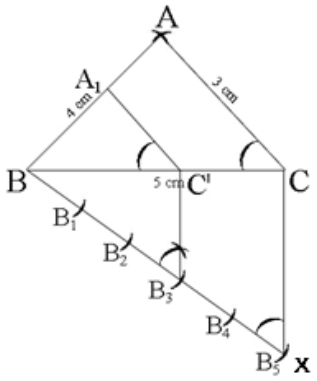
CONSTRUCTION OF A TRIANGLE SIMILAR TO A GIVEN TRIANGLE (Internally)

1. Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{3}{5}$ of the corresponding sides of ABC.

Sol:- Scale Factor $= \frac{3}{5}$

$\Rightarrow$ Given triangle is divided in 5 equal parts and on 3rd part draw similar triangle.

- Draw ΔABC with suitable measure.
- Construct any acute angle ∠BAX.
- Draw **5(Denominator)** equal arcs on AX.
- Join points A_5 and B
- Now we have 3(numerator).
- From A_3, Draw a line segment $A_3P \,||\, A_5B$
- From P, Draw a line segment $PQ \,||\, BC$
  Then APQ is the required triangle each of whose side is $\left(\frac{3}{5}\right)^{th}$ of the corresponding sides of the triangle.



EXERCISE

1. Construct a triangle with sides 6cm, 7cm and 7cm and then draw another triangle whose sides are $\left(\frac{2}{5}\right)^{th}$ of the corresponding sides of the first triangle.

2. Construct a triangle with sides 6cm, 6cm and 6cm and then draw another triangle whose sides are $\left(\frac{5}{7}\right)^{th}$ of the corresponding sides of the first triangle.

3. Construct a triangle with sides 4cm, 5cm and 6cm and then draw another triangle whose sides are $\left(\frac{2}{3}\right)^{\text{rd}}$ of the corresponding sides of the first triangle.

4. Draw a ΔABC with sides $BC = 6\ cm, \angle B = 45^0$ and $\angle ABC = 60^0$ then construct a triangle whose sides are $\frac{3}{4}$ of the corresponding sides of ΔABC