Chapter- 11
CONSTRUCTIONS

STUDY NOTES

Determining a Point Dividing a given Line Segment, Internally in the given Ratio M : N

Let AB be the given line segment of length x cm. We are required to determine a point P dividing it internally in the ratio m : n.

Steps of Construction:

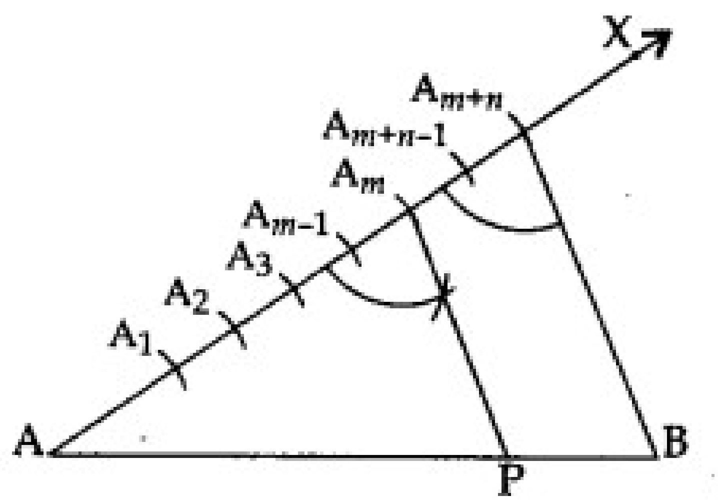
Draw a line segment AB = x cm.

Make an acute ∠BAX at the end A of AB.

Use a compass of any radius and mark off arcs. Take (m + n) points A_1, A_2, … A_m, A_{m+1}, …, A_{m+n} along AX such that $AA_1 = A_1A_2 = … = A_{m+n-1}$, A_{m+n}

Join $A_{m+n}B$.

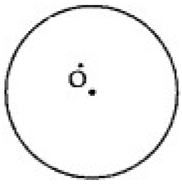
Passing through A_m, draw a line $A_mP \parallel A_{m+n}B$ to intersect AB at P. The point P so obtained is the A required point which divides AB internally in the ratio m : n.



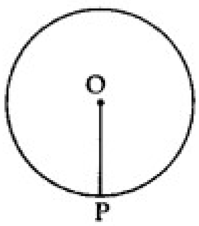
Construction of a Tangent at a Point on a Circle to the Circle when its Centre is Known

Steps of Construction:

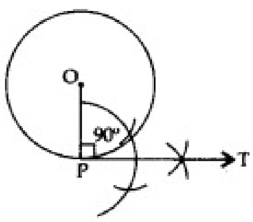
- Draw a circle with centre O of the given radius.



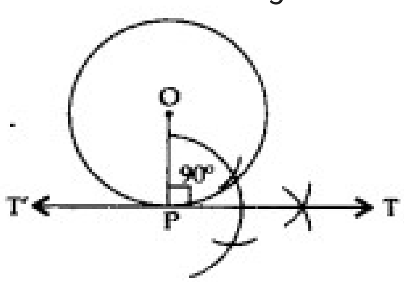
- Take a given point P on the circle.
- Join OP.



- Construct ∠OPT = 90°.



- Produce TP to T' to get TPT' as the required tangent.



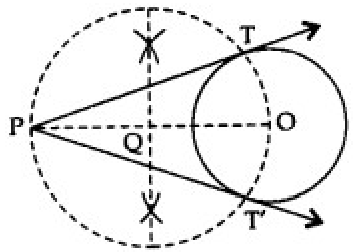
- **Construction of a Tangent at a Point on a Circle to the Circle when its Centre is not Known**

- If the centre of the circle is not known, then we first find the centre of the circle by drawing two non-parallel chords of the circle. The point of intersection of perpendicular bisectors of these chords gives the centre of the circle. Then we can proceed as above.

- **Construction of a Tangents from an External Point to a Circle when its Centre is Known**

: Steps of Construction

- Draw a circle with centre O.
- Join the centre O to the given external point P.
- Draw a right bisector of OP to intersect OP at Q.
- Taking Q as the centre and OQ = PQ as radius, draw a circle to intersect the given circle at T and T'.
- Join PT and PT' to get the required tangents as PT and PT'.



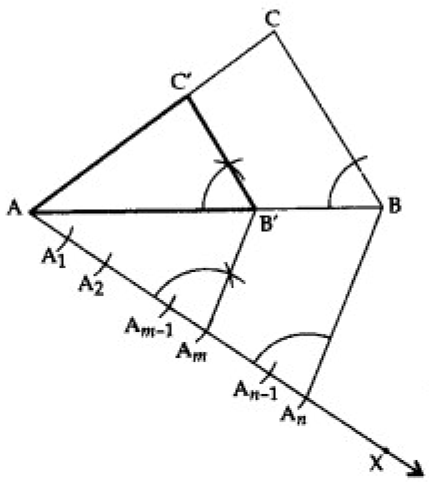
- **Construction of a Tangents from an External Point to a Circle when its Centre is not Known**

- If the centre of the circle is not known, then we first find the centre of the circle by drawing two non-parallel chords of a circle. The point of intersection of perpendicular bisectors of the chords gives the centre of the circle. Then we can proceed as above.

Let ΔABC be the given triangle. To construct a ΔA'B'C' such that each of its sides is mn (m < n) of the corresponding sides of ΔABC.

Steps of Construction:

- Construct a triangle ABC by using the given data.
- Make an acute angle ∠BAX, below the base AB.
- Along AX, mark n points A_1, A_2 ..., A_n, such that $AA_1 = A_1A_2 = \ldots = A_{m-1} A_m = \ldots A_{n-1} A_n$.
- Join A_nB.
- From A_m, draw A_mB' parallel to AnB, meeting AB at B'.
- From B', draw B'C' parallel to BC, meeting AC at C'.
  Triangle AB'C' is the required triangle, each of whose sides is mn (m < n) of the corresponding sides of ΔABC.



Construction of a Triangle Similar to a given Triangle as per given Scale Factor mn , m > n.

Let ΔABC be the given triangle and we want to construct a ΔAB'C', such that each of its sides is mn (m > n) of the corresponding side of ΔABC.

Steps of Construction:

- Construct a ΔABC by using the given data.
- Make an acute angle ∠BAX, below the base AB. Extend AB to AY and AC to AZ.
- Along AX, mark m points A_1, A_2 ..., A_n, ..A_m, such that $AA_1 = A_1A_2 = A_2A_3 = \ldots = A_{n-1} A_n = \ldots = A_{m-1} A_m$
- Join A_nB.
- From A_m, draw A_mB' parallel to A_nB, meeting AY produced at B'.
- From B', draw B'C' parallel to BC, meeting AZ produced at C'.

- Triangle AB’C’ is the required triangle, each of whose sides is (mn) (m > n) of the corresponding sides of ΔABC.