

CONSTRUCTIONS

Construction is very important in geometry which helps to develop the skill of drawing figures accurately.

Division of a line segment:

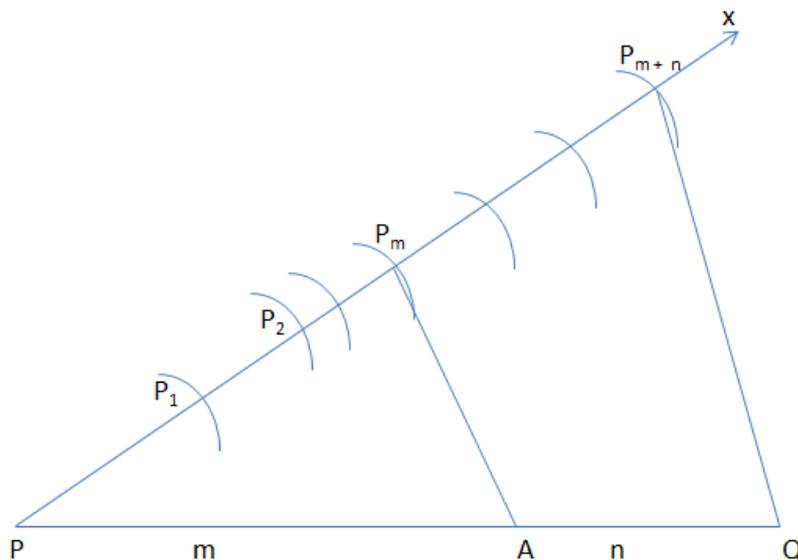
In order to divide a line segment internally in a given ratio $m : n$, where both m and n are positive integers, the following steps are followed:

Given: A line segment PQ and ratio $m : n$.

Required: To divide line segment PQ in the ratio $m : n$.

Steps of construction:

- ❖ Draw a line segment PQ of given length by using a ruler. Draw any ray PX making a suitable acute angle with PQ .
- ❖ Along PX draw $(m + n)$ arcs intersecting the rays PX at $P_1, P_2, \dots, P_m, \dots, P_{m+n}$.
- ❖ Join the points i.e. $Q P_{m+n}$.
- ❖ Draw a line through point P_m parallel to $P_{m+n}Q$.
- ❖ We get one point A ; this point divides PQ internally in the ratio $m : n$.



Construction of a triangle similar to a given triangle:

Suppose we are given $\triangle ABC$ and we have to construct a triangle whose sides are equal to $\frac{m}{n}$ of the corresponding sides of $\triangle ABC$.

- ❖ If $m > n$, then the triangle to be constructed is larger than the given triangle.
- ❖ If $m < n$, then the triangle to be constructed is smaller than the given triangle.

Scale Factor: Scale factor means the ratio of the sides of the triangle to be constructed with corresponding sides of the given triangle.

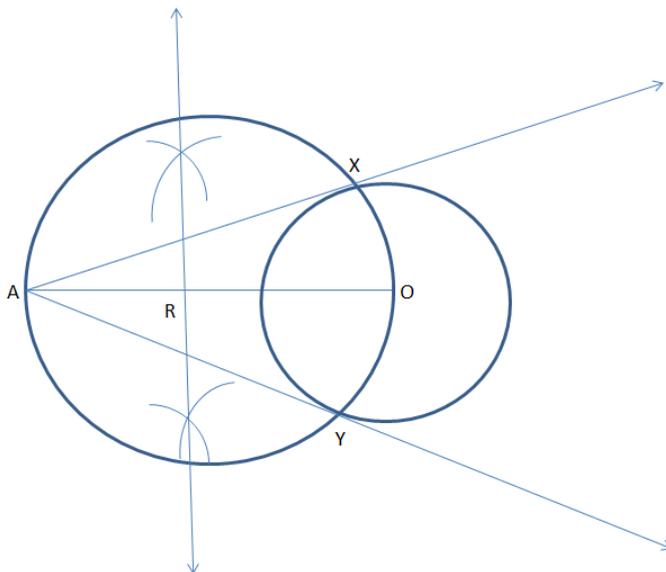
Construction of tangents to a circle:**1) To draw tangents to a circle from a point outside it, when centre of the Circle is known:**

Given: A circle is given with centre as O and radius r, and an external point A

Required: To draw the tangents to the circle from the point A.

Steps of construction:

- ❖ Join OA, and bisect it.
- ❖ Let R be the midpoint of OA.
- ❖ Taking point R as centre and RO as radius draw a circle to intersect the given circle at two points X and Y.
- ❖ Draw a rays AX and AY.
- ❖ Ray AX and AY are the required tangents from A to given circle.



2) To draw tangents to a circle from a point outside it, when centre of the circle is not known:

Given: A circle and a point V outside it

Required: To draw tangents from point V to the circle.

Steps of construction:

- ❖ Draw a secant VXY to intersect the circle at two points X and Y.
- ❖ Extend VX to point Z, such that $VX = VZ$,
- ❖ With ZY as diameter draw semi-circle.
- ❖ Draw VW perpendicular to ZY, intersecting semicircle drawn at W.
- ❖ Taking VW as radius and V as centre draw an arcs intersecting given circle at R and R'
- ❖ Draw rays VR and VR'
- ❖ Rays VR and VR' are the required tangents.

