

Constructions

Division of a Line Segment

To divide a line segment internally in a given ratio $m:n$, where both m and n are positive integers.

Steps:

Step 1: Draw a line segment AB of given length using a ruler.

Step 2: Draw any ray AX making an acute angle with AB .

Step 3: Along AX mark off $(m+n)$ points, namely $A_1, A_2 \dots A_m, A_{m+1} \dots A_{m+n}$

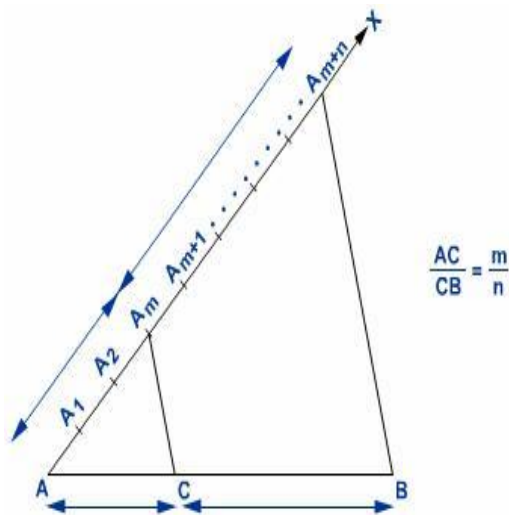
Step 4: Join B to A_{m+n}

Step 5: Through the point A_m draw a line parallel to $A_{m+n}B$ at A_m . Let this line meet AB at 'C' which divides AB internally in the ratio $m:n$.

Proof: In $\triangle ABA_{m+n}$, CA_m is parallel to BA_{m+n} .

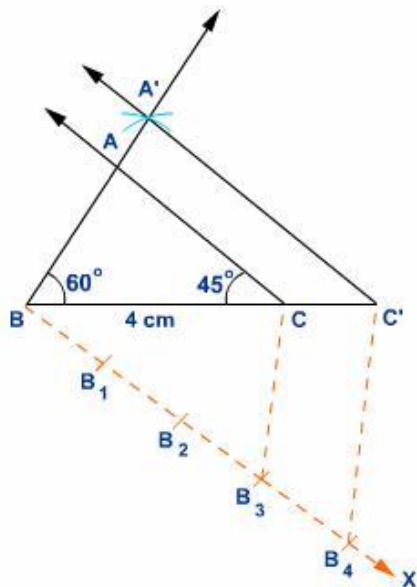
By basic proportionality theorem, we get, $\frac{AA_m}{A_m A_{m+n}} = \frac{AC}{CB} = \frac{m}{n}$

Here 'C' divides AB internally in the ratio $m:n$.



To Construct a Triangle Similar To a Given Triangle as Per the Given Scale Factor

Construct a $\triangle ABC$ in which $BC = 4\text{cm}$, $\angle B = 60^\circ$ and $\angle C = 45^\circ$. Also construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of $\triangle ABC$.



Steps of construction:

Step 1: Construct a triangle ABC with the given measurement i.e. $BC = 4\text{cm}$, $\angle B = 60^\circ$ and $\angle C = 75^\circ$

Step 2: Construct an acute angle CBX downwards.

Step 3: On BX , make 4 equal parts and mark them B_1, B_2, B_3, B_4 .

Step 4: Join ' C ' to B_3 and draw a line through B_4 parallel to B_3C , intersecting the extended line segment BC at C' .

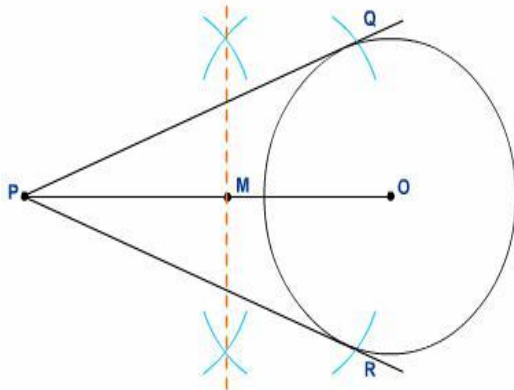
Step 5: In the same way draw $C'A'$ parallel to CA . Thus $\triangle A'BC'$ is the required triangle similar to $\triangle ABC$ whose sides are $\frac{4}{3}$ times the corresponding sides of $\triangle ABC$.

Construction of Tangents to a Circle

To construct the tangents to a circle from a point outside it

Given: A circle with centre 'O' and a point 'P' outside it

Required: To construct the tangents to the circle from P.



Steps of construction:

Step 1: Draw a circle with centre 'O'

Step 2: Join OP.

Step 3: Draw the perpendicular bisector OP. It meets OP at 'M'.

Step 4: Taking 'M' as centre and OM as radius draw arcs which cut the circle with centre 'O' at two points. Name them as Q and R.

Step 5: Join PQ and PR

Step 6: PQ and PR are the required tangents to the circle with centre 'O' from an external point 'P'.

Note:

We can prove that the length of PQ and PR are equal.