

CHAPTER 11

Constructions

Construction of a similar triangle to the given triangle such

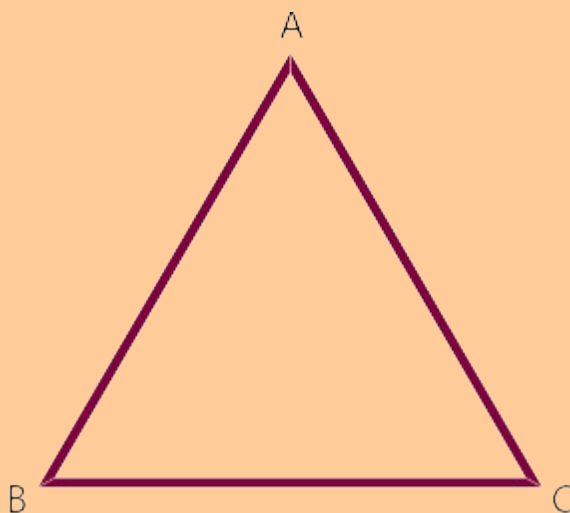
that scale factor is $\frac{m}{n}$, $m > n$:

Method I:

Steps of construction:

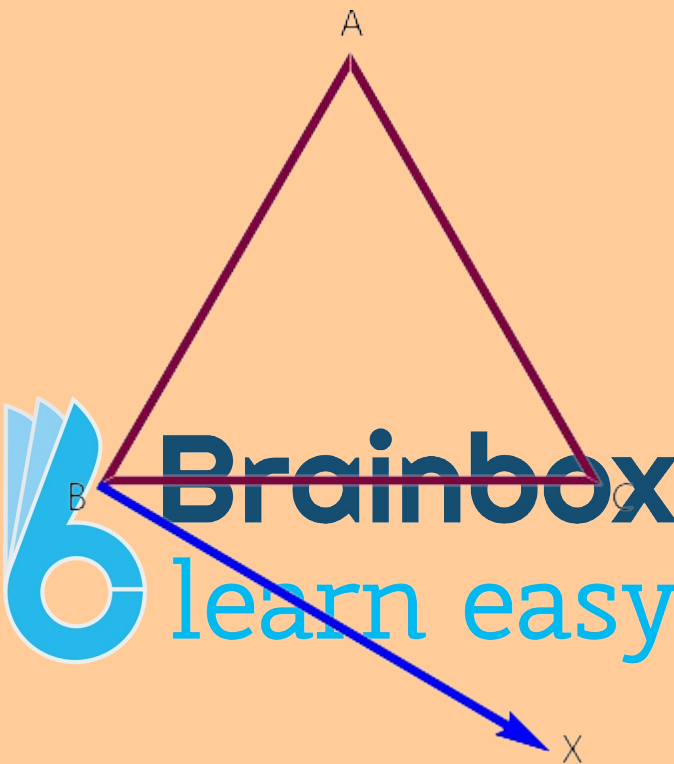
Step I:

Construct the given triangle ABC using the given data and take any one of three sides of the given triangle as base. Let BC be the base of the given triangle.



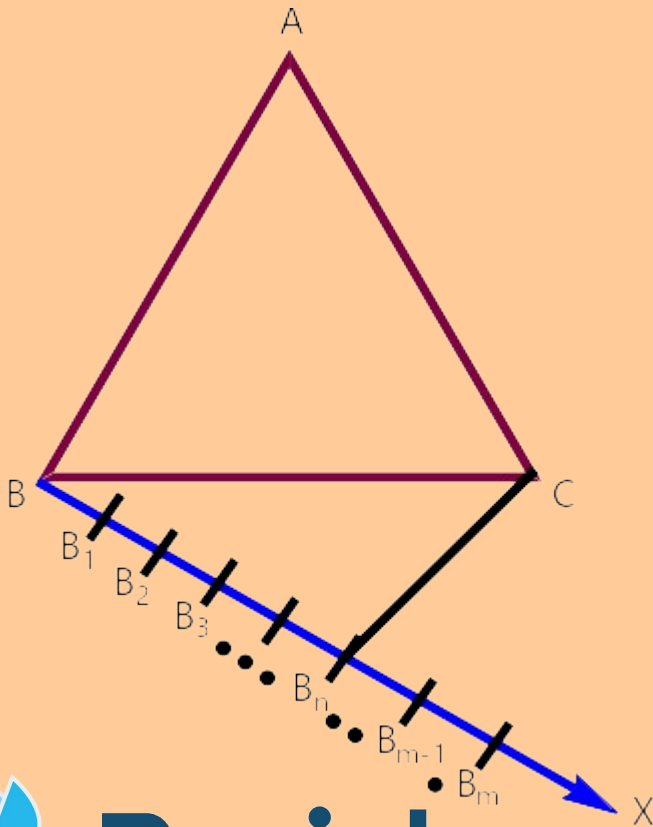
Step II:

At one end, say B of base BC construct an acute angle CBX below the base BC.

**Step III:**

Along BX marks off 'm' points $B_1, B_2 \dots B_m$ on BX such that

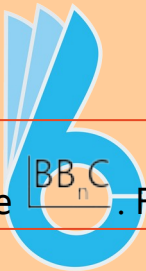
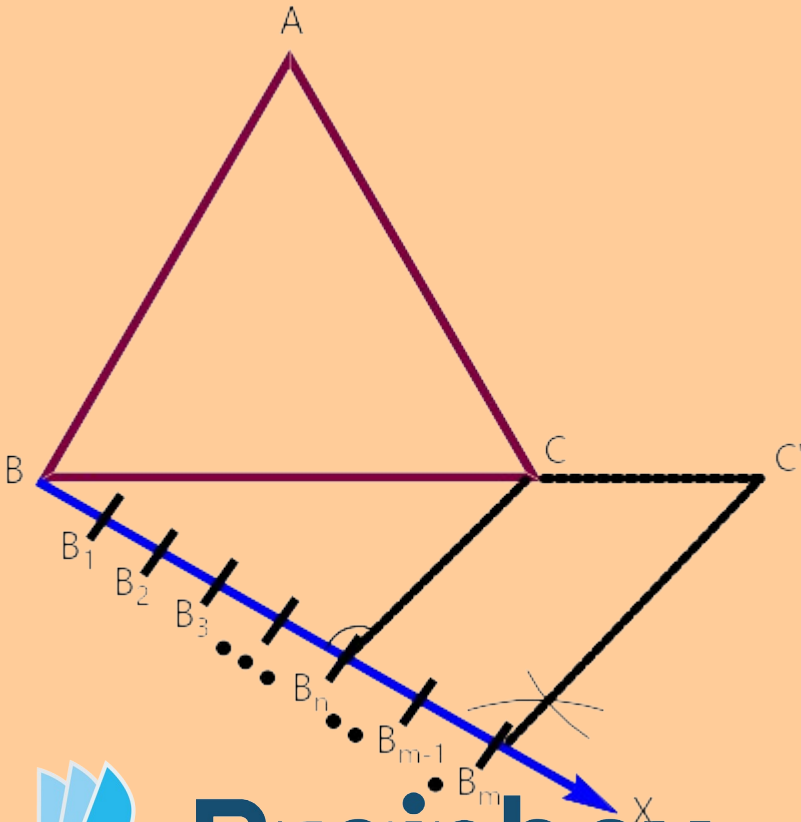
$BB_1 = B_1B_2 = \dots = B_{m-1}B_m$. Join B_mC .



Step IV:

Start from B and reach to point B_n on BX. Draw B_nC parallel to

B_mC' , which meets BC at C' .

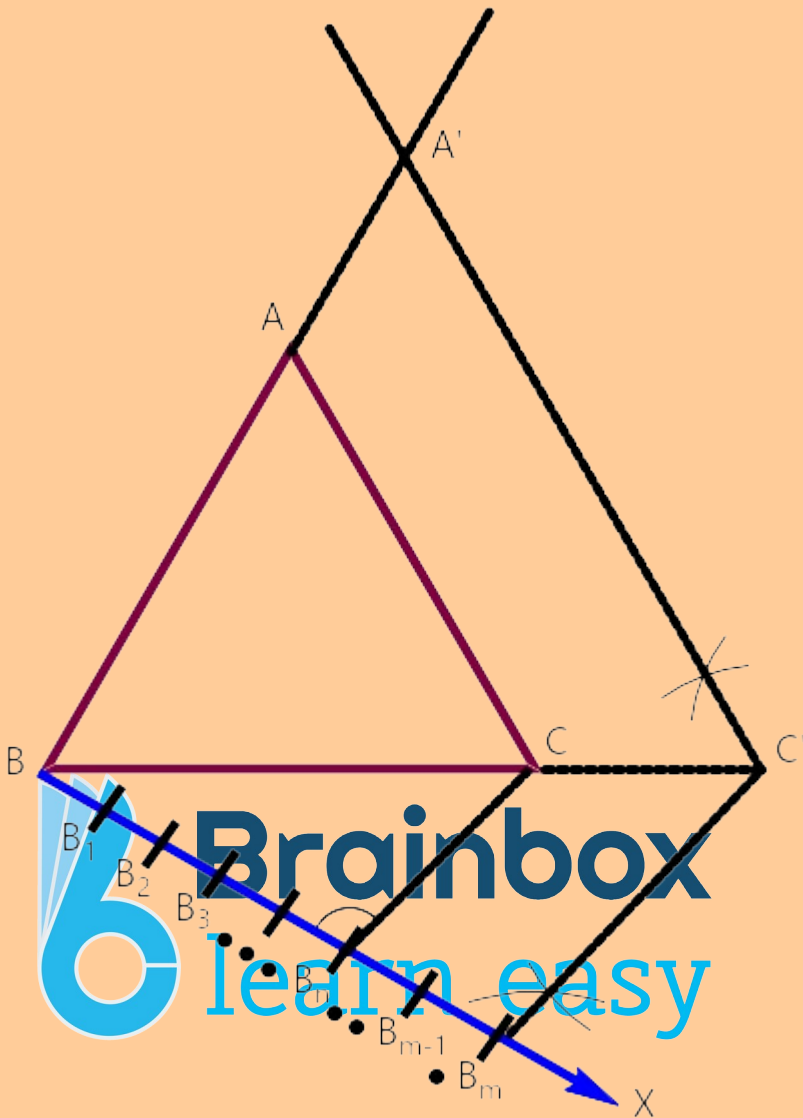


Brainbox

Measure $\angle BB_nC$. From the point B_m draw an arc equal to $\angle BB_nC$.

Step V:

From C' draw $A'C'$ parallel to AC meeting AB at A' .



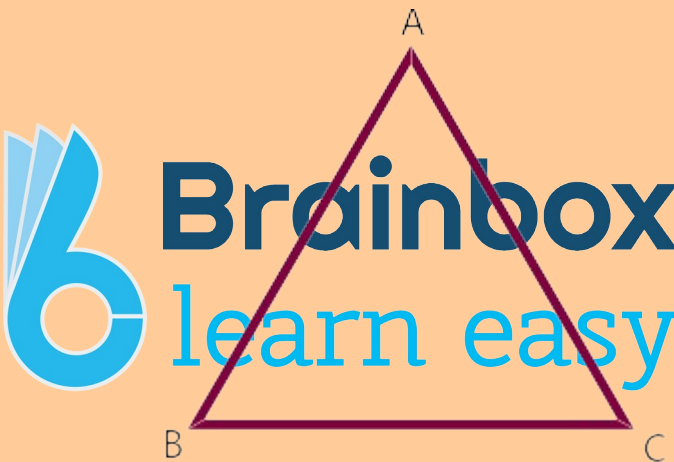
Measure $\angle BCA$. From the point C' draw an arc equal to $\angle ACB$.

Hence $A'BC'$ is the required triangle each of whose side is

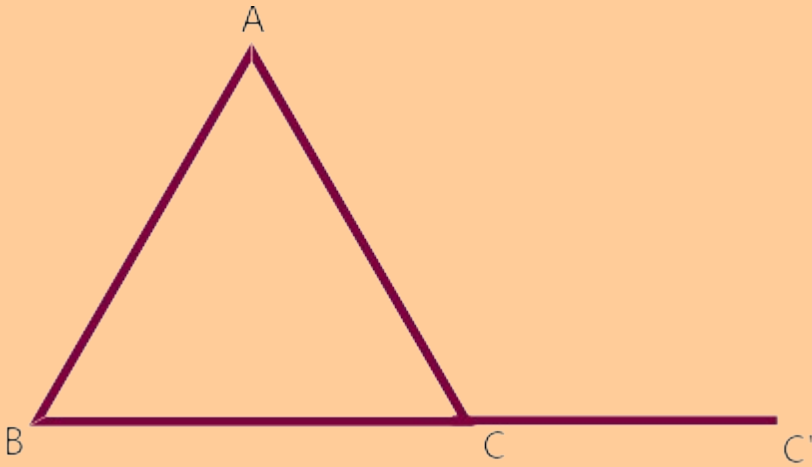
$\left(\frac{m}{n}\right)^{\text{th}}$ of corresponding sides of $\triangle ABC$.

Method II:**Steps of construction:****Step I:**

Construct a triangle ABC of given data and take any one of three sides of the given triangle as its base. Let BC be the base of the given triangle.

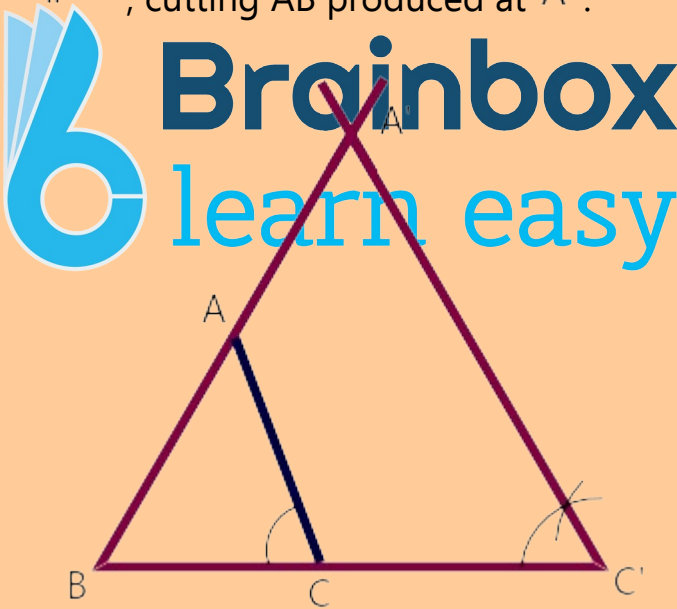
**Step II:**

Extend BC to C' such that $BC' = \frac{m}{n} BC$.



Step III:

Draw $A'C' \parallel AC$, cutting AB produced at A' .



Hence, $A'B'C'$ is the required triangle each of whose sides is

$\left(\frac{m}{n}\right)$ times the corresponding sides of $\triangle ABC$.

Example:

Draw a right triangle ABC in which $AC = AB = 4.5$ cm and

$\angle A = 90^\circ$. Draw a triangle similar to $\triangle ABC$ with its sides

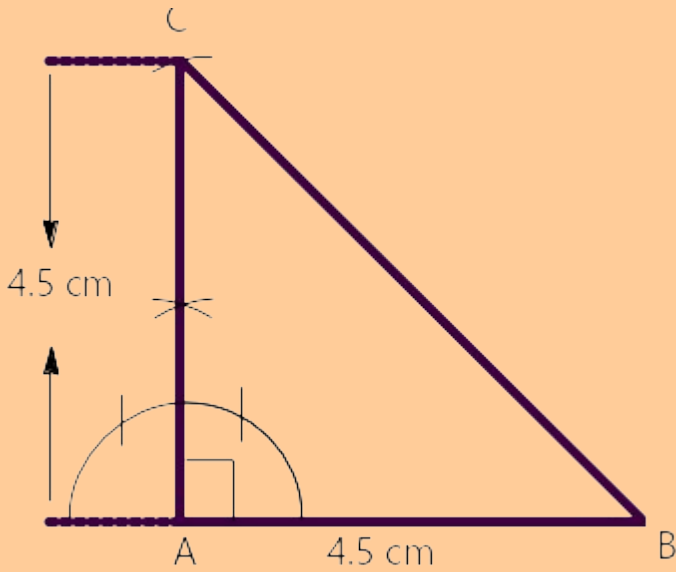
equal to $\left(\frac{5}{4}\right)^{\text{th}}$ of the corresponding sides of $\triangle ABC$.

Sol.**Method II:****Steps of construction:**

Here, $\frac{m}{n} = \frac{5}{4} \Rightarrow m > n$

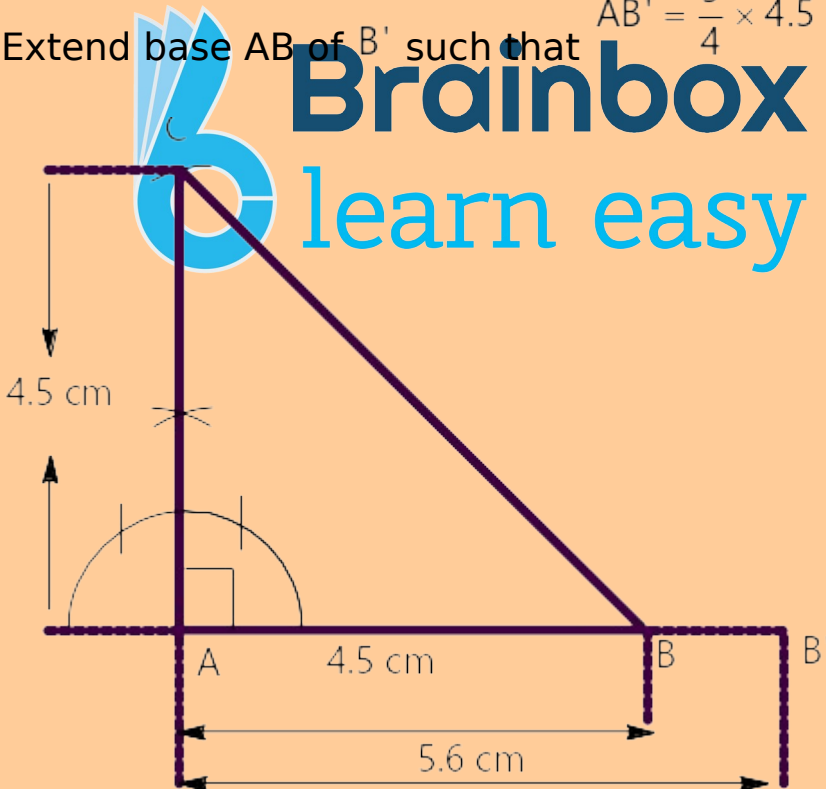
Step I:

Construct $\triangle ABC$, $\angle A = 90^\circ$, $AB = 4.5$ cm & $AC = 4.5$ cm



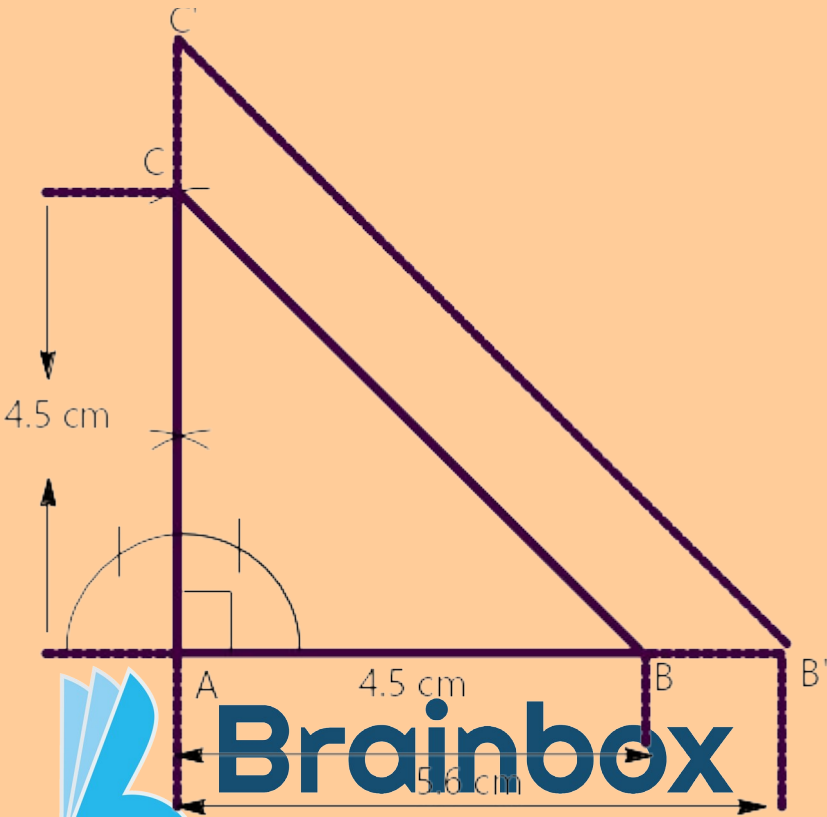
Step II:

Extend base AB of $\triangle ABC$ such that $AB' = \frac{5}{4} \times 4.5 = 5.6 \text{ cm}$.



Step III:

Draw $B'C' \parallel BC$, cutting AC produced at C' .



Hence, $\triangle AB'C'$ is the required triangle similar to $\triangle ABC$ such that

sides of $\triangle AB'C'$ is $\frac{5}{4}$ times the corresponding side of $\triangle ABC$.

Justification:

By $\triangle ABC$ and $\triangle AB'C'$

$BC \parallel B'C'$

$$\therefore \frac{AC}{AC'} = \frac{AB}{AB'} \dots\dots\dots (1) \quad (\text{By B.P.T})$$

In $\triangle AA_4B$ & $\triangle AA_5B'$

$$A_4B \parallel A_5B'$$

$$\therefore \frac{AB}{AB'} = \frac{AA_4}{AA_5} = \frac{4}{5} \dots\dots\dots (2)$$

From (1) & (2),

$$\frac{AC}{AC'} = \frac{4}{5} \Rightarrow AC' \times 4 = AC \times 5$$

$$\Rightarrow AC' = \frac{5}{4} AC$$

 **Brainbox**
 $\therefore$ Side of new triangle formed are $\frac{5}{4}$ times of the given triangle.
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