



NCERT Solutions for Class 10 Maths Chapter 11 Constructions
Exercise 11.1

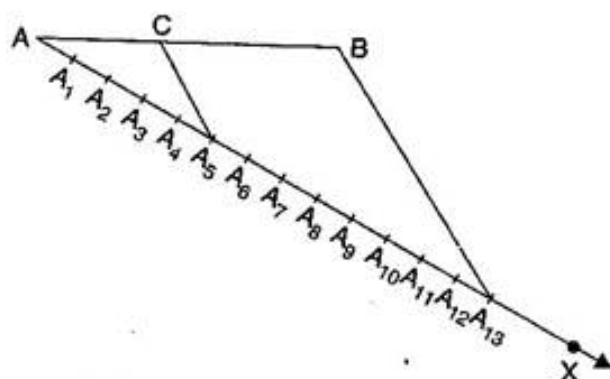
In each of the following, give the justification of the construction also:

Q1. Draw a line segment of length 7.6 cm and divide it in the ratio 5: 8. Measure the two parts.

Ans: Given: A line segment of length 7.6 cm.

To construct: To divide it in the ration 5: 8 and to measure the two parts.

Steps of construction:



(a) From any ray AX, making an acute angle with AB.

(b) Locate 13 ($=5 + 8$) points

$A_1, A_2, A_3, A_4, A_5, A_6, A_7, A_8, A_9, A_{10}, A_{11}, A_{12}$ and A_{13} on AX such that

$$AA_1 = A_1A_2 = A_2A_3 = A_3A_4 = A_4A_5 = A_5A_6 = A_6A_7 = A_7A_8 = A_8A_9 = A_9A_{10} = A_{10}A_{11} = A_{11}A_{12} = A_{12}A_{13}$$

(c) Join BA_{13} .

(d) Through the point A_5 , draw a line parallel to $A_{13}B$ intersecting AB at the point C.

Then, $AC : CB = 5 : 8$

On measurement, $AC = 3.1$ cm, $CB = 4.5$ cm

Justification:

$\because A_5C \parallel A_{13}B$ [By construction]

$$\therefore \frac{AA_5}{A_5A_{13}} = \frac{AC}{CB}$$

[By Basic Proportionality Theorem]

$$\text{But } \frac{AA_5}{A_5A_{13}} = \frac{5}{8} \text{ [By construction]}$$

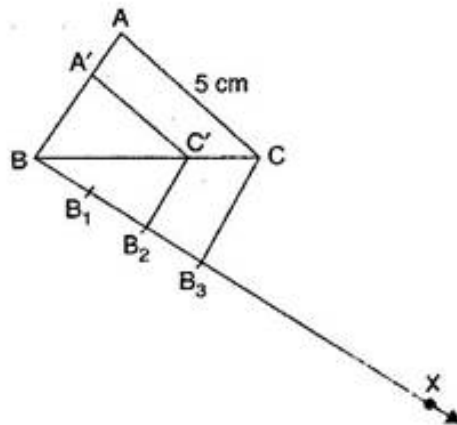
$$\text{Therefore, } \frac{AC}{CB} = \frac{5}{8}$$

$$\Rightarrow AC : CB = 5 : 8$$

Q2. Construct a triangle of sides 4 cm, 5 cm and 6 cm

and then a triangle similar to it whose sides are $\frac{2}{3}$ of the corresponding sides of the first triangle.

Ans: To construct: To construct a triangle of sides 4 cm, 5 cm and 6 cm and then a triangle similar to it whose sides are $\frac{2}{3}$ of the corresponding sides of the first triangle.



Steps of construction:

- Draw a triangle ABC of sides 4 cm, 5 cm and 6 cm.
- From any ray BX, making an acute angle with BC on the side opposite to the vertex A.
- Locate 3 points B_1 , B_2 and B_3 on BX such that
- Join B_3C and draw a line through the point B_2 , draw a line parallel to B_3C intersecting BC at the point C' .
- Draw a line through C' parallel to the line CA to intersect BA at A' .

Then, $A'BC'$ is the required triangle.

Justification:

$\therefore B_3C \parallel B_2C'$ [By construction]

$$\therefore \frac{BB_2}{B_2B_3} = \frac{BC'}{C'C}$$

[By Basic Proportionality Theorem]

But $\frac{BB_2}{B_2B_3} = \frac{2}{1}$ [By construction]

Therefore, $\frac{BC'}{C'C} = \frac{2}{1}$

$$\Rightarrow \frac{C'C}{BC'} = \frac{1}{2}$$

$$\Rightarrow \frac{C'C}{BC'} + 1 = \frac{1}{2} + 1$$

$$\Rightarrow \frac{C'C + BC'}{BC'} = \frac{1+2}{2}$$

$$\Rightarrow \frac{BC}{BC'} = \frac{3}{2}$$

$$\Rightarrow \frac{BC'}{BC} = \frac{2}{3} \dots\dots\dots(i)$$

$\therefore CA \parallel C'A'$ [By construction]

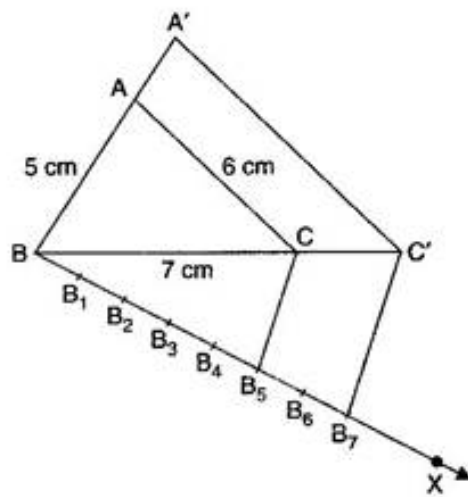
$\therefore \Delta BC'A' \sim \Delta BCA$ [AA similarity]

$$\therefore \frac{AB'}{AB} = \frac{A'C'}{AC} = \frac{BC'}{BC} = \frac{2}{3} \text{ [From eq. (i)]}$$

Q3. Construct a triangle with sides 6 cm, 6 cm and 7 cm and then another triangle whose sides are $\frac{7}{5}$ of the corresponding sides of the first triangle.

Ans: To construct: To construct a triangle of sides 5 cm, 6 cm and 7 cm and then a triangle similar to it whose sides are $\frac{7}{5}$ of the corresponding sides of the first triangle.

Steps of construction:



- (a) Draw a triangle ABC of sides 5 cm, 6 cm and 7 cm.
- (b) From any ray BX, making an acute angle with BC on the side opposite to the vertex A.
- (c) Locate 7 points $B_1, B_2, B_3, B_4, B_5, B_6$ and B_7 on BX such that
 $BB_1 = B_1B_2 = B_2B_3 = B_3B_4 = B_4B_5 = B_5B_6 = B_6B_7$.
- (d) Join B_5C and draw a line through the point B_7 , draw a line parallel to B_5C intersecting BC at the point C' .
- (e) Draw a line through C' parallel to the line CA to intersect BA at A' .

Then, $A'BC'$ is the required triangle.

Justification:

$\therefore C'A' \parallel CA$ [By construction]

$$\therefore \frac{AB}{AB} = \frac{A'C'}{AC} = \frac{BC'}{BC}$$

[By Basic Proportionality Theorem]

$$\because B_7C' \parallel B_5C \quad [\text{By construction}]$$

$$\therefore \triangle BB_7C' \sim \triangle BB_5C \quad [\text{AA similarity}]$$

$$\text{But } \frac{BB_5}{BB_7} = \frac{5}{7} \quad [\text{By construction}]$$

$$\text{Therefore, } \frac{BC}{BC'} = \frac{5}{7}$$

$$\Rightarrow \frac{BC'}{BC} = \frac{7}{5}$$

$$\therefore \frac{AB}{AB} = \frac{A'C'}{AC} = \frac{BC'}{BC} = \frac{7}{5}$$

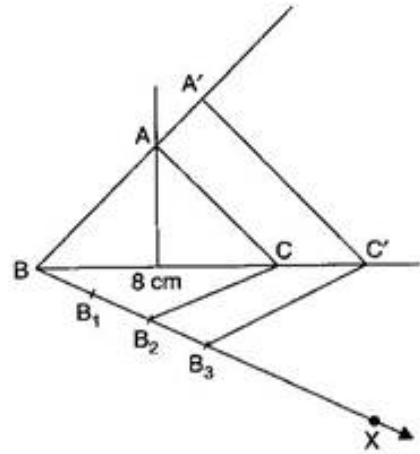
Q4. Construct an isosceles triangle whose base is 8 cm and altitude 4 cm and then another

triangle whose sides are $1\frac{1}{2}$ times the

corresponding sides of the isosceles triangle.

Ans: To construct: To construct an isosceles triangle whose base is 8 cm and altitude 4 cm and then a triangle similar to it whose sides are $1\frac{1}{2}$ (or $\frac{3}{2}$) of the corresponding sides of the first triangle.

Steps of construction:



- (a) Draw $BC = 8$ cm
- (b) Draw perpendicular bisector of BC . Let it meet BC at D .
- (c) Mark a point A on the perpendicular bisector such that $AD = 4$ cm.
- (d) Join AB and AC . Thus $\triangle ABC$ is the required isosceles triangle.
- (e) From any ray BX , making an acute angle with BC on the side opposite to the vertex A .

(f) Locate 3 points B_1 , B_2 and B_3 on BX such that $BB_1 = B_1B_2 = B_2B_3$.

(g) Join B_2C and draw a line through the point B_3 , draw a line parallel to B_2C intersecting BC at the point C' .

(h) Draw a line through C' parallel to the line CA to intersect BA at A' .

Then, $A'BC'$ is the required triangle.

Justification:

$\because C'A' \parallel CA$ [By construction]

$\therefore \Delta ABC \sim \Delta A'BC'$ [AA similarity]

$$\therefore \frac{AB}{AB} = \frac{A'C'}{AC} = \frac{BC'}{BC}$$

[By Basic Proportionality Theorem]

$\because B_3C' \parallel B_2C$ [By construction]

$\therefore \Delta BB_3C' \sim \Delta BB_2C$ [AA similarity]

$$\text{But } \frac{BB_3}{BB_2} = \frac{3}{2} \text{ [By construction]}$$

Therefore,

$$\Rightarrow \frac{BC'}{BC} = \frac{3}{2}$$

$$\therefore \frac{AB}{AB} = \frac{A'C'}{AC} = \frac{BC'}{BC} = \frac{3}{2}$$

Q5. Draw a triangle ABC with side $BC = 6$ cm, $AB = 5$ cm and $\angle ABC = 60^\circ$. Then construct a triangle whose sides are $\frac{3}{4}$ of the corresponding sides of triangle ABC.

Ans: To construct: To construct a triangle ABC with side $BC = 6$ cm, $AB = 5$ cm and $\angle ABC = 60^\circ$ and then a triangle similar to it whose sides are $\frac{3}{4}$ of the corresponding sides of the first triangle ABC.

Steps of construction:

