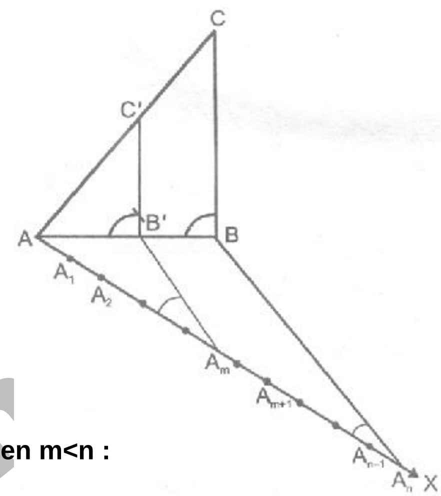
11.2 CONTRUCTION OF A TRIANGLE SIMILAR TO A GIVEN TRIANGLE

Scale Factor : The ratio of the sides of the triangle to be constructed with the corresponding sides of the given triangle is known as their scale factor.



Steps of Construction when m<n :

(i) Construct the given triangle ABC by using the given data.
(ii) Take any one of the three side of the given triangle as base. Let AB be the base of the given triangle.
(iii) At one end, say A, of base AB. Construct an acute angle $\angle BAX$ below the base AB.
(iv) Along AX mark of n points A_1, A_2,A_3,.....A_n such that $AA_1 = A_1A_2 = ... = A_{n-1}A_n$.
(v) Join A_n B.
(vi) Draw A_mB' parallel to A_n B which meets AB at B'.
(vii) From B' draw B' C'$\parallel$ CB meeting AC at C'.

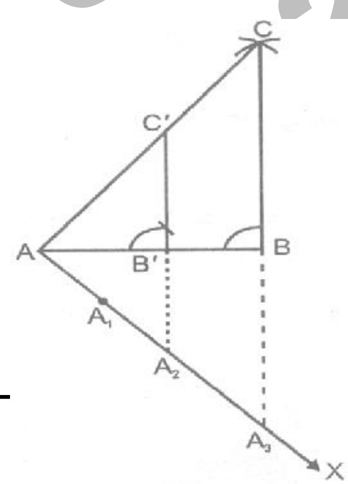
Triangle AB'C' is the required triangle each of whose side is $\left(\frac{m}{n}\right)^{th}$ of the corresponding side of ΔABC.

Ex.3 Construction a ΔABC in which AB = 5 cm, BC = 6 cm and AC = 7 cm. Now, construct a triangle similar to ΔABC such that each of its side is two-third of the corresponding side of ΔABC.

Sol. Steps of Construction
(i) Draw a line segment AB = 5 cm.
(ii) With A as centre and radius AC = 7 cm, draw an arc.
(iii) With B as centre and BC= 6 cm, draw another arc, intersecting the arc draw in step (ii) at C.
(iv) Join AC and BC to obtain ΔABC.
(v) Below AB, make an acute angle $\angle BAX$.

(vi) Along AX, mark off three points (greater of 2 and 3 in $\frac{2}{3}$) A_1,A_2,A_3 such that $AA_1 = A_1A_2 = A_2A_3$.

(vi) Join A_3B.



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(viii) Draw $A_2B' \parallel A_3B$, meeting AB at B'.

(iv) From B', draw $B'C' \parallel BC$, meeting AC at C'.

AB'C' is the required triangle, each of the whose sides is two-third of the corresponding sides of ΔABC.

Steps of Construction when m > n:

(i) Construct the given triangle by using the given data.

(ii) Take any of the three sides of the given triangle and consider it as the base. Let AB be the base of the given triangle.

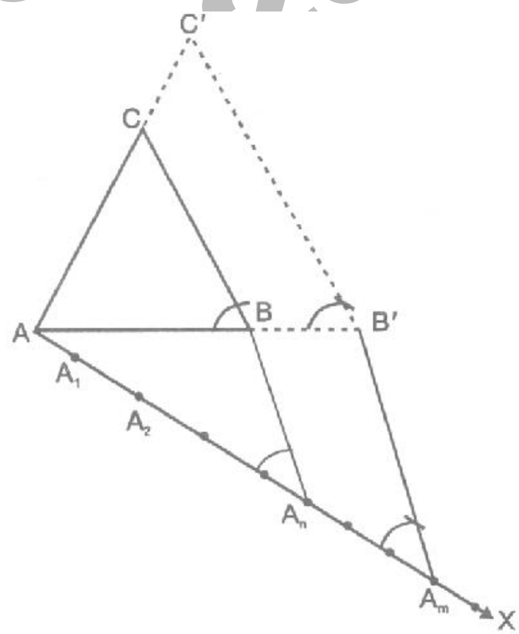
(iii) At one end, say A, of base AB construct an acute angle $\angle BAX$ below base AB i.e. on the composite side of the vertex C.

(iv) Along AX, mark-off m (large of m and n) points $A_1, A_2, ...A_m$ on AX such that $AA_1 = A_1A_2 = ... A_{m-1}A_m$.

(v) Join A_n to B and draw a line through A_m parallel to A_n B, intersecting the extended line segment AB at B'.

(vi) Draw a line through B' parallel to BC intersecting the extended line segment AC at C'.

(vii) ΔAB'C' so obtained is the required triangle.



Ex.4 Draw a triangle ABC with side BC = 7 cm, $\angle B = 45^0$, $\angle A = 150^0$ Construct a triangle whose side are (4/3) times the corresponding side of ΔABC.

Sol. In order to construct ΔABC, follow the following steps :

(i) Draw BC = 7 cm.

(ii) At B construct $\angle CBX = 45^0$ and at C construct $\angle BCY = 180^0 - (45^0 + 105^0) = 30^0$
Suppose BC and CY intersect at A. ΔABC so obtained is the given triangle.

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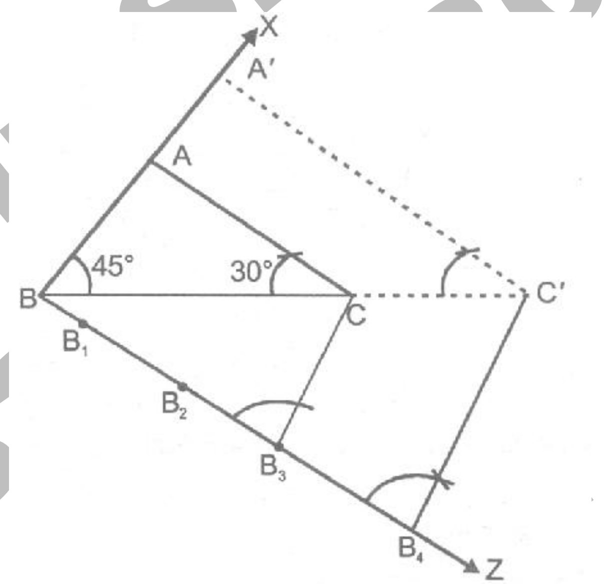
(iii) Construct an acute angle $\angle CBZ$ at B on opposite side of vertex A of ΔABC.

(iv) Mark-off four (greater of 4 and 3 in $\frac{4}{3}$) points, B_1, B_2, B_3, B_4 on BZ such that $BB_2 - B_1B_2 = V_2B_3 = B_3B_4$.

(v) Join B_3 (the third point) to C and draw a line through B_4 parallel to B_3C, intersecting the extended line segment BC at C'.

(vi) Draw a line through C' parallel to CA intersecting the extended line segment BA at A' Triangle A'BC' so obtained is the required triangle such that

$$\frac{A'B'}{AB} = \frac{BC'}{BC} = \frac{A'C'}{AC} = \frac{4}{3}$$



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