ODM EDUCATIONAL GROUP
Changing your Tomorrow

CONSTRUCTIONS

INTRODUCTION

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 11
CHAPTER NAME : CONSTRUCTIONS

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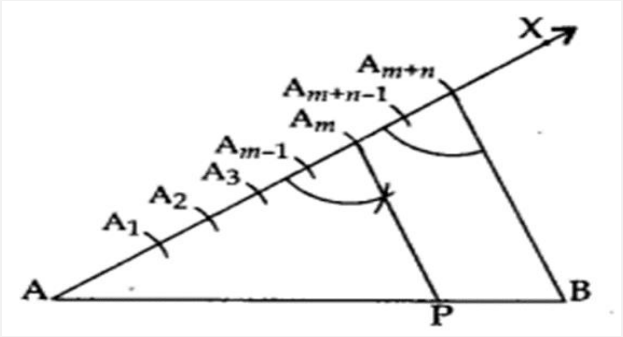
LEARNING OUTCOME

1.Students will be able to learn to divide a line segment internally in a given ratio.

2.Students will be able to construct a triangle similar to a given triangle as per given scale factor which may be less than 1 or greater than1.

Determining a Point Dividing a given Line Segment, Internally in the given Ratio M : N

Let AB be the given line segment of length x cm. We are required to determine a point P dividing it internally in the ratio m : n.



Steps of Construction:

Draw a line segment AB = x cm.

Make an acute ∠BAX at the end A of AB.

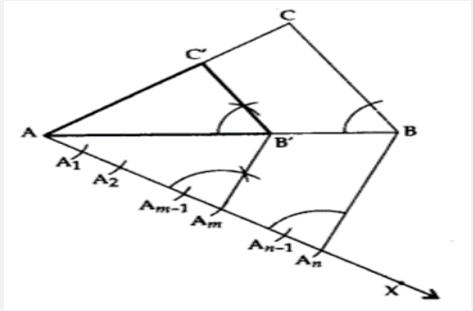
Use a compass of any radius and mark off arcs.

Take (m + n) points A_1, A_2, … A_m, A_{m+1}, …, A_{m+n} along AX such that $AA_1 = A_1A_2 = \ldots = A_{m+n-1}$, A_{m+n}

Join $A_{m+n}B$.

Passing through A_m, draw a line $A_mP \,||\, A_{m+n}B$ to intersect AB at P. The point P so obtained is the A required point which divides AB internally in the ratio m : n..

Let ΔABC be the given triangle. To construct a ΔA'B'C' such that each of its sides is m:n (m < n) of the corresponding sides of ΔABC.



Steps of Construction:

- Construct a triangle ABC by using the given data.
- Make an acute angle ∠BAX, below the base AB.
- Along AX, mark n points A_1, A_2 ..., A_n, such that $AA_1 = A_1A_2 = \dots = A_{m-1}A_m = \dots A_{n-1}A_n$.
- Join A_nB.
- From A_m, draw A_mB' parallel to AnB, meeting AB at B'.

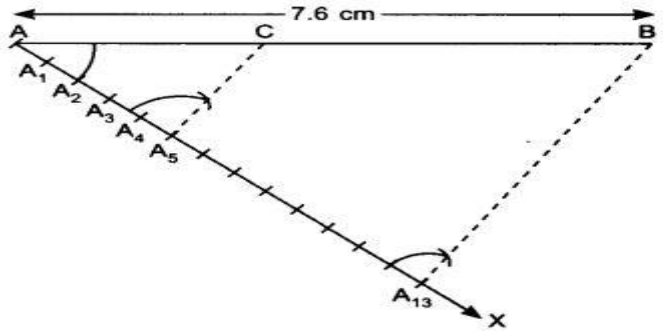
From B', draw B'C' parallel to BC, meeting AC at C'.
Triangle AB'C' is the required triangle, each of whose sides is mn (m < n) of the corresponding sides of ΔABC.

Division of a line segment,
https://youtu.be/vvKMJVSLvnM{10.15}

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

Steps of Construction:

1. Draw a line segment AB = 7.6 cm.
2. Draw an acute angle BAX on base AB. Mark the ray as AX.
3. Locate 13 points $A_1, A_2, A_3, \ldots\ldots, A_{13}$ on the ray AX so that $AA_1 = A_1A_2 = \ldots\ldots = A_{12}A_{13}$
4. Join A_{13} with B and at A_5 draw a line ‖ to BA_{13}, i.e. A_5C. The line intersects AB at C.
5. On measure AC = 2.9 cm and BC = 4.7 cm.



Justification:

In ΔAA_5C and $\Delta AA_{13}B$,

$A_5C \parallel A_{13}B$

$$\frac{AC}{BC} = \frac{AA_5}{A_5A_{13}}$$ (By the Basic Proportionality Theorem)

$$\frac{AC}{BC} = \frac{5}{8} \quad \left[\because \frac{AA_5}{A_5A_{13}} = \frac{5}{8}\right]$$

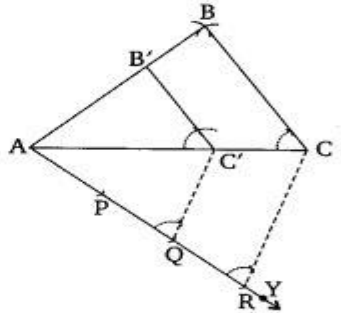
$\therefore$ AC : BC = 5 : 8

Construction of similar triangles as per the ratio.
https://youtu.be/xGHAyVdxiWQ{8.15}

2.Construct a triangle of sides 4 cm, 5 cm and 6 cm and then a triangle similar to it whose sides are 2 3 of the corresponding sides of the first triangle.

Steps of Construction:

1. Draw AC – 6 cm (ii) With A and Cas centres and radii 4 cm.
2. 5 cm respectively draw two ares intersecting each other at B. Join BA and BC.
3. Draw a ray AY making an acute angle with AC.
4. Locate three points and Ron AY, such that AP – POQR.
5. Join CR.
6. Through o. draw a line QC' parallel to RC (by making an angle equal to ∠ARC) meeting the line segment AC at C'.



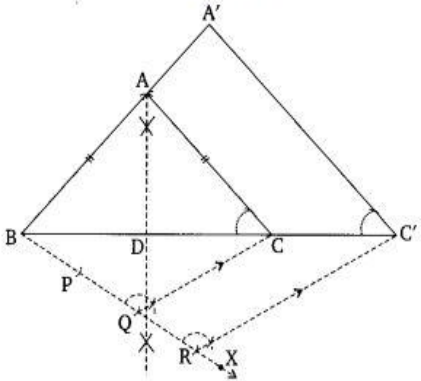
7. Similarly, through C, draw a line B'C parallel to CB

Thus, ABC is the required triangle, which is similar to ΔABC with scale factor $\frac{2}{3}$

3. Construct an isosceles triangle whose base is 8 cm and altitude 4 cm and then another triangle whose sides are 3/2 times the corresponding sides of the isosceles triangle

Steps of Construction:

1. Construct an isosceles triangle ABC in which BC – 8 cm and altitude AD is 4 cm.
2. Draw a ray BX, making an acute angle with BC.
3. Locate 3 points on BX, such that BP – PQ = QR.
4. Join QC.
5. Through R, draw a line RC parallel to QC, meeting produced line BC at C'.
6. Through C, draw a line CA parallel to CA, meeting the produced line BA at A'.



Thus, ΔA'BC' is the required isosceles triangle

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HOME ASSIGNMENT Ex. 11.1 Q. 1 to Q 4

AHA

1. Draw a triangle ABC with side BC = 7 cm, $\angle B = 45°$, $\angle A = 105°$. Then, construct a triangle whose sides are 4 /3 times the corresponding sides of Δ ABC.

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THANKING YOU

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