

ASSIGNMENT-1

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ICSE 10 2018 - PROBLEM 7(C)

- (c) A(2, 5), B(-1, 2) and C(5, 8) are the vertices of a triangle ABC, 'M' is a point on AB such that $AM : MB = 1 : 2$. Find the co-ordinates of 'M'. Hence find the equation of the line passing through the points C and M.

Solution: According to the question, M is a point on the side AB such that

$$AM : MB = 1 : 2$$

When the line segment AB is divided internally by C in the ratio $m : n$, from Section formula, we get the Coordinates of point C as,

$$C = \left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right), \text{ where} \quad (0.1)$$

$$A = \begin{pmatrix} x_1 \\ y_1 \end{pmatrix}, B = \begin{pmatrix} x_2 \\ y_2 \end{pmatrix} \quad (0.2)$$

From given data, Using (0.1) here, we get

$$M = \left(\frac{-1+4}{1+2}, \frac{2+10}{1+2} \right) \quad (0.3)$$

$$= \begin{pmatrix} 1 \\ 4 \end{pmatrix} \quad (0.4)$$

The equation of the line joining two points $\begin{pmatrix} a \\ b \end{pmatrix}$ and $\begin{pmatrix} c \\ d \end{pmatrix}$ is

$$(y - b) = \left(\frac{d-b}{c-a} \right) (x - a) \quad (0.5)$$

Here, the equation of the line joining points $C \begin{pmatrix} 5 \\ 8 \end{pmatrix}$

and $M \begin{pmatrix} 1 \\ 4 \end{pmatrix}$ will be

$$(y - 4) = \left(\frac{8-4}{5-1} \right) (x - 1) \quad (0.6)$$

Simplified, we get the equation

$$(1 \ -1) \mathbf{x} + 3 = 0 \quad (0.7)$$

which can also be represented as

$$x - y + 3 = 0 \quad (0.8)$$

But, However,

On using (0.5), we get

1) The equation of the line joining $A \begin{pmatrix} 2 \\ 5 \end{pmatrix}, B \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ as $(1 \ -1) \mathbf{x} + 3 = 0$

2) and the equation of the line joining $B \begin{pmatrix} -1 \\ 2 \end{pmatrix}, C \begin{pmatrix} 5 \\ 8 \end{pmatrix}$ as $(1 \ -1) \mathbf{x} + 3 = 0$ too.

This implies that A, B, C points are 'collinear' and lie on the line $x - y + 3 = 0$ and Hence, given points A, B, C don't form a triangle.

Verified by plotting the graph of A,B,C and M points :

