

# Question-1-1.5-2

EE24BTECH11035 - KOTHAPALLI AKHIL

## Question:

Find the ratio in which the Y axis divides the line segment joining points  $(6, -4)$  and  $(-2, -7)$ . Also find the point of intersection.

## Solution:

Let the point on the Y-axis be  $\begin{pmatrix} 0 \\ y \end{pmatrix}$ ,

The given two points are  $\begin{pmatrix} 6 \\ -4 \end{pmatrix}$  and  $\begin{pmatrix} -2 \\ -7 \end{pmatrix}$ .

The above 3 points are collinear.

Construct a Matrix for the above points

$$M = \begin{pmatrix} 0 & y & 1 \\ 6 & -4 & 1 \\ -2 & -7 & 1 \end{pmatrix} \quad (0.1)$$

The Determinant of the matrix is 0

$$\text{Det} = 0(-4 + 7) - y(6 + 2) + 1(-42 - 8) = 0 \quad (0.2)$$

$$\Rightarrow y = -6.25 \quad (0.3)$$

$\therefore$  The point on Y-Axis is  $\begin{pmatrix} 0 \\ -6.25 \end{pmatrix}$

Point	Coordinates
<b>A</b>	$(6, -4)$
<b>B</b>	$(0, -6.25)$
<b>C</b>	$(-2, -7)$

TABLE 0: variables used

Assume point **B** divides the line segment **AC** in the ratio  $k:1$ . According to the section formula:

$$\mathbf{B} = \frac{k\mathbf{C} + \mathbf{A}}{k+1}$$

Substituting the values:

$$\begin{pmatrix} 0 \\ -6.25 \end{pmatrix} = \frac{k \begin{pmatrix} -2 \\ -7 \end{pmatrix} + \begin{pmatrix} 6 \\ -4 \end{pmatrix}}{k+1}$$

This gives us two equations:

$$0 = \frac{-2k+6}{k+1}, \quad -6.25 = \frac{-7k-4}{k+1}$$

Solving for  $k$  from the first equation:

$$0 = -2k + 6$$

$$\Rightarrow 2k = 6$$

$$\Rightarrow k = 3$$

Therefore, the ratio in which **B** divides **AC** is 3:1 .

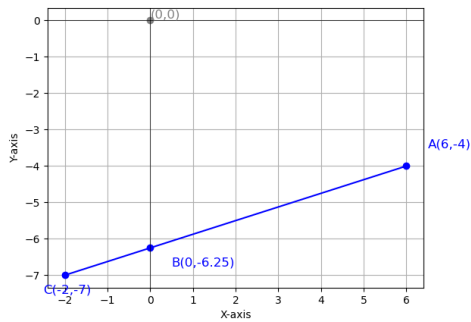


Fig. 0.1: Line AC