

1.5.25

EE24BTECH11010 - BALAJI B

Question:

In what ratio does the point $\left(\frac{24}{11}, y\right)$ divide the line segment joining the points $\mathbf{P} = \begin{pmatrix} 2 \\ -2 \end{pmatrix}$ and $\mathbf{Q} = \begin{pmatrix} 3 \\ 7 \end{pmatrix}$? Also find the value of y . (10,2017)

Answer:

Symbol	Value	Description
P	$\begin{pmatrix} 2 \\ -2 \end{pmatrix}$	First Endpoint
Q	$\begin{pmatrix} 3 \\ 7 \end{pmatrix}$	Second Endpoint
R	$\begin{pmatrix} \frac{24}{11} \\ y \end{pmatrix}$	Point divides P and Q in the ratio $k : 1$

TABLE 0: Variables Used

The point $\mathbf{R} \begin{pmatrix} \frac{24}{11} \\ y \end{pmatrix}$ divides the points $\mathbf{P} \begin{pmatrix} 2 \\ -2 \end{pmatrix}$ and $\mathbf{Q} \begin{pmatrix} 3 \\ 7 \end{pmatrix}$ in the ratio $k : 1$.

$$\mathbf{C} = \frac{k\mathbf{B} + \mathbf{A}}{k + 1} \quad (0.1)$$

Here,

$$\begin{pmatrix} \frac{24}{11} \\ y \end{pmatrix} = \frac{k \begin{pmatrix} 3 \\ 7 \end{pmatrix} + \begin{pmatrix} 2 \\ -2 \end{pmatrix}}{k + 1} \quad (0.2)$$

$$(k + 1) \begin{pmatrix} \frac{24}{11} \\ y \end{pmatrix} = k \begin{pmatrix} 3 \\ 7 \end{pmatrix} + \begin{pmatrix} 2 \\ -2 \end{pmatrix} \quad (0.3)$$

$$\Rightarrow k = \frac{2}{9} \quad (0.4)$$

Substituting the value of k in the equation(0.2) we get value of y as

$$y = \frac{-4}{11} \quad (0.5)$$

$$\mathbf{R} = \begin{pmatrix} \frac{24}{11} \\ \frac{11}{-4} \\ \frac{-4}{11} \end{pmatrix}$$

(0.6)

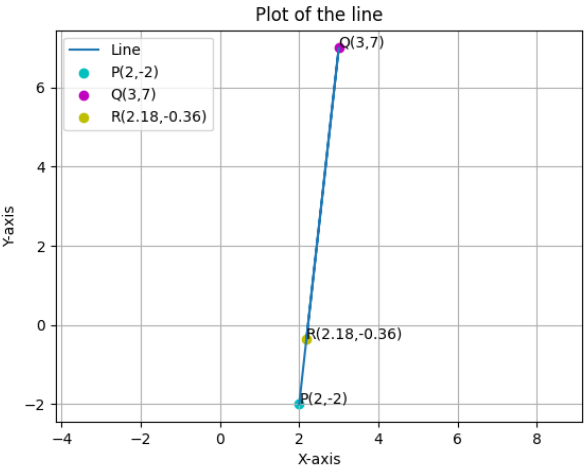


Fig. 0.1: Plot of the line