1.5.9

EE24BTECH11001 - Aditya Tripathy

Question:
In what ratio does the x-axis divide the line segment joing the points $\mathbf{A}\,(3,6)$ and $\mathbf{B}\,(-12,-3)$?
Solution:
From (1.1.4.1), if **D** divides **BC** in the ratio $k:1$,

$$\mathbf{D} = \frac{k\mathbf{C} + \mathbf{B}}{k+1} \tag{0.1}$$

Since the point lies on the x-axis, it is of the form $(x,0)$. So,

$$\begin{pmatrix} x \\ 0 \end{pmatrix} = \frac{\begin{pmatrix} -12 \\ -3 \end{pmatrix} + \begin{pmatrix} 3 \\ 6 \end{pmatrix}}{k+1} \tag{0.2}$$

$$\begin{pmatrix} x \\ 0 \end{pmatrix} = \frac{\begin{pmatrix} -12k+3 \\ -3k+6 \end{pmatrix}}{k+1} \tag{0.3}$$

$$\begin{pmatrix} x \\ 0 \end{pmatrix} = \begin{pmatrix} \frac{-12k+3}{k+1} \\ \frac{-3k+6}{k+1} \end{pmatrix} \tag{0.4}$$

$$\tag{0.5}$$

On comparing the entries in the two vectors we get,

$$0 = \frac{-3k+6}{k+1} \implies k = 2 \tag{0.6}$$

$$x = \frac{-12k+3}{k+1} \implies x = -7 \tag{0.7}$$

$$\tag{0.8}$$

Hence the x-axis divides the line segment joining **A** ,**B** in the ratio $2:1$

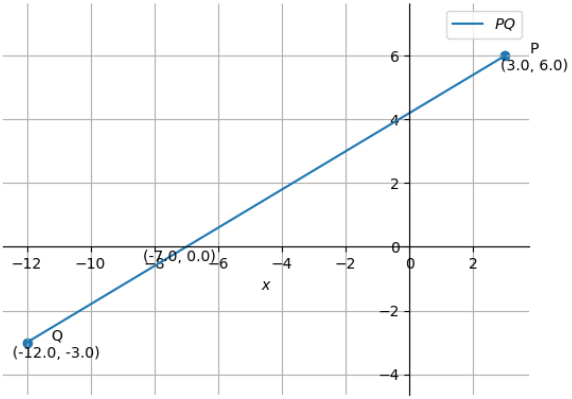

Fig. 0.1: Point joining A and B