1-1.5-21

EE24BTECH11062 - Homa Harshitha Vuddanti

Question:

Find the ratio in which $\mathbf{P} = \begin{pmatrix} 4 \\ m \end{pmatrix}$ divides the line segment joining the points $\mathbf{A} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} 6 \\ -3 \end{pmatrix}$. Hence find m.

Solution:

Given,

Variable	Description
k	Ratio in which P divides line AB.
m	y-coordinate of point P

TABLE 0: Variables Used

$$\mathbf{A} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \tag{0.1}$$

$$\mathbf{B} = \begin{pmatrix} 6 \\ -3 \end{pmatrix} \tag{0.2}$$

$$\mathbf{P} = \begin{pmatrix} 4 \\ m \end{pmatrix} \tag{0.3}$$

Section formula:

If C divides AB in the ratio k:1;

$$C = \frac{kB + A}{k + 1} \tag{0.4}$$

$$\begin{pmatrix} 4 \\ m \end{pmatrix} = \frac{k\begin{pmatrix} 6 \\ -3 \end{pmatrix} + \begin{pmatrix} 2 \\ 3 \end{pmatrix}}{k + 1} \tag{0.5}$$

$$\begin{pmatrix} 4 \\ m \end{pmatrix} = \frac{1}{k + 1}\begin{pmatrix} 6k + 2 \\ -3k + 3 \end{pmatrix} \tag{0.6}$$

$$6k + 2 = 4\,(k + 1) \tag{0.7}$$

$$-3k + 3 = m\,(k + 1) \tag{0.8}$$

From equations (0.7) and (0.8),

$$k = 1, \tag{0.9}$$

$$m = 0 \tag{0.10}$$

Hence, *ratio* = 1 : 1;
$m = 0$.

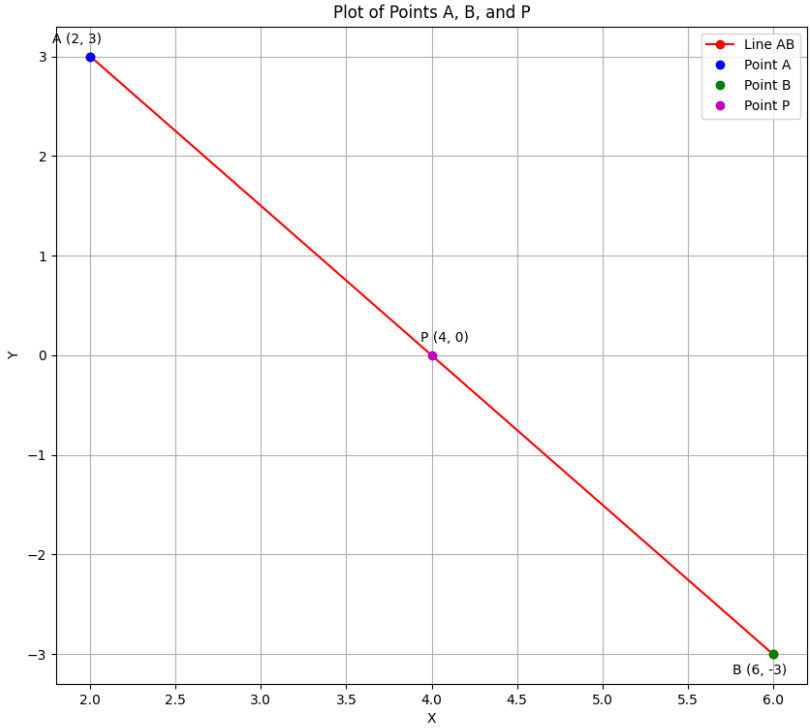

Fig. 0.1: Plot