

# 1.5.21

EE25BTECH11033 - Kevin

## Question:

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

## Solution:

Let the vector  $\mathbf{P}$  be

$$\mathbf{P} = \begin{pmatrix} 4 \\ m \end{pmatrix}, \quad (1)$$

Given the points,

$$\mathbf{A} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \mathbf{B} = \begin{pmatrix} 6 \\ -3 \end{pmatrix} \quad (2)$$

We can use the section formula to find the ratio first and then we can compute the value of  $m$ .

Section formula for a vector  $\mathbf{P}$  which divides the line formed by vectors  $\mathbf{A}$  and  $\mathbf{B}$  in the ratio  $k:1$  is given by

$$\mathbf{P} = \frac{k\mathbf{B} + \mathbf{A}}{k + 1} \quad (3)$$

Using section formula,

$$\begin{pmatrix} 4 \\ m \end{pmatrix} = \frac{\begin{pmatrix} 2 \\ 3 \end{pmatrix} + k \begin{pmatrix} 6 \\ -3 \end{pmatrix}}{1 + k} \quad (4)$$

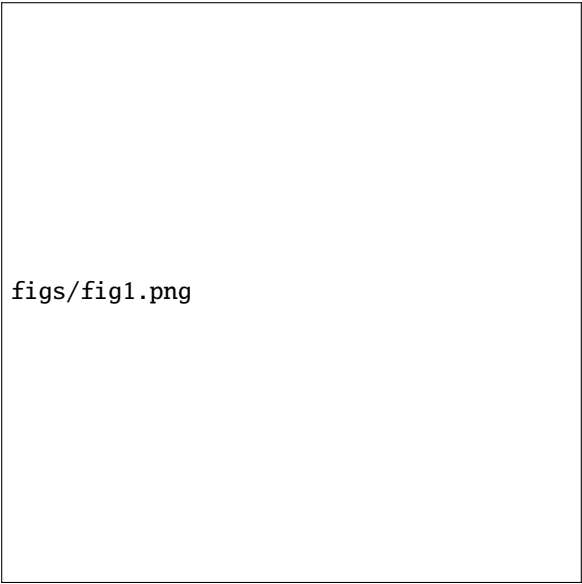
$$\Rightarrow \begin{pmatrix} 4 \\ m \end{pmatrix} + k \begin{pmatrix} 4 \\ m \end{pmatrix} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} + k \begin{pmatrix} 6 \\ -3 \end{pmatrix} \quad (5)$$

$$\Rightarrow k \begin{pmatrix} 2 \\ -3 - m \end{pmatrix} = \begin{pmatrix} 2 \\ m - 3 \end{pmatrix} \quad (6)$$

$$\text{or, } k = \frac{1}{1}. \quad (7)$$

$$\Rightarrow m = 0. \quad (8)$$

See Fig. 0 ,



`figs/fig1.png`

Fig. 0