1-1.5-12

AI24BTECH11011 - Himani Gourishetty

1) In what ratio does the point $\mathbf{P}(-4, y)$ divide the line segment joining the points $\mathbf{A}(-6, 10)$ and $\mathbf{B}(3, -8)$? Hence, find the value of y.
Solution: Given,

Variable	Description	formula
n	Ratio in which point **P** divides AB	-
P	Point on AB	$\mathbf{P}=\frac{\mathbf{A}+n\mathbf{B}}{1+n}$
A	$\begin{pmatrix}-6\\10\end{pmatrix}$	-
B	$\begin{pmatrix}3\\8\end{pmatrix}$	-

By section formula,

$$\mathbf{P} = \left(\frac{\mathbf{A} + n\mathbf{B}}{1 + n}\right) \tag{1}$$

$$\begin{pmatrix}-4\\y\end{pmatrix} = \frac{\begin{pmatrix}-6\\10\end{pmatrix} + n\begin{pmatrix}3\\-8\end{pmatrix}}{1 + n} \tag{2}$$

$$\begin{pmatrix}-4\,(2 + n)\\y\,(1 + n)\end{pmatrix} = \begin{pmatrix}-6 + 3n\\10 - 8n\end{pmatrix} \tag{3}$$

$$\tag{4}$$

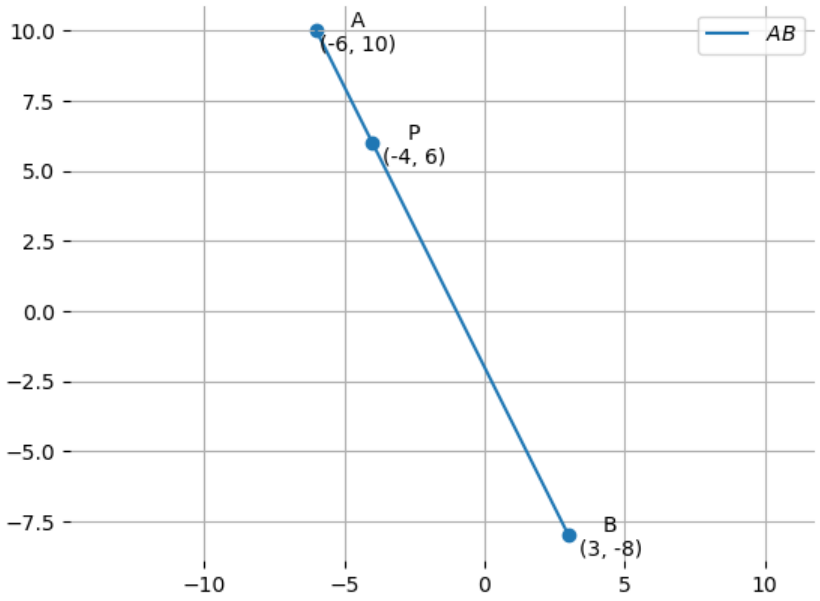
on comparing,

$$n = \frac{2}{7} \tag{5}$$

$$y = \frac{10 - 8\left(\frac{2}{7}\right)}{1 + \frac{2}{7}} \tag{6}$$

$$y = 6 \tag{7}$$

point **P** divides the line segment AB in the ratio 2:7.


A
(-6, 10)
P
(-4, 6)
B
(3, -8)
AB
10.0
7.5
5.0
2.5
0.0
−2.5
−5.0
−7.5
−10
−5
0
5
10