

1-1.5-12

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- 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
n	Ratio in which point \mathbf{P} divides AB
\mathbf{P}	Point on AB
\mathbf{A}	$\begin{pmatrix} -6 \\ 10 \end{pmatrix}$
\mathbf{B}	$\begin{pmatrix} 3 \\ -8 \end{pmatrix}$

By section formula,

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

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

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

$$(4)$$

on comparing,

$$n = \frac{2}{7} \quad (5)$$

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

$$y = 6 \quad (7)$$

point \mathbf{P} divides the line segment AB in the ratio 2:7.

