

1-1.5-8

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Question: Find the ratio in which $P(4,5)$ divides the line segment joining $A(2,3)$ and $B(7,8)$

solution :

variable	Description	formula
$A(2,3)$	one end of the line segment	—
$B(7,8)$	another end of the line segment	—
$P(4,5)$	divides A and B in the ratio $k:1$	$P = \frac{A+kB}{k+1}$

TABLE 0: variable used

$P(4,5)$ divides A and B in the ratio $k:1$

$$P = \frac{A}{k+1} + \frac{kB}{k+1} \quad (1)$$

$$\Rightarrow P = \left(\begin{matrix} A & B \end{matrix} \right) \left(\begin{matrix} \frac{1}{k+1} \\ \frac{k}{k+1} \end{matrix} \right) \quad (2)$$

$$\Rightarrow \begin{pmatrix} 4 \\ 5 \end{pmatrix} = \begin{pmatrix} 2 & 7 \\ 3 & 8 \end{pmatrix} \begin{pmatrix} \frac{1}{k+1} \\ \frac{k}{k+1} \end{pmatrix} \quad (3)$$

$$\Rightarrow \begin{pmatrix} 4 \\ 5 \end{pmatrix} = \begin{pmatrix} \frac{2}{k+1} + \frac{7k}{k+1} \\ \frac{3}{k+1} + \frac{8k}{k+1} \end{pmatrix} \quad (4)$$

$$\Rightarrow 4 = \frac{2+7k}{k+1} \quad (5)$$

$$\Rightarrow 4k+4 = 2+7k \quad (6)$$

$$3k = 2 \quad (7)$$

$$k = \frac{2}{3} \quad (8)$$

$$\Rightarrow k:1 = \frac{2}{3}:1 \quad (9)$$

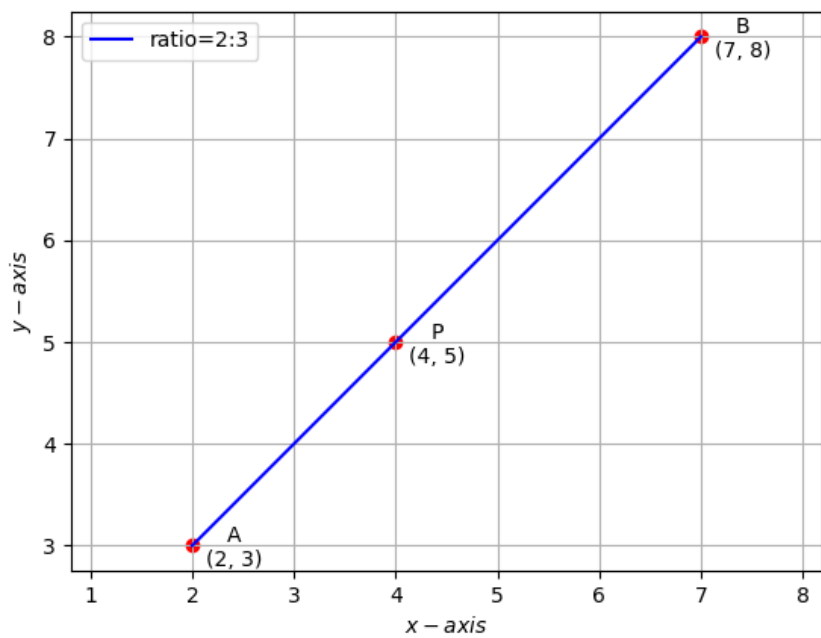


Fig. 0: plot of A,B and P