AI25BTECH11034-SUJAL CHAUHAN

Problem 1.4.4 . Find the coordinate of the point which divides the line segment joining the point $\mathbf{P}(4,3)$and $\mathbf{Q}(8,5)$ in the ratio 3:1 internally.

Solution.

Input variable	Value
$\mathbf{P}$	$\begin{pmatrix}4\\3\end{pmatrix}$
$\mathbf{Q}$	$\begin{pmatrix}8\\5\end{pmatrix}$
$\mathbf{PR}:\mathbf{RP}$	$3:1$

Table 1

Let the position vectors be

$$\mathbf{P}=\begin{pmatrix}4\\3\end{pmatrix}, \qquad \mathbf{Q}=\begin{pmatrix}8\\5\end{pmatrix}. \tag{0}$$

If $\mathbf{R}$ is the position vector of R, then

$$\mathbf{R}=\frac{3\mathbf{Q}+\mathbf{R}}{3+1} \tag{1}$$

So,

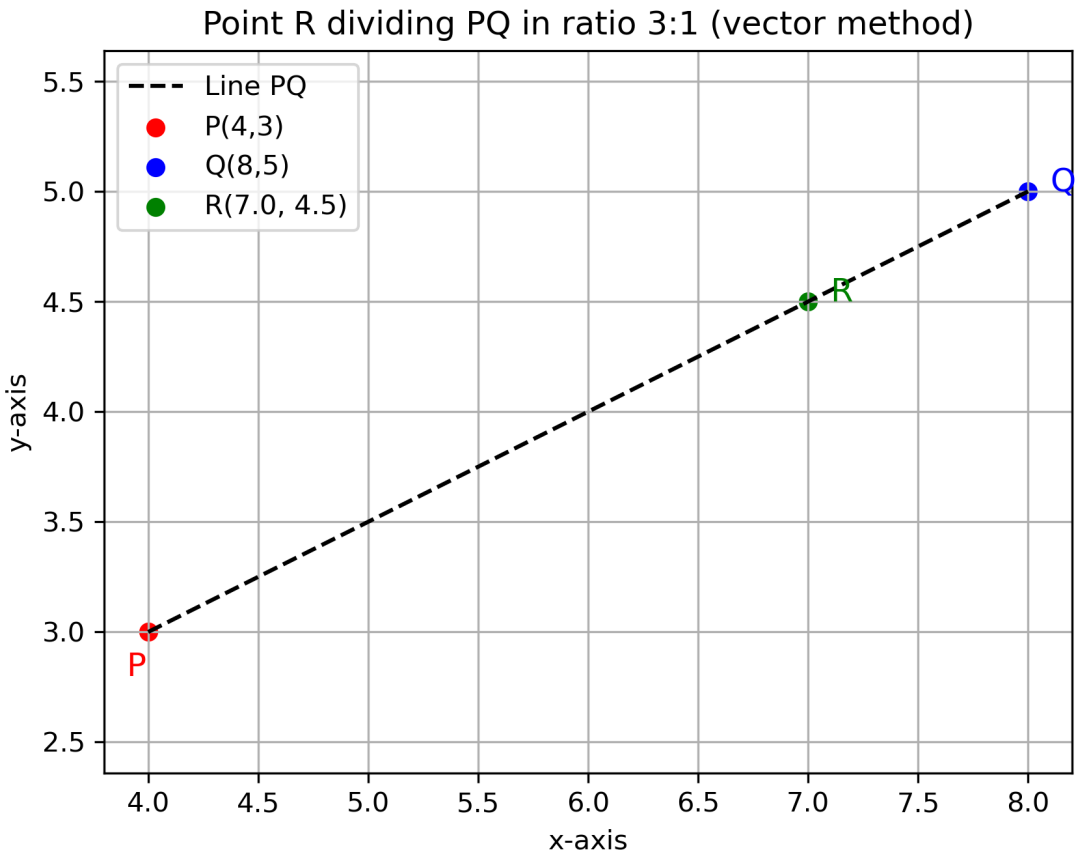
$$\mathbf{R}=\frac{3\begin{pmatrix}8\\5\end{pmatrix}+\begin{pmatrix}4\\3\end{pmatrix}}{4}$$

Therefore, the required point is

$$\boxed{\mathbf{R}=\begin{pmatrix}7\\\frac{9}{2}\end{pmatrix}}$$

which indeed satisfies

$$\mathbf{R}-\mathbf{P}=3(\mathbf{Q}-\mathbf{P}) \tag{2}$$


Point R dividing PQ in ratio 3:1 (vector method)
Line PQ
P(4,3)
Q(8,5)
R(7.0, 4.5)
P
Q
R
y-axis
x-axis
5.5
5.0
4.5
4.0
3.5
3.0
2.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0

j

Figure 1