1 NCERT 12.10.5.9

Find the position vector of a point R which divides the line joining two points P and Q whose Position Vectors are $2\mathbf{a}+\mathbf{b}$ and $\mathbf{a}-3\mathbf{b}$ externally in the ratio $1:2$.Also, Show that P is the mid point of the line segment QR
Solution: The coordinates and ratio are given in 1

Symbol	Value	Description
$\mathbf{P}$	$\begin{pmatrix}2\\1\end{pmatrix}$	Position vector P
$\mathbf{Q}$	$\begin{pmatrix}1\\-3\end{pmatrix}$	Position vector Q
k	2	Ratio

Table 1: Position vectors P,Q and Ratio K

Using section formula

$$\mathbf{R}=\frac{\mathbf{Q}-k.\mathbf{P}}{1-k} \tag{1}$$

$$\mathbf{R}=\frac{\begin{pmatrix}1\\-3\end{pmatrix}-2\begin{pmatrix}2\\1\end{pmatrix}}{1-2} \tag{2}$$

$$\mathbf{R}=\begin{pmatrix}3\\5\end{pmatrix} \tag{3}$$

Position vector R which is a External point

Symbol	Value	Description
$\mathbf{R}$	$\begin{pmatrix}3\\5\end{pmatrix}$	Position vector R

Table 2: Position vector R

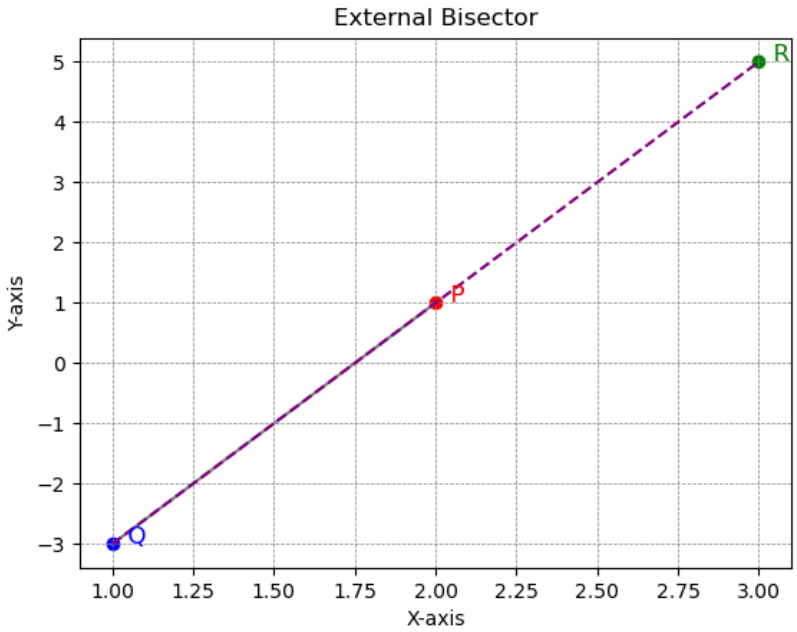

Figure 1: point vectors A,B,C