VECTORS

12^{th} Maths - Chapter 10 - EXERCISE 5.9

1. Find the position vector of a point **R** which divides the line joining two points **P** and **Q** whose position vectors are $\mathbf{P} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ and $\mathbf{Q} = \begin{pmatrix} 1 \\ -3 \end{pmatrix}$ externally in the ratio 1:2.Also show that **P** is the midpoint of the linesegment RQ.

   Solution:
   The input parameters for this problem are available in Table 1

Symbol	Value	Description
P	$\begin{pmatrix} 2 \\ 1 \end{pmatrix}$	First point
Q	$\begin{pmatrix} 1 \\ -3 \end{pmatrix}$	Second point

Table 1

R divides the line joining two points **P** and **Q**

$$\mathbf{P} = \begin{pmatrix} 2 \\ 1 \end{pmatrix} \tag{1}$$

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

When **R** divides line segment joining **P** and **Q** externally,

$$\mathbf{R} = \frac{1\mathbf{Q} - 2\mathbf{P}}{-1} \tag{3}$$

$$\mathbf{R} = \begin{pmatrix} 3 \\ 5 \end{pmatrix} \tag{4}$$

Also,
Let the midpoint of **R** and **Q** be **P** , Position vector of **P** is given by

$$\mathbf{P} = \frac{(\mathbf{R} + \mathbf{Q})}{2} = \begin{pmatrix} 2 \\ 1 \end{pmatrix} = \mathbf{P} \tag{5}$$

equation (5) is same as equation (1)

See Fig. 1.

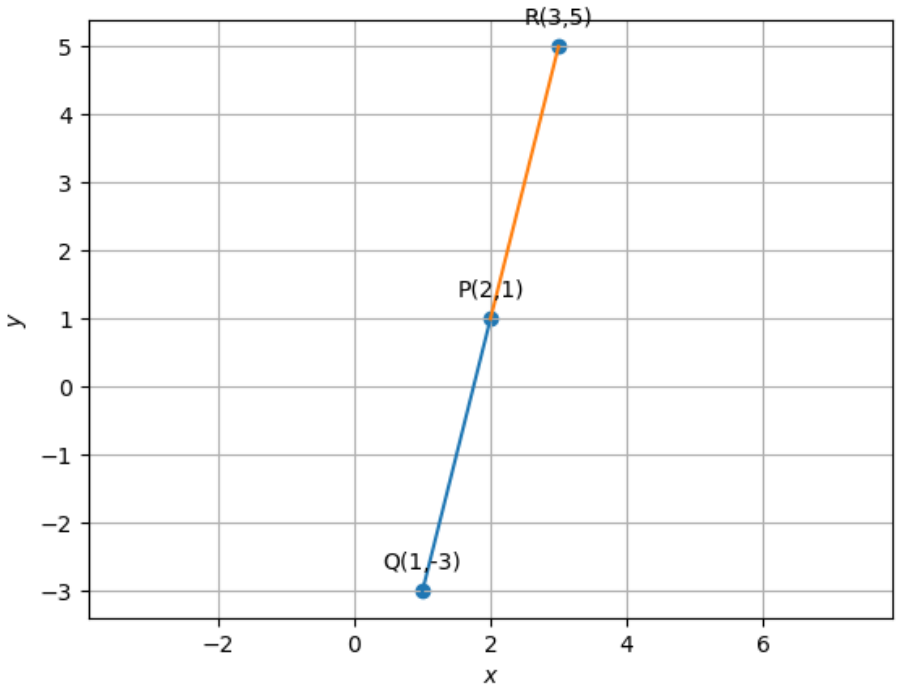

Figure 1