

VECTORS

12th 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 line segment 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**

$$\mathbf{P} = \begin{pmatrix} 2 \\ 1 \end{pmatrix} \quad (1)$$

$$\mathbf{Q} = \begin{pmatrix} 1 \\ -3 \end{pmatrix} \quad (2)$$

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

$$\mathbf{R} = \frac{1\mathbf{Q} - 2\mathbf{P}}{-1} \quad (3)$$

$$\mathbf{R} = \begin{pmatrix} 3 \\ 5 \end{pmatrix} \quad (4)$$

Also,

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

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

equation (1) is same as equation (5)