

# 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  $2\vec{a} + \vec{b}$  and  $\vec{a} - 3\vec{b}$  externally in the ration 1 : 2.Also, Show that P is the mid point of the line segment RQ

**Construction steps:**

1. Let us, Consider Position vectors and the ratio is

Symbol	value	Description
P	$\begin{pmatrix} x_1 \\ y_1 \end{pmatrix}$	position vector P
Q	$\begin{pmatrix} x_2 \\ y_2 \end{pmatrix}$	position vector Q

$$m : n \quad (1)$$

For finding the position vector R,

$$R = \frac{n(x_1, y_1) - m(x_2, y_2)}{n - m} \quad (2)$$

2. Now The position vectors P,Q and R are For showing P is the midpoint

symbol	Value	Description
R	$\begin{pmatrix} \frac{n.x_1 - m.x_2}{n - m} \\ \frac{n.y_1 - m.y_2}{n - m} \end{pmatrix}$	position vector P

of the line segms RQ

$$P = \frac{R + Q}{2} \quad (3)$$

$$P = \begin{pmatrix} x_1 \\ y_1 \end{pmatrix} \quad (4)$$

So,it is proved that P is the midpoint of RQ.

3. The Plot showing the Vector representation of the position vectors P,Q and R is

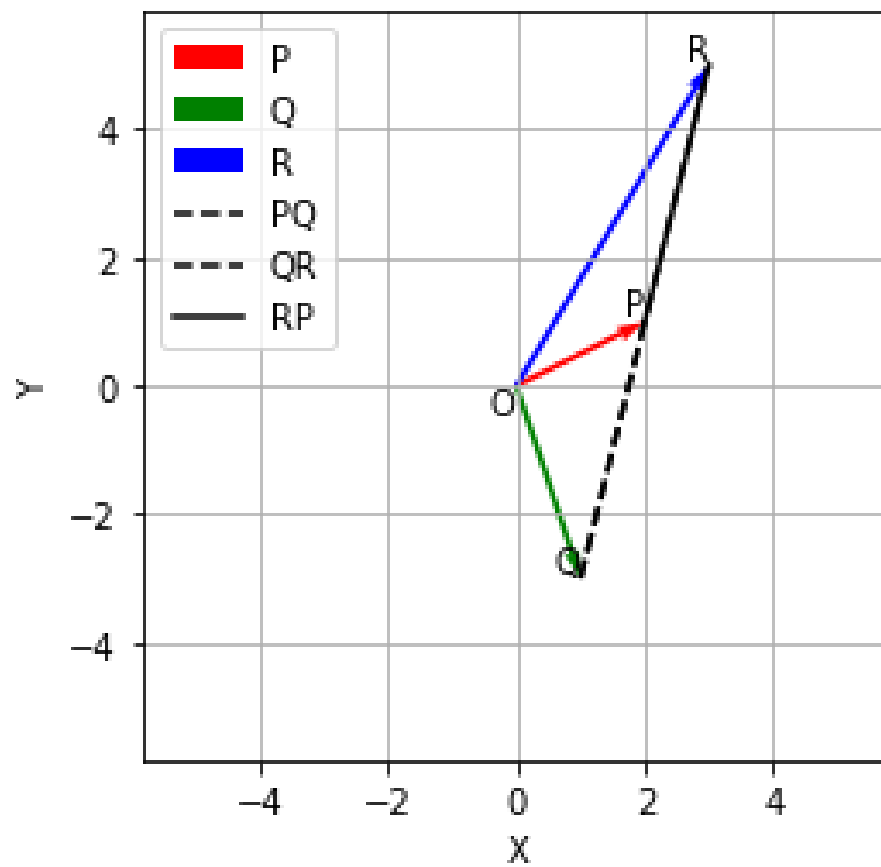


Figure 1: point vectors P,Q,R