

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
\vec{P}	$2\vec{a} + \vec{b}$	position vector P
\vec{Q}	$\vec{a} - 3\vec{b}$	position vector Q

$$m : n = 1 : 2 \quad (1)$$

For finding the position vector R,

$$\vec{R} = \frac{2(2\vec{a} + \vec{b}) - 1(\vec{a} - 3\vec{b})}{2 - 1} \quad (2)$$

$$\vec{R} = 3\vec{a} + 5\vec{b} \quad (3)$$

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

symbol	Value	Description
\vec{R}	$3\vec{a} + 5\vec{b}$	position vector R

of the line segment RQ

$$\vec{P} = \frac{\vec{R} + \vec{Q}}{2} \quad (4)$$

$$\vec{P} = 2\vec{a} + \vec{b} \quad (5)$$

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

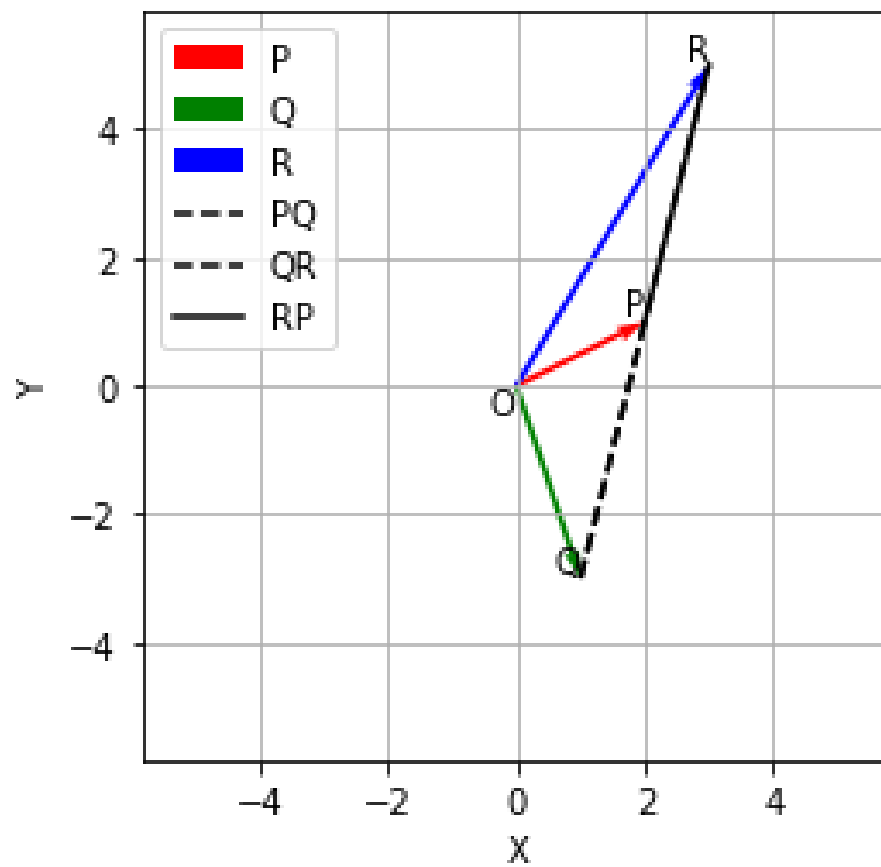


Figure 1: point vectors P,Q,R