

# 1.4.25

EE25BTECH11009 - Anshu kumar ram

**Question:**

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 ratio  $1 : 2$ .

**Solution:**

$$P = 2\vec{a} + \vec{b} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}, \quad (0.1)$$

$$Q = \vec{a} - 3\vec{b} = \begin{pmatrix} 1 \\ -3 \end{pmatrix}. \quad (0.2)$$

For external division of  $PQ$  in ratio  $1 : 2$ , the point  $R$  is given by

$$R = \frac{1 \cdot Q - 2 \cdot P}{1 - 2} \quad (0.3)$$

$$R = \frac{1}{-1} \left( \begin{pmatrix} 1 \\ -3 \end{pmatrix} - 2 \begin{pmatrix} 2 \\ 1 \end{pmatrix} \right) \quad (0.4)$$

$$= - \begin{pmatrix} 1 - 4 \\ -3 - 2 \end{pmatrix} \quad (0.5)$$

$$= - \begin{pmatrix} -3 \\ -5 \end{pmatrix} \quad (0.6)$$

$$= \begin{pmatrix} 3 \\ 5 \end{pmatrix}. \quad (0.7)$$

So the position vector is

$$R = 3\vec{a} + 5\vec{b} \quad (0.8)$$

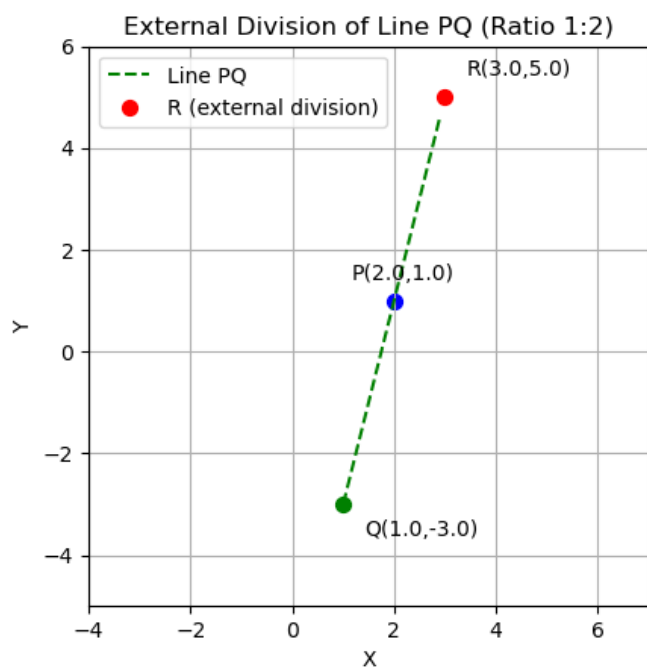


Fig. 0.1: plot