Coordinate Geometry

10^{th} Maths - Chapter 7

This is Problem-4 from Exercise 7.2

1. Find the ratio in which the line segement joining the points $\begin{pmatrix}-3\\10\end{pmatrix}$ and $\begin{pmatrix}6\\-8\end{pmatrix}$ is divided by $\begin{pmatrix}-1\\6\end{pmatrix}$.

   Solution:

   The input parameters for this problem are available in Table (1) Using

Symbol	Value	Description
P	$\begin{pmatrix}-3\\10\end{pmatrix}$	First point
Q	$\begin{pmatrix}6\\-8\end{pmatrix}$	Second point
R	$\begin{pmatrix}-1\\6\end{pmatrix}$	Desired point

Table 1

section formula,

$$\mathbf{R} = \frac{\mathbf{P} + n\mathbf{Q}}{1+n} \tag{1}$$

Substituting the values of $\mathbf{P}, \mathbf{Q}$ and $\mathbf{R}$ in (1)

$$\begin{pmatrix} -1 \\ 6 \end{pmatrix} = \frac{\begin{pmatrix} -3 \\ 10 \end{pmatrix} + n \begin{pmatrix} 6 \\ -8 \end{pmatrix}}{1+n} \tag{2}$$

$$\begin{pmatrix} -1 \\ 6 \end{pmatrix} = \frac{1}{1+n} \left(\begin{pmatrix} -3 \\ 10 \end{pmatrix} + n \begin{pmatrix} 6 \\ -8 \end{pmatrix} \right) \tag{3}$$

$$\begin{pmatrix} -1 \\ 6 \end{pmatrix} = \frac{1}{1+n} \begin{pmatrix} -3+6n \\ 10-8n \end{pmatrix} \tag{4}$$

Simplifying the (**??**) yeilds,

$$-1 = \frac{-3+6n}{1+n} \tag{5}$$

$$n = \frac{2}{7} \tag{6}$$

and also,

$$6 = \frac{10-8n}{1+n} \tag{7}$$

$$n = \frac{2}{7} \tag{8}$$

Hence the ratio n is $\frac{2}{7}$.

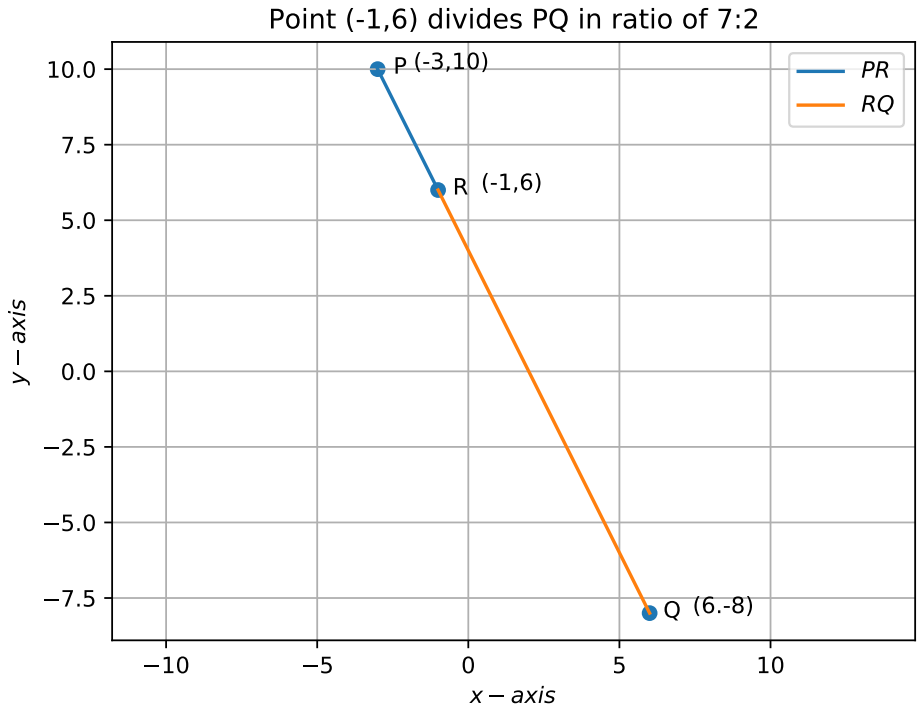
Point (-1,6) divides PQ in ratio of 7:2
P (-3,10)
R (-1,6)
Q (6.-8)
PR
RQ
10.0
7.5
5.0
2.5
0.0
−2.5
−5.0
−7.5
−10
−5
0
5
10
y − axis
x − axis

Figure 1