

# Question 1-1.4-9p

EE24BTECH11041 - Mohit

- 1) Let **A** (4, 2), **B** (6, 5) and **C** (1, 4) be the vertices of  $\Delta ABC$ . Find the coordinates of points **Q** and **R** on medians  $BE$  and  $CF$  respectively such that  $BQ : QE = 2 : 1$  and  $CR : RF = 2 : 1$ .

Variable	Description	Values
<b>A</b>	Points on triangle $\Delta ABC$	(4, 2)
<b>B</b>	Points on triangle $\Delta ABC$	(6, 5)
<b>C</b>	Points on triangle $\Delta ABC$	(1, 4)
<b>F</b>	Mid point of $AC$	
<b>E</b>	Mid point of $AB$	

TABLE 1: Variables Used

Solution:-

**F** is the mid point of  $AB$

$$\mathbf{F} = \frac{A + B}{2} = \frac{\begin{pmatrix} 4 \\ 2 \end{pmatrix} + \begin{pmatrix} 6 \\ 5 \end{pmatrix}}{2} = \begin{pmatrix} 5 \\ \frac{7}{2} \end{pmatrix} \quad (1.1)$$

**E** is the mid point of  $AC$

$$\mathbf{E} = \frac{A + C}{2} = \frac{\begin{pmatrix} 4 \\ 2 \end{pmatrix} + \begin{pmatrix} 1 \\ 4 \end{pmatrix}}{2} = \begin{pmatrix} \frac{5}{2} \\ \frac{3}{2} \end{pmatrix} \quad (1.2)$$

By section formula,

$$\mathbf{R} = \frac{B + KA}{1 + K} \quad (1.3)$$

It is given that  $\frac{BQ}{QE} = \frac{2}{1}$

So,

$$\mathbf{Q} = \frac{B + 2E}{1 + 2} = \frac{\begin{pmatrix} 6 \\ 5 \end{pmatrix} + 2\begin{pmatrix} \frac{5}{2} \\ \frac{3}{2} \end{pmatrix}}{3} = \begin{pmatrix} \frac{11}{3} \\ \frac{11}{3} \end{pmatrix} \quad (1.4)$$

It is given that  $\frac{CR}{RF} = \frac{2}{1}$

So,

$$\mathbf{R} = \frac{C + 2F}{1 + 2} = \frac{\begin{pmatrix} 1 \\ 4 \end{pmatrix} + 2\begin{pmatrix} 5 \\ \frac{7}{2} \end{pmatrix}}{3} = \begin{pmatrix} \frac{11}{3} \\ \frac{11}{3} \end{pmatrix} \quad (1.5)$$

Hence, Co-ordinates of  $\mathbf{Q}$  and  $\mathbf{R}$  are

$$\mathbf{Q}\left(\frac{11}{3}, \frac{11}{3}\right) \text{ and } \mathbf{R}\left(\frac{11}{3}, \frac{11}{3}\right) \quad (1.6)$$

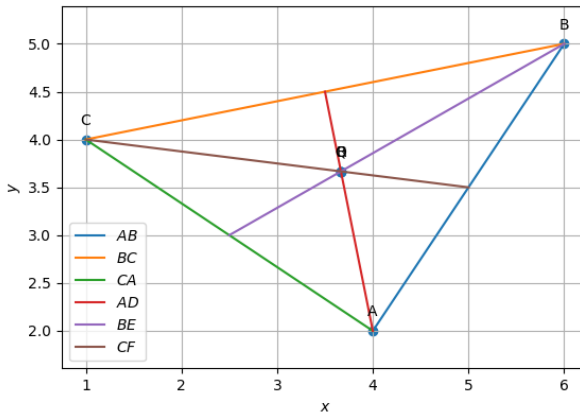


Fig. 1.1: Plot of Triangle ABC