

# Question 1-1.4-9p

EE24BTECH11041 - Mohit

- 1) Let  $\mathbf{A} \begin{pmatrix} 4 \\ 2 \end{pmatrix}$ ,  $\mathbf{B} \begin{pmatrix} 6 \\ 5 \end{pmatrix}$  and  $\mathbf{C} \begin{pmatrix} 1 \\ 4 \end{pmatrix}$  be the vertices of  $\Delta ABC$ . Find the coordinates of points  $\mathbf{Q}$  and  $\mathbf{R}$  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 $\Delta ABC$	$\begin{pmatrix} 4 \\ 2 \end{pmatrix}$
<b>B</b>	Points on triangle $\Delta ABC$	$\begin{pmatrix} 6 \\ 5 \end{pmatrix}$
<b>C</b>	Points on triangle $\Delta ABC$	$\begin{pmatrix} 1 \\ 4 \end{pmatrix}$
<b>F</b>	Mid point of $AC$	
<b>E</b>	Mid point of $AB$	

TABLE 1: Variables Used

Solution:-

$\mathbf{F}$  is the mid point of  $AB$

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

$\mathbf{E}$  is the mid point of  $AC$

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

By section formula,

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

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

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

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

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

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

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

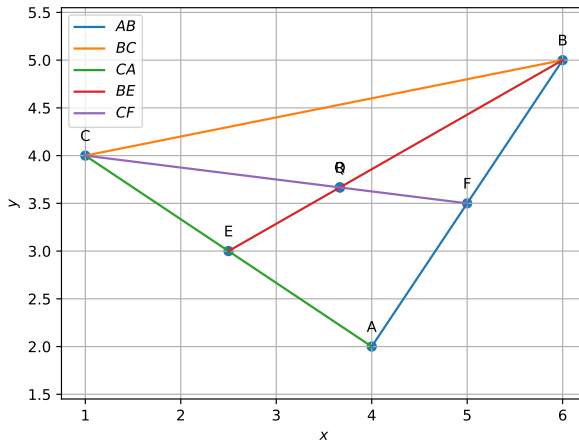


Fig. 1.1: Plot of Triangle  $ABC$