

# Solution to 1.2.1

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Question: If  $\mathbf{D}$  divides  $BC$  in the ratio  $k : 1$ ,

$$\mathbf{D} = \frac{k\mathbf{C} + \mathbf{B}}{k + 1} \quad (1)$$

Find the mid points  $\mathbf{D}$ ,  $\mathbf{E}$ ,  $\mathbf{F}$  of the sides  $BC$ ,  $CA$  and  $AB$  respectively.

Given:

$$\mathbf{A} = \begin{pmatrix} 1 \\ -1 \end{pmatrix} \quad (2)$$

$$\mathbf{B} = \begin{pmatrix} -4 \\ 6 \end{pmatrix} \quad (3)$$

$$\mathbf{C} = \begin{pmatrix} -3 \\ -5 \end{pmatrix} \quad (4)$$

Solution: Since  $\mathbf{D}$  is the midpoint of  $BC$ ,

$$\Rightarrow k = 1 \quad (5)$$

$$\Rightarrow \mathbf{D} = \frac{\mathbf{C} + \mathbf{B}}{2} \quad (6)$$

$$\mathbf{D} = \frac{1}{2} \begin{pmatrix} -7 \\ 1 \end{pmatrix} \quad (7)$$

Similarly,

$$\Rightarrow \mathbf{E} = \frac{\mathbf{A} + \mathbf{C}}{2} \quad (8)$$

$$\mathbf{E} = \begin{pmatrix} -1 \\ -3 \end{pmatrix} \quad (9)$$

$$\Rightarrow \mathbf{F} = \frac{\mathbf{A} + \mathbf{B}}{2} \quad (10)$$

$$\mathbf{F} = \frac{1}{2} \begin{pmatrix} -3 \\ 5 \end{pmatrix} \quad (11)$$