

Solution of 1.3.2

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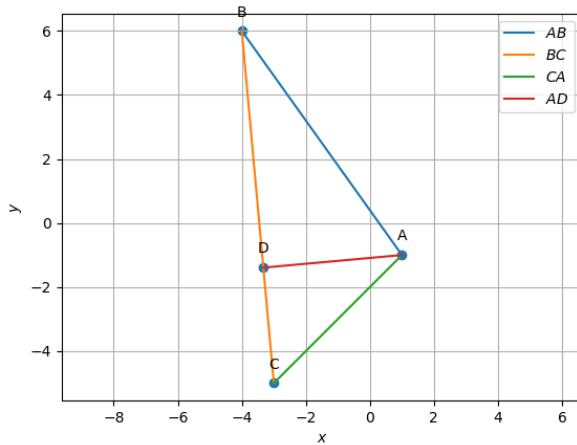


Fig. 0. Line AD

Question:- We are given the three vertices of a triangle (A, B, C) . D_1 is a point on line BC such that AD is perpendicular to BC . Find the equation of AD .

Solution:

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

$$\mathbf{B} = \begin{pmatrix} -4 \\ 6 \end{pmatrix} \quad (2)$$

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

From previous results, the normal vector of AD :-

$$\mathbf{n} = \begin{pmatrix} -1 \\ 11 \end{pmatrix} \quad (4)$$

Now, normal form of line AD is:-

$$\Rightarrow \mathbf{n}^T(\mathbf{x} - \mathbf{A}) = 0 \quad (5)$$

$$\Rightarrow \mathbf{n}^T \mathbf{x} = \mathbf{n}^T \mathbf{A} \quad (6)$$

$$\Rightarrow \begin{pmatrix} -1 & 11 \end{pmatrix} \mathbf{x} = \begin{pmatrix} -1 & 11 \end{pmatrix} \begin{pmatrix} 1 \\ -1 \end{pmatrix} \quad (7)$$

$$\Rightarrow \begin{pmatrix} -1 & 11 \end{pmatrix} \mathbf{x} = -12 \quad (8)$$