

1.9.2

EE24BTECH11021 - Eshan Ray

Question:

The point on the X axis which is equidistant from $(-4, 0)$ and $(10, 0)$ is...

Solution:

Variable	Description	Formula
$\mathbf{B}(-4, 0)$	coordinates of first point	—
$\mathbf{C}(10, 0)$	coordinates of second point	—
$\mathbf{A}(a, 0)$	Equidistant point of \mathbf{B} and \mathbf{C} on X axis	—

TABLE 0: Input parameters

$$\|\mathbf{B} - \mathbf{A}\|^2 = \|\mathbf{C} - \mathbf{A}\|^2 \quad (1)$$

$$\Rightarrow \mathbf{B}^2 + \mathbf{A}^2 - 2\mathbf{A}\mathbf{B}^\top = \mathbf{C}^2 + \mathbf{A}^2 - 2\mathbf{A}\mathbf{C}^\top \quad (2)$$

$$\Rightarrow \mathbf{A}(\mathbf{C}^\top - \mathbf{B}^\top) = \frac{\mathbf{C}^2 - \mathbf{B}^2}{2} \quad (3)$$

$$\Rightarrow \mathbf{A}((10 \ 0) - (-4 \ 0)) = \frac{100 - 16}{2} \quad (4)$$

$$\Rightarrow \begin{pmatrix} a \\ 0 \end{pmatrix} (14 \ 0) = \frac{84}{2} \quad (5)$$

$$\Rightarrow 14a = 42 \quad (6)$$

$$\Rightarrow a = 3 \quad (7)$$

$$\therefore \mathbf{A} = \begin{pmatrix} 3 \\ 0 \end{pmatrix} \quad (8)$$

The point equidistant from $(-4, 0)$ and $(10, 0)$ is $(3, 0)$.

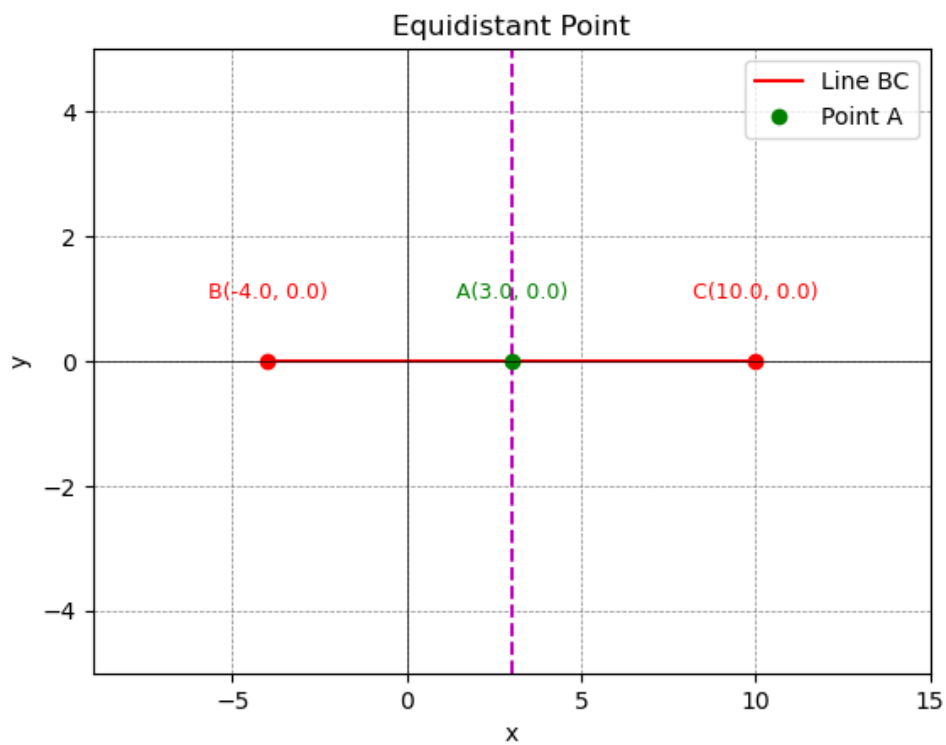


Fig. 0