

1.9.3

EE24BTECH11021 - Eshan Ray

Question:

AOBC is a rectangle whose three vertices are (0, -3), (0, 0) and (4, 0). The length of its diagonal is...

Solution:

| Variable | Description | Formula |
|---------------------|--------------------------------------|---------|
| $\mathbf{A}(0, -3)$ | coordinates of first point | – |
| $\mathbf{O}(0, 0)$ | coordinates of second point | – |
| $\mathbf{B}(4, 0)$ | coordinates of third point | – |
| a | side length of OB in $\triangle AOB$ | – |
| b | side length of OA in $\triangle AOB$ | – |
| l | side length of AB in $\triangle AOB$ | – |

TABLE 0: Input parameters

In a rectangle any 3 adjacent points form a right triangle, where the hypotenuse is the diagonal.

So, in $\triangle AOB$,

$$l = \|\mathbf{A} - \mathbf{B}\| \quad (1)$$

$$\Rightarrow l = \sqrt{(\mathbf{A} - \mathbf{B})^T (\mathbf{A} - \mathbf{B})} \quad (2)$$

$$\Rightarrow l = \sqrt{\begin{pmatrix} -4 & -3 \end{pmatrix} \begin{pmatrix} -4 \\ -3 \end{pmatrix}} \quad (3)$$

$$\Rightarrow l = \sqrt{25} \quad (4)$$

$$\Rightarrow l = 5 \quad (5)$$

$$\text{Similarly, } a = \|\mathbf{B} - \mathbf{O}\| \quad (6)$$

$$\Rightarrow a = \sqrt{(4^2)} \quad (7)$$

$$\Rightarrow a = 4 \quad (8)$$

$$\text{and, } b = \|\mathbf{A} - \mathbf{O}\| \quad (9)$$

$$\Rightarrow b = \sqrt{(3^2)} \quad (10)$$

$$\Rightarrow b = 3 \quad (11)$$

$l = 5$ is the greatest length of $\triangle AOB$.

\therefore The length of diagonal of rectangle AOBC = 5.

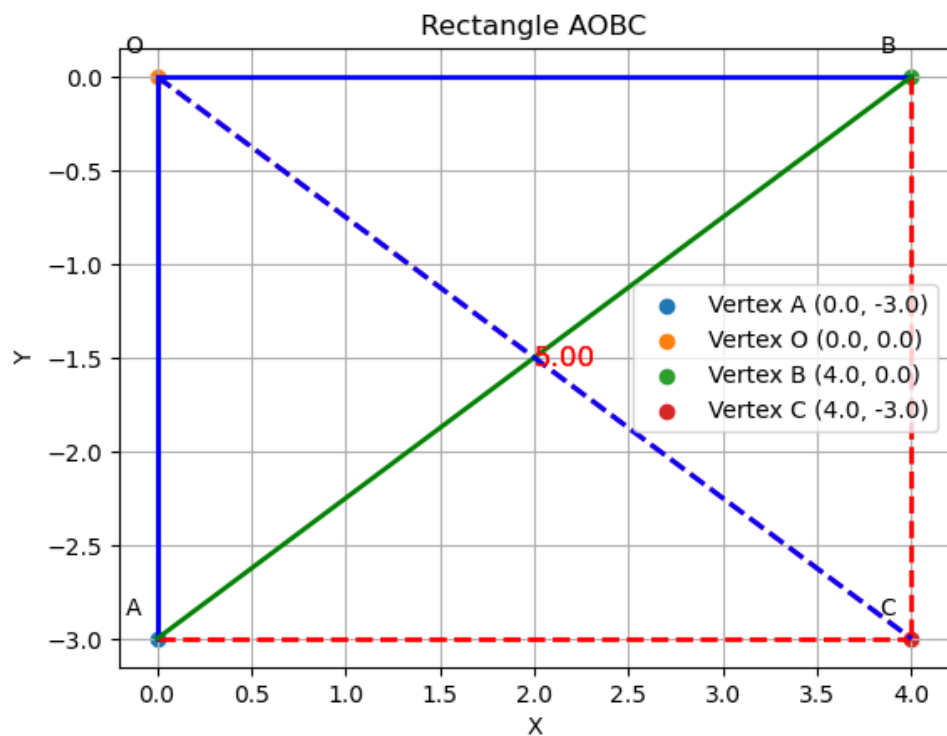


Fig. 0