

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
$\mathbf{A}(0, -3)$	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 $\triangle AOB$,

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

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

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

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

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

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

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

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

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

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

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

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

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

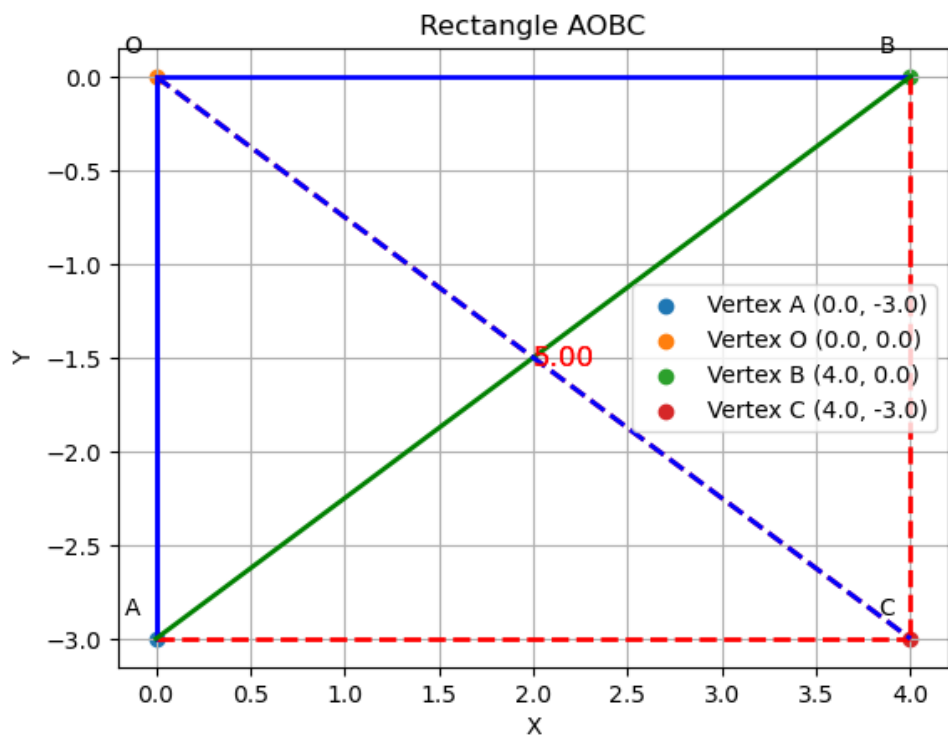


Fig. 0