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 $\triangle AOB$,

$$l = \|\mathbf{A} - \mathbf{B}\| \tag{1}$$

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

$$\implies l = \sqrt{\begin{pmatrix} -4 & -3 \end{pmatrix} \begin{pmatrix} -4 \\ -3 \end{pmatrix}} \tag{3}$$

$$\implies l = \sqrt{25} \tag{4}$$

$$\implies l = 5 \tag{5}$$

$$Similarly, a = \|\mathbf{B} - \mathbf{O}\| \tag{6}$$

$$\implies a = \sqrt{(4^2)} \tag{7}$$

$$\implies a = 4 \tag{8}$$

$$and, b = \|\mathbf{A} - \mathbf{O}\| \tag{9}$$

$$\implies b = \sqrt{(3^2)} \tag{10}$$

$$\implies b = 3 \tag{11}$$

$l = 5$ is the greatest length of $\triangle AOB$.
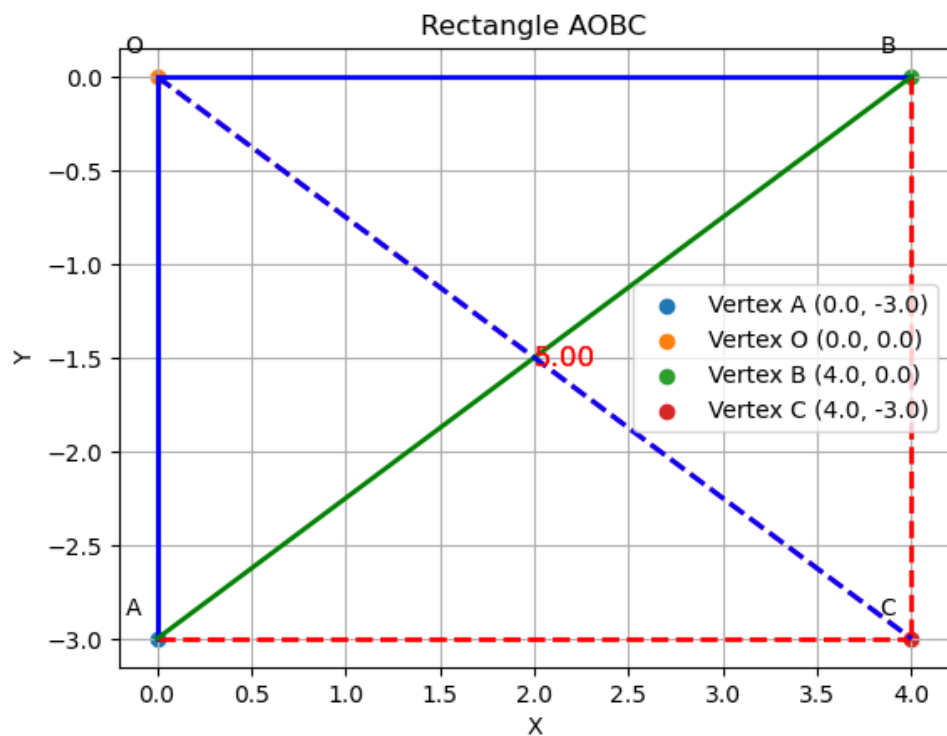
$\therefore$ The length of diagonal of rectangle AOBC = 5.

Fig. 0