# 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 $AOBC = 5$.

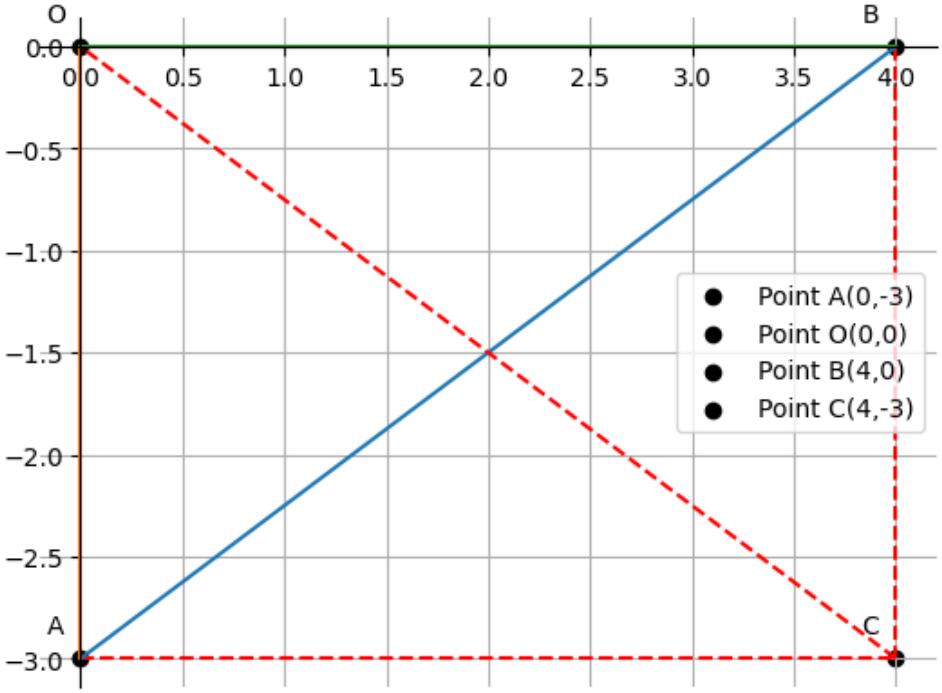


Fig. 0: Rectangle AOBC