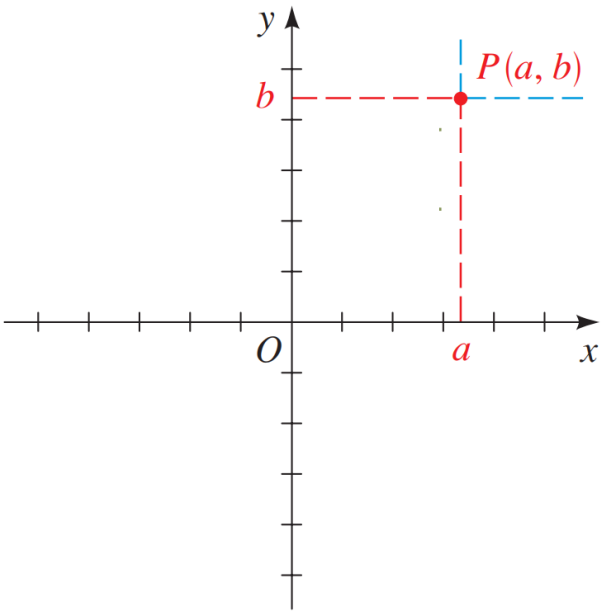
The Coordinate Plane

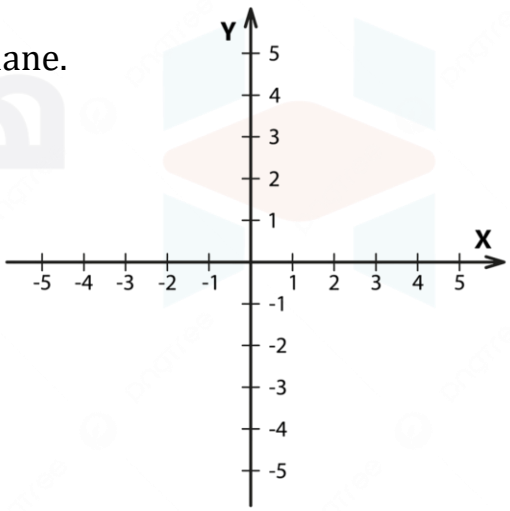


$a \Rightarrow x$-coordinate

$b \Rightarrow y$-coordinate

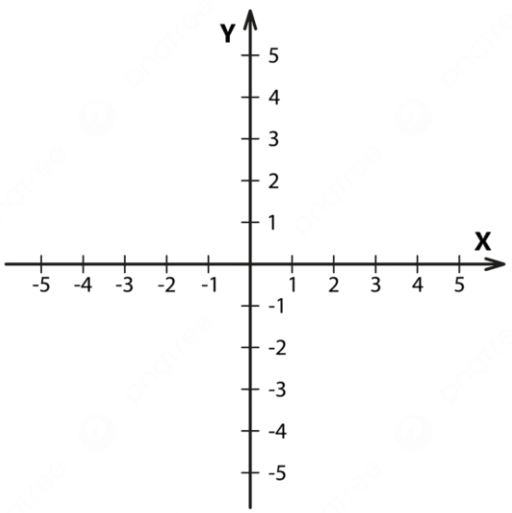
Example 1: Plot the given points in a coordinate plane.

$(0, 5), (-1, 0)$



Example 2: Sketch the region given by the set.

$\{(x, y) \mid x \leq 2\}$



The Distance and Midpoint Formulas

Distance Formula

The distance between the points $A(x_1, y_1)$ and $B(x_2, y_2)$ in is

$$d(A,B) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Horizontal distance: $d(A,B) = |x_2 - x_1|$

Vertical distance: $d(A,B) = |y_2 - y_1|$

Midpoint Formula

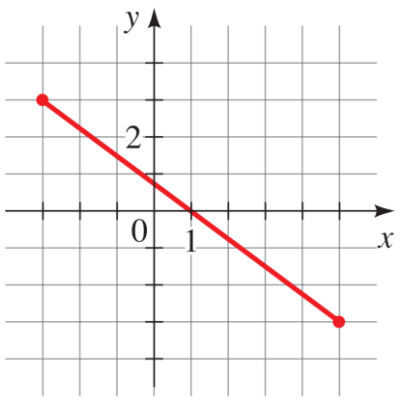
The midpoint of the line segment from $A(x_1, y_1)$ to $B(x_2, y_2)$ is

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Example 3: Find the distance between the points and Find the midpoint of the segment that joins them.

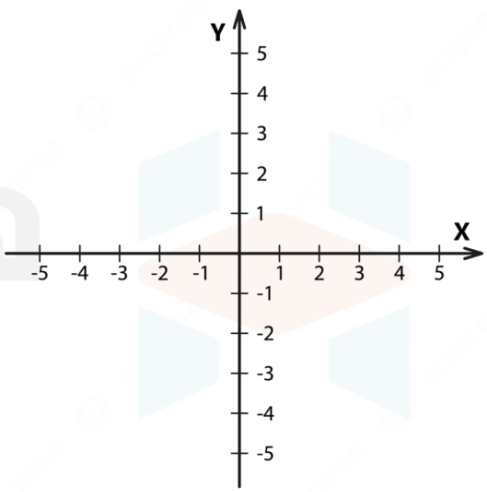
$$(16, -2), (-6, 2)$$

Example 4: A pair of points is graphed. (a) Find the distance between them. (b) Find the midpoint of the segment that joins them.

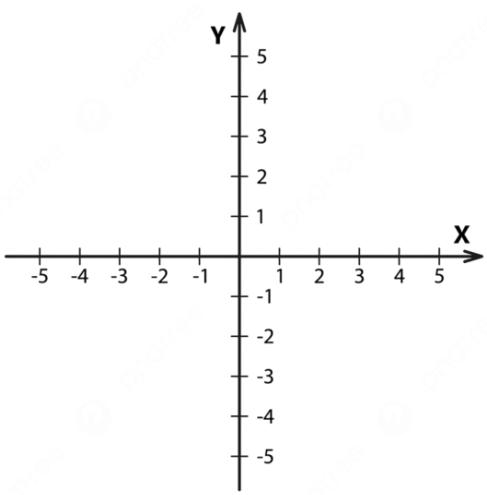


Example 5: Which of the points $A(6,7)$ or $B(-5,8)$ is closer to the origin?

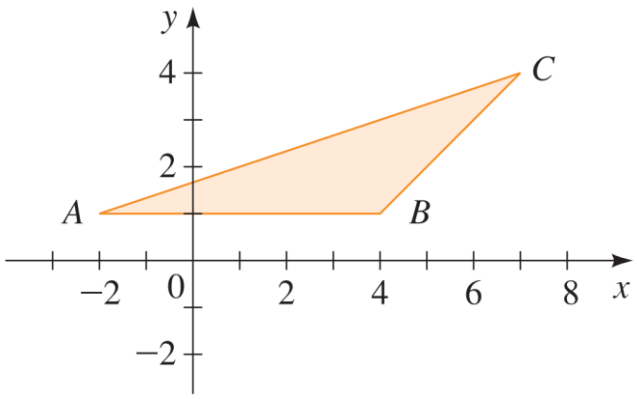
Example 6: Draw the rectangle with vertices $A(1,3), B(5,3), C(1,-3)$, and $D(5,-3)$ on a coordinate plane. Find the area of the rectangle.



Example 7: Draw the parallelogram with vertices $A(1,2), B(5,2), C(3,6)$, and $D(7,6)$ on a coordinate plane. Find the area of the parallelogram.



Example 8: Find the area of the triangle shown in the figure.



Example 9: If $M(6,8)$ is the midpoint of the line segment AB and if A has coordinates $(2,3)$, find the coordinates of B.