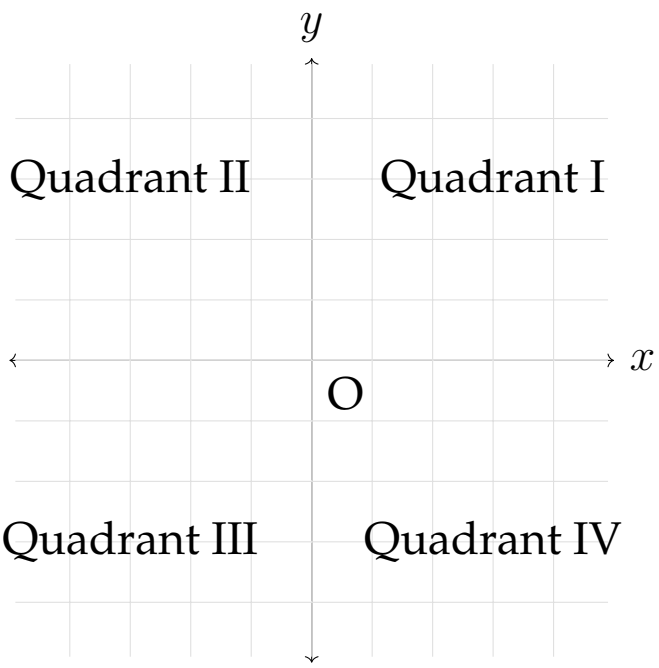
Day 4 Notes
Thursday Jan 30th
2.1 The coordinate system

1. Introduction to the Coordinate System

The rectangular coordinate system (also called the Cartesian plane) consists of two perpendicular number lines:

- The horizontal line is called the _____
- The vertical line is called the _____
- The point where these lines intersect is called the _____



Quadrants:

- Quadrant I: Both x and y are _____
- Quadrant II: x is _____ and y is _____
- Quadrant III: Both x and y are _____
- Quadrant IV: x is _____ and y is _____

Plotting Points: Any point in the plane can be written as an ordered pair (x, y) where:

- x represents the _____
- y represents the _____

2. Distance and Midpoint Formulas

Distance Formula: The distance d between two points (x_1, y_1) and (x_2, y_2) is:

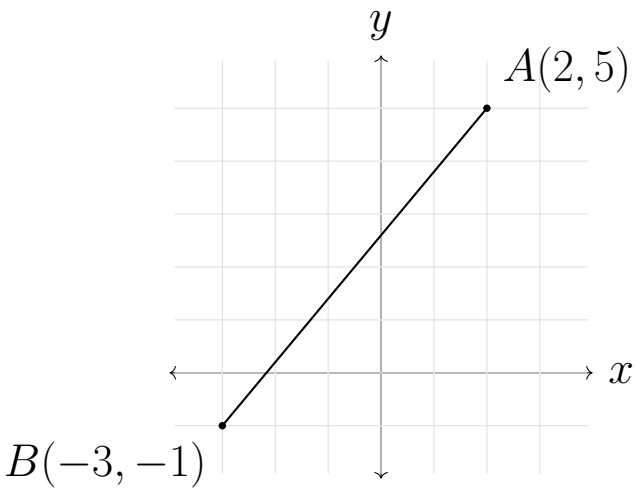
$$\boxed{d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}}$$

Midpoint Formula: The midpoint $M(x, y)$ of a line segment with endpoints (x_1, y_1) and (x_2, y_2) is:

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

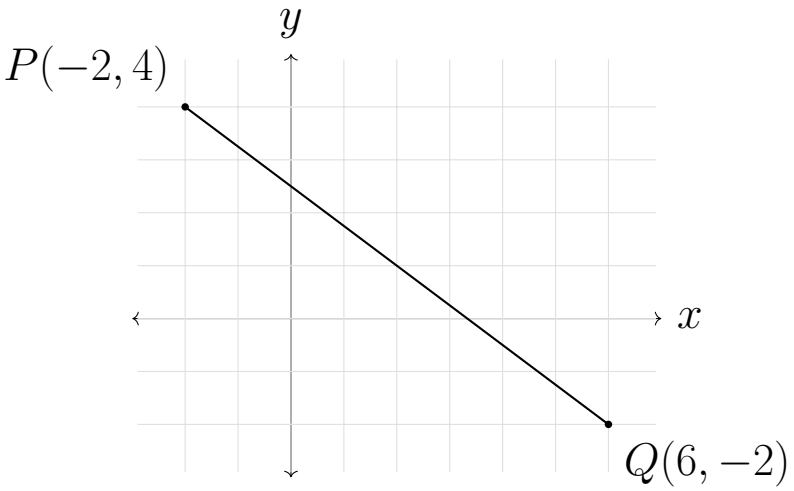
3. Examples

Example 1: Find the distance between points $A(2, 5)$ and $B(-3, -1)$



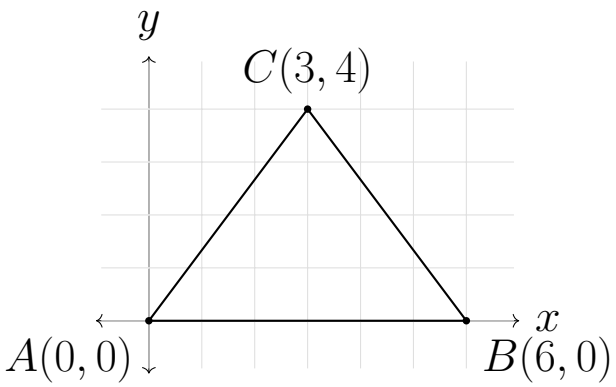
Solution:

Example 2: Find the midpoint of the line segment with endpoints $P(-2, 4)$ and $Q(6, -2)$



Solution:

Example 3: Determine if triangle ABC with vertices $A(0, 0)$, $B(6, 0)$, and $C(3, 4)$ is a right triangle.



Solution:

Practice Problems:

1. Plot the points $A(-3, 4)$, $B(2, -1)$, and $C(5, 3)$. Label which quadrant each point is in.

2. Find the distance between points $(1, 7)$ and $(4, -2)$.