

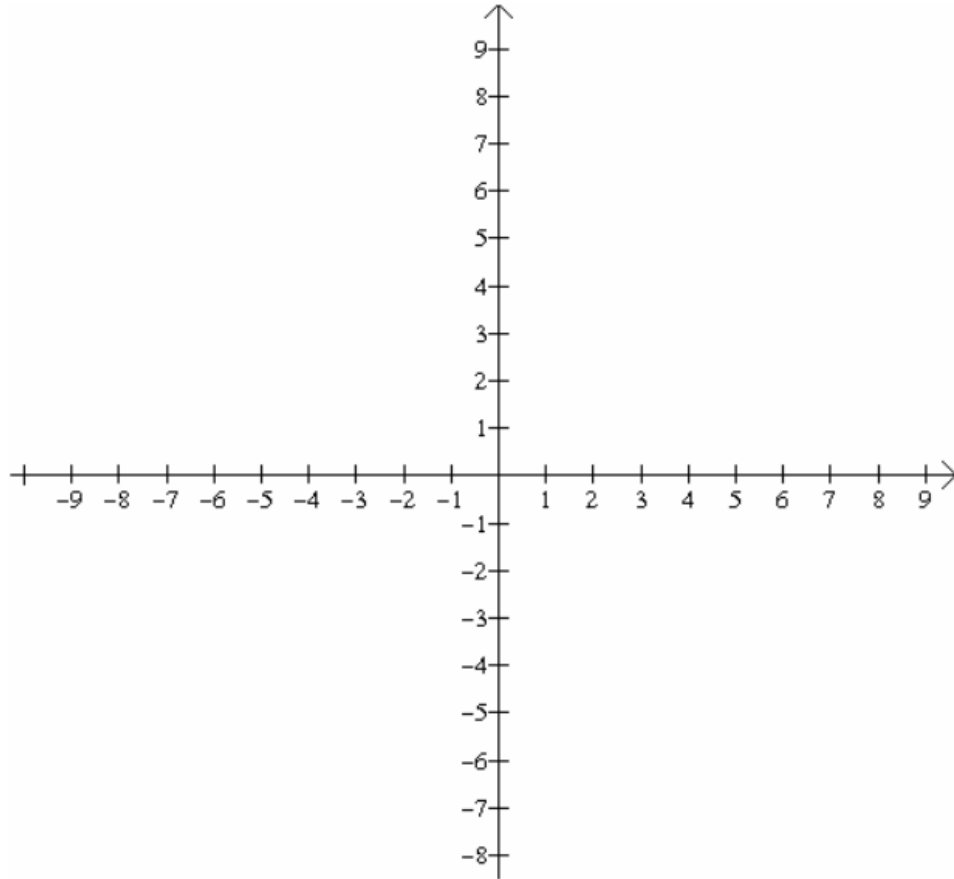
MATH 1314

Section 1.1

Section 1.1: Points, Regions, Distance and Midpoints

Graphing Points and Regions

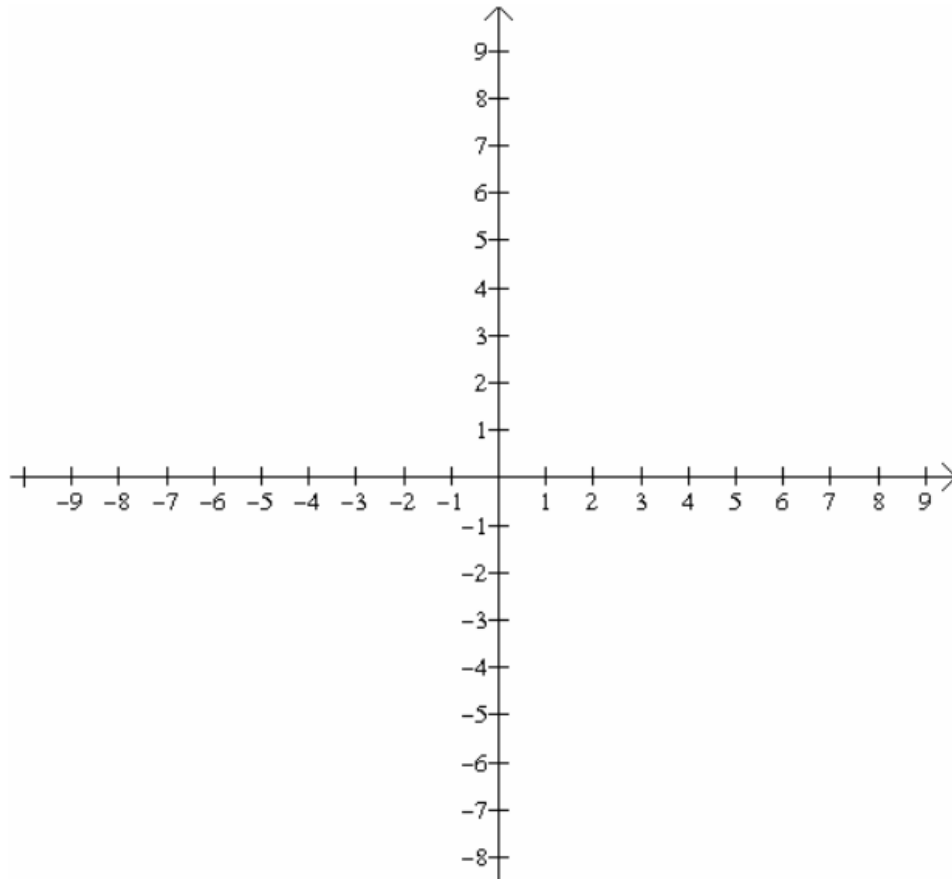
Here's the coordinate plane:



Section 1.1: Points, Regions, Distance and Midpoints

Graphing Points and Regions

Here's the coordinate plane:



As we see the plane consists of two perpendicular lines, the x-axis and the y-axis. These two lines separate them into four regions, or quadrants.

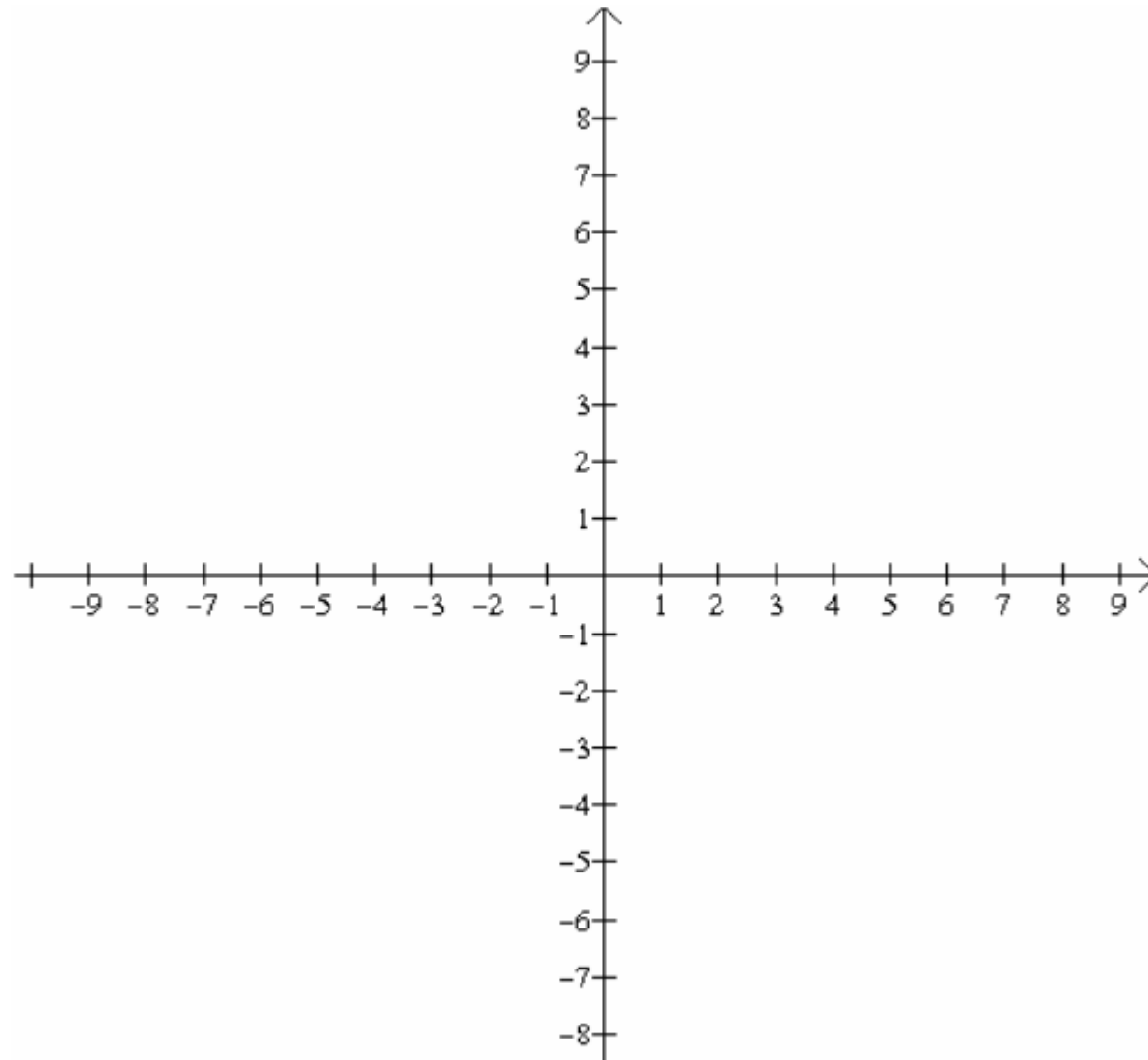
The pair, (x, y) , is called an ordered pair. It corresponds to a single unique point in the coordinate plane. The first number is called the x coordinate, and the second number is called the y coordinate.

The ordered pair $(0, 0)$ is referred to as the origin.

The x coordinate tells us the horizontal distance a point is from the origin. The y coordinate tells us the vertical distance a point is from the origin. You'll move right or up for positive coordinates and left or down for negative coordinates.

Example: Plot the following points.

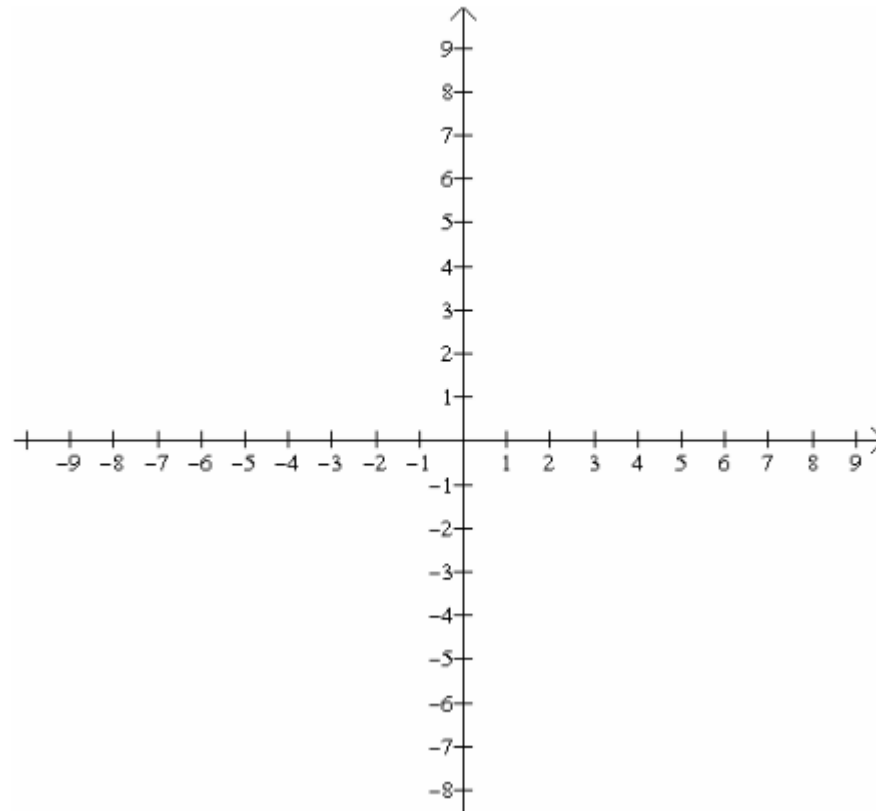
- A. $(8,6)$
- B. $(-2,4)$
- C. $(2,5)$
- D. $(-3,-7)$
- E. $(2,-3)$
- F. $(-5,3)$



Graphing Regions in the Coordinate Plane

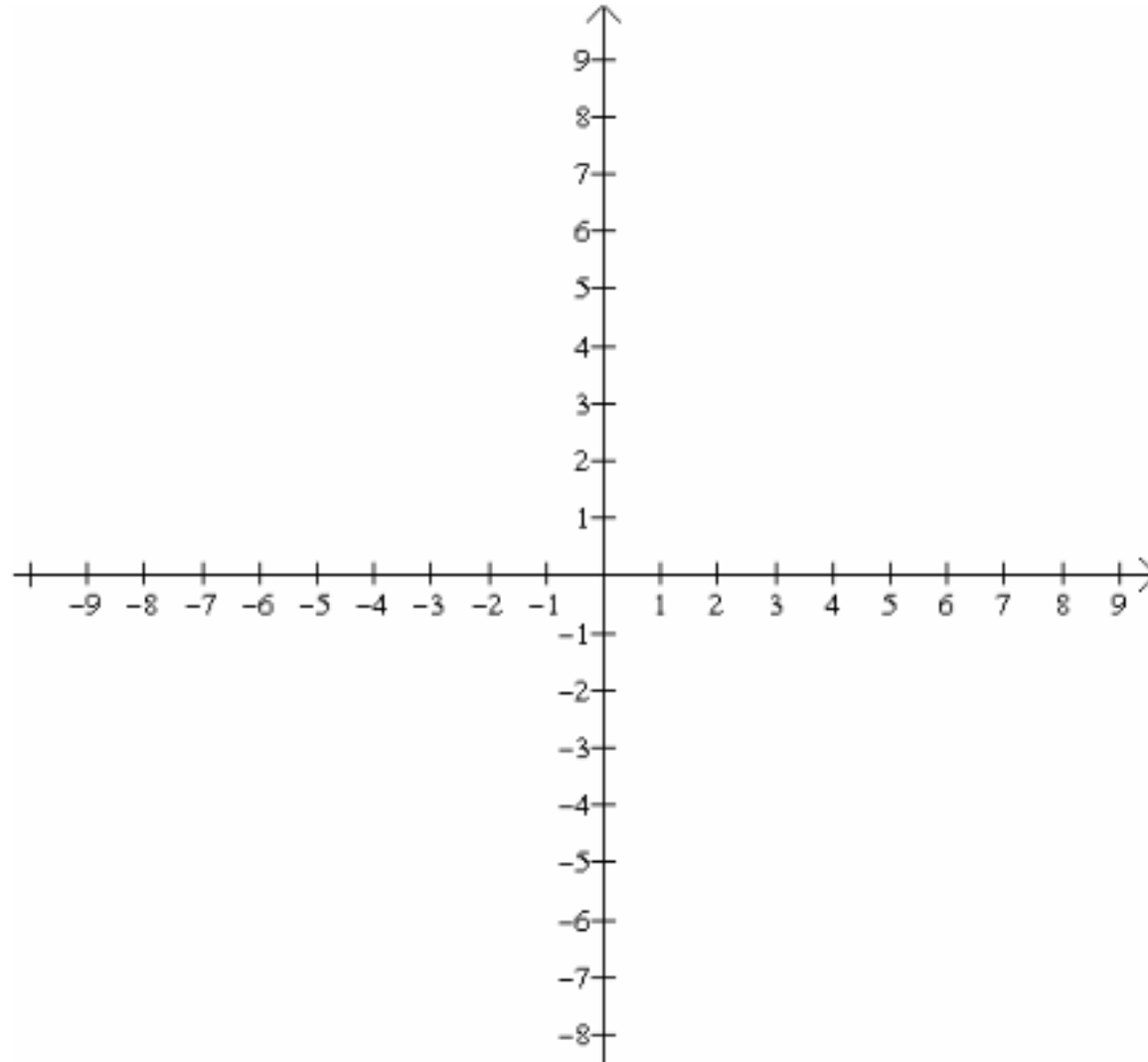
The set of all points in the coordinate plane with y coordinate k is the **horizontal line $y = k$**

The set of all points in the coordinate plane with x coordinate k is the **vertical line $x = k$**



Graphing Regions in the Coordinate Plane

Example: Graph $\{(x, y) \mid x > 4 \text{ and } y \leq 3\}$.



The Distance Formula

For any two points (x_1, y_1) and (x_2, y_2) , the distance between them is given by

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

Example: Find the distance between the following pair of points.

- a) $(-3, 1)$ & $(1, 3)$

b) $(2\sqrt{3}, 5\sqrt{6})$ & $(-\sqrt{3}, \sqrt{6})$

The Midpoint Formula

Midpoint Formula

The midpoint of the line segment joining the two points (x_1, y_1) and (x_2, y_2) is given by

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

Example: Find the midpoint between the following pair of points.

- a) $(-3,1)$ & $(1,3)$

b) $(2\sqrt{3}, 5\sqrt{6})$ & $(-\sqrt{3}, \sqrt{6})$