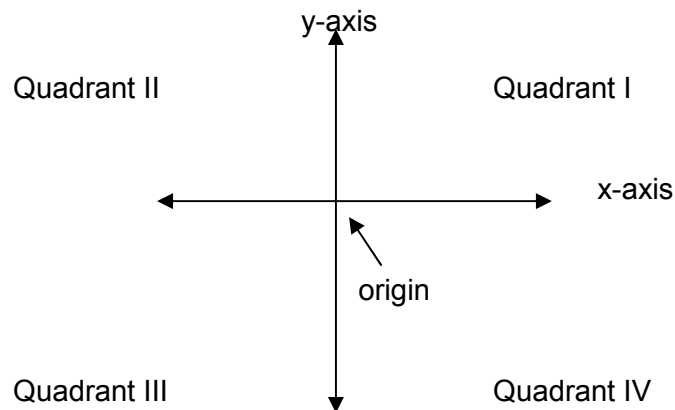


The Coordinate System Is Our Friend

The Cartesian Coordinate System

If x and y are real numbers then (x, y) is called an **ordered pair** of real numbers.

The numbers x and y are the **coordinates** of the ordered pair, with x being the **first coordinate** or **abscissa**, and y being the **second coordinate** or **ordinate**.



The point of intersection of the two axes is named the **origin**. The origin is the point $(0,0)$.

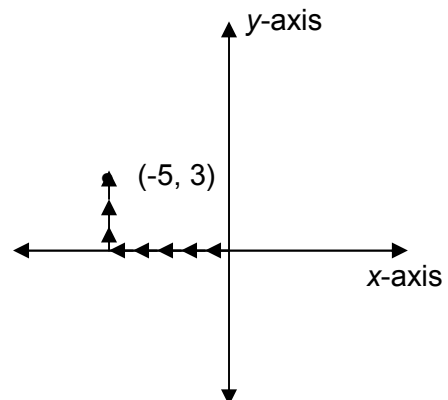
Keep in mind that **each ordered pair corresponds to exactly one point in the real plane and that each point in the plane corresponds to exactly one ordered pair.**

To plot a point:

1. Draw and label the axes. (If the axes are not already drawn for you.)
2. Start at the origin and move left or right based on the first component value in an ordered pair.
3. Then move up or down based on the second component.
4. Place the point.

Given the point $(-5, 3)$ Think $(\leftrightarrow, \updownarrow)$

(from the origin move left 5 spaces,
turn and move up 3 spaces)



Examples: Plot each ordered pair on a Cartesian coordinate system and name the quadrant where the point is located. You may label the point with the capital letter or the coordinates.

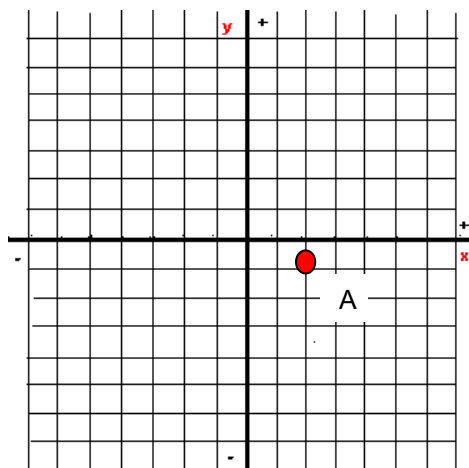
1. A (2,-1) **Quadrant IV**

2. B (0,3)

3. C (-2,4)

4. D (-4,0)

5. E $\left(\frac{1}{2}, -2\right)$



Solutions make equations true. A **solution** for an equation in two variables consists of an ordered pair (x, y) , two numbers that form a true statement when substituted into the equation.

Examples: Determine whether each ordered pair is a solution of the given equation. Replace the x with the x -value from the point and the y with the y -value from the point. Is the statement true? If the statement is true, then the ordered pair is a solution to the given equation. If the statement is false, then the ordered pair is not a solution to the given equation.

| | | | |
|----------------------------------|---------|---|-------------------------------|
| 6. $y = -2x + 5$; (1,3), (-2,3) | (1, 3) | $3 = -2(1) + 5$ $3 = -2 + 5$ $3 = 3$ | YES (1, 3) is a solution. |
| | (-2, 3) | $3 = -2(-2) + 5$ $3 = 4 + 5$ $3 \neq 9$ | NO (-2, 3) is not a solution. |

Now you try one.

7. $y = \sqrt[3]{x} - 4$; $(1, -3)$, $(8, 6)$

To Graph Equations:

To graph equations in two variables, plot ordered pairs (points) that make the equation true. Then draw a line (also called a curve) through the points.

Examples: For the following,

1. Find several points that make each equation true.
2. Plot the points.
3. Then draw a line or curve through the points to graph the equation.

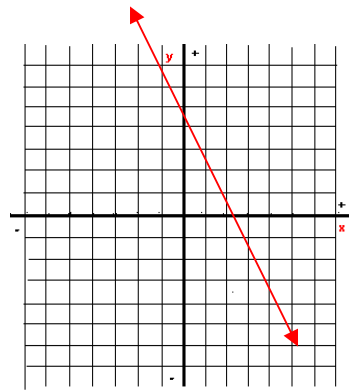
8. $y = -2x + 5$

| x | y |
|----|---|
| 1 | 3 |
| 0 | 5 |
| -1 | 7 |

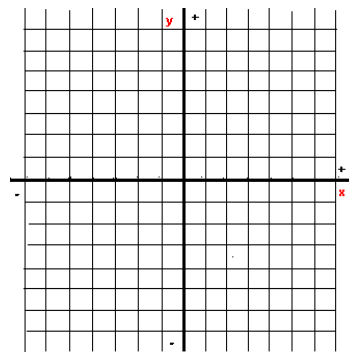
resulting ordered pair is $(1, 3)$

resulting ordered pair is $(0, 5)$

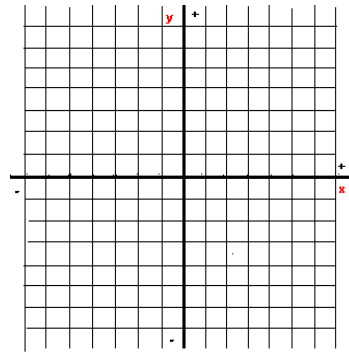
resulting ordered pair is $(-1, 7)$



9. $y = 2x - 3$



10. $y = x$



In summary, the Cartesian coordinate system is a plane formed by two number lines, a vertical number line and a horizontal number line. The location where these two number lines intersect is called the origin. To locate points on the coordinate system we use ordered pairs which consist of an x -coordinate and a y -coordinate. To plot a point on the coordinate system we use the x -coordinate to move left or right first and then the y -coordinate to locate our point up or down. Being able to plot a point is helpful when graphing equations. By plotting several points that make an equation true, we can connect those points and create a line.