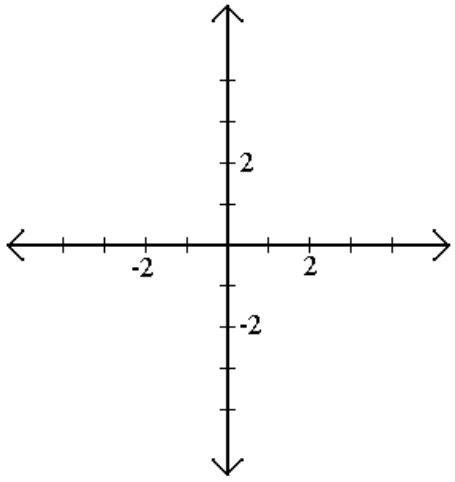
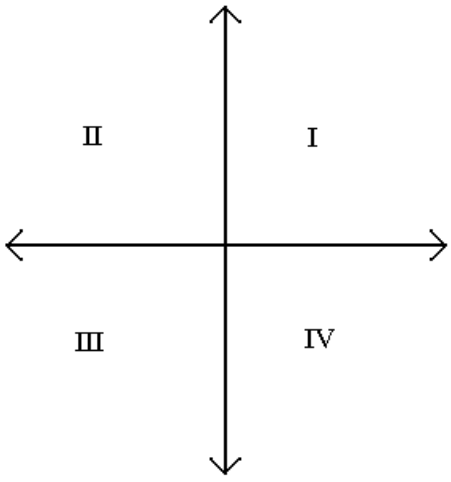
The Cartesian Coordinate System and Linear Equations in Two Variables

When graphing equations in two dimensions a rectangular coordinate system is used. This system is created when two number lines are placed perpendicular to each other, crossing at their zero values, (Graph A).



Graph A

In Graph B we see that four regions or *quadrants* are formed when the axis cross each other.



Graph B

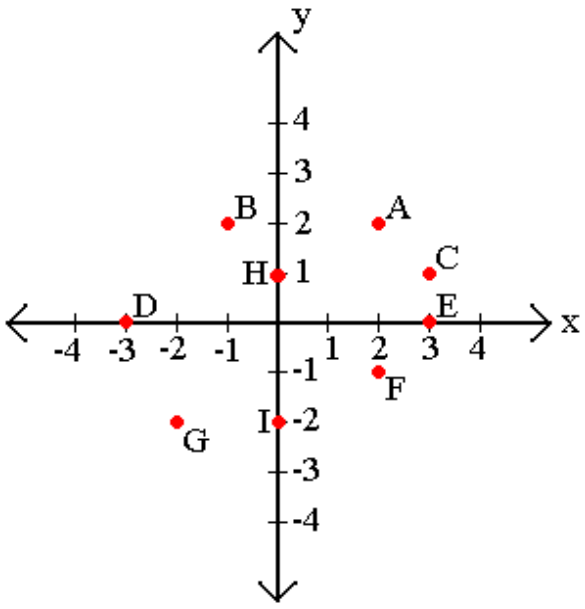
This graph shows how they named. Points that are found in a quadrant share their sign values with all other points in the same quadrant: **QI : (+, +) QII: (-, +) QIII: (-, -) QIV: (+, -)**

Another convention used is that each axis is given a letter designation, *x* for the horizontal axis and *y* for the vertical. Points are a set of ordered pair in the form of (*x*, *y*). These coordinate values are found by tracing their location first to the *x* axis and then to the *y*.

Example 1: Plot each point on the same axes.

A = (2, 2)	B = (-1, 2)	C = (3, 1)	D = (-3, 0)	E = (3, 0)
F = (2, –1)	G = (-2, -2)	H = (0, 1)	I = (0, -2)	

Solution



An equation such as y = 3x – 4 has two variables, x and y. The equation defines the relationship between these variables. The x variable is in independent variable and y is the dependent variable. The variable y is called the dependent variable because its value depends on the value of x.

From this equation we could produce ordered pairs (x, y) that are solutions of the equation. The collection of the ordered pairs is referred to as a relation.

The equation can then be used to determine if a set of ordered pairs are solutions for the given equation.

Example 2. Determine if the ordered pairs satisfy the equation $2x = y + 3$.
$(1, -1), (-3, -9), (0, 3)$

Solution:

$(1, -1)$	$(-3, -9)$	$(0, 3)$
$2x = y + 3$	$2x = y + 3$	$2x = y + 3$
$2(1) = -1 + 3$	$2(-3) = -9 + 3$	$2(0) = 3 + 3$
$2 = 2$	$-6 = -6$	$0 = 6$
true	true	false