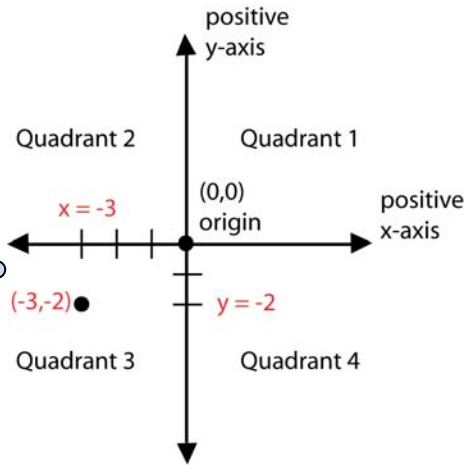
We will glance over some review topics and probably some new stuff for you.

College algebra
Intercepts and Symmetry (Section 2.2)

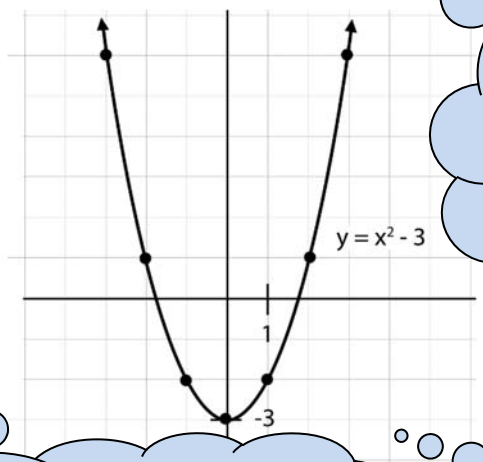
Cartesian Plane: The Cartesian plane (or simply the *xy*-plane) is shown below. Familiarize yourself with its parts. Remember a point's coordinates are alphabetical, x then y or (x, y).

The ***x* coordinate** tells you how far left or right from center the point is. The ***y* coordinate** tells you how far up or down from center the point is.



Graphs of Equations: The graph of an equation in two variables shows us every point (x, y) that satisfies the equation (or makes it true). Consider the equation $y = x^2 - 3$. Complete the table below and then look at the graph I have provided.

x	$y = x^2 - 3$
-3	
-2	
-1	
0	
1	
2	
3	



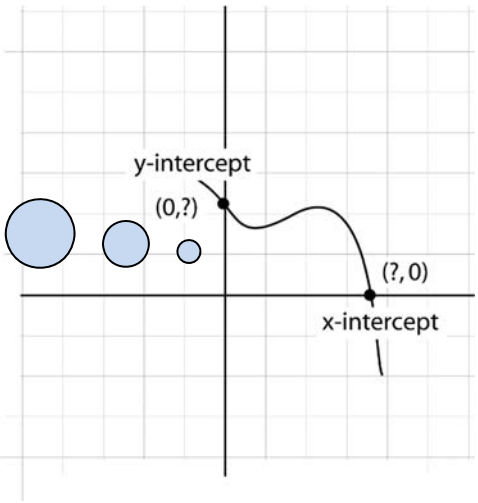
What does the equation say about x and y? How are they related? Every point adheres to this relationship.

Every y value is gotten by the same operations. What are they?

A **complete graph** shows all the intercepts and turns.

Finding *x*- and *y*-intercepts: The *x*- and *y*-intercepts of a graph are where the graph intersects the *x* and *y* axes.

Now, *x* and *y* intercepts occur on the axes. **The one thing you know about any point on an axis, is that the other coordinate is zero.** We'll use that with the equation to find the *x* and *y* intercepts.



expl 1: Find the (*x* and *y*) intercepts of $5x - 6y = 60$. Quickly plot the intercepts and connect them with a straight line to graph.

y-intercept: Set *x* to 0 and solve for *y*.

x-intercept: Set *y* to 0 and solve for *x*.

Worksheet: Things to know about your calculator:
This worksheet is a laundry list of things I have found useful over the years. Try out everything it mentions. Instructions for the TI83 should work for the TI84 calculators.

Worksheet: Getting started on your graphing calculator:
This is an introduction to home screen operations, graphing, window settings, and the TRACE function. Instructions for the TI83 should work for the TI84 calculators.

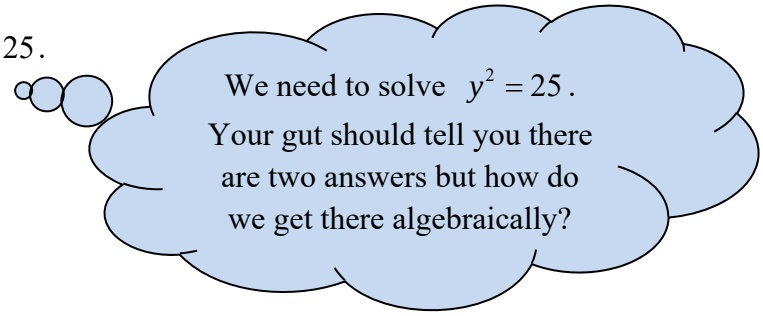
expl 2: Find the (*x* and *y*) intercepts of the following quadratic function. Quickly plot and connect them with a smooth curve to graph.

$y = x^2 - 4$

Solving for a variable that is squared in the original equation:

This may seem straight-forward but can trip people up. We'll use the example below to illustrate.

expl 3: Find the *y*-intercept for $y^2 = x + 25$.



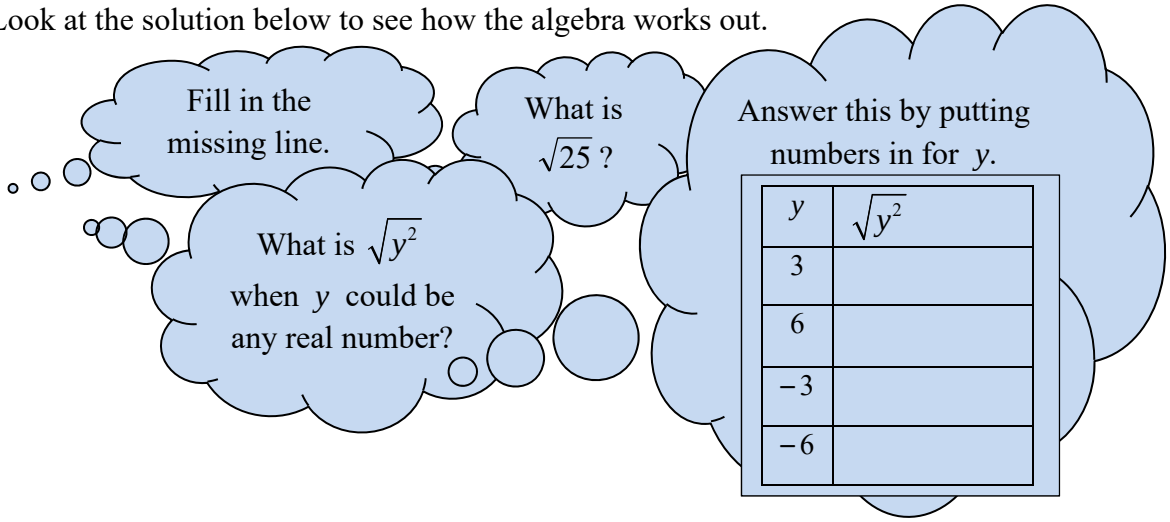
Let's look more closely at $y^2 = 25$. Notice, both 5 and –5 make the equation true. We write this as $y = \pm 5$. Look at the solution below to see how the algebra works out.

$y^2 = 25$

$\sqrt{y^2} = \sqrt{25}$

$?? = ??$

$y = \pm 5$



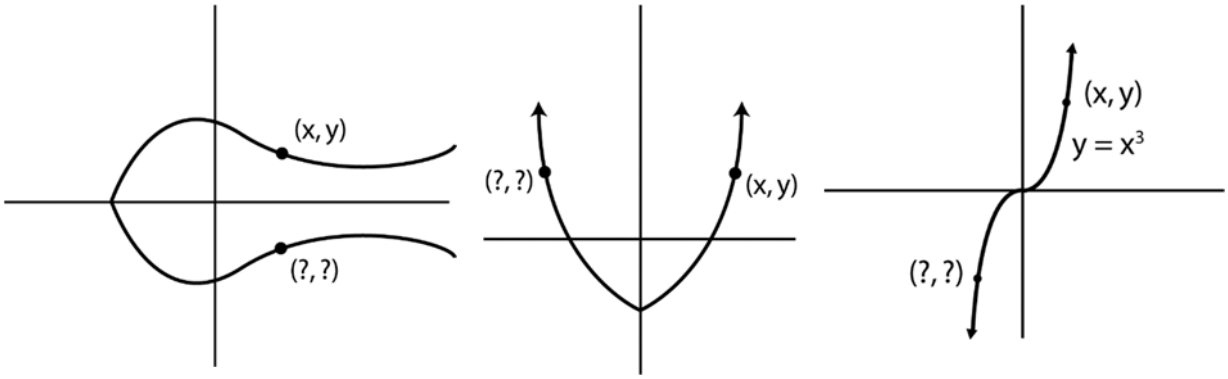
The inclusion of the ± sign (pronounced "plus or minus") is very important. I would like you to know why it happens, but in practice, we usually will *not* write the third line above. We will simply write

$y^2 = 25$

$\sqrt{y^2} = \sqrt{25}$

$y = \pm 5$

Symmetry:
Notice the symmetric nature of the following graphs. Which one is a mirror image of itself across the *y*-axis? the *x*-axis? Which one could be rotated 180 degrees about the origin and it would lie upon itself?



Can you figure out the coordinates of the unknown points? Write your answers above.

Algebraic Tests for Symmetry:
The pictures above help justify the following tests.

To test a relationship for symmetry about the …

***x*-axis:** Replace y with $-y$. If the equation is equivalent, then the relationship is symmetric with respect to the x-axis.

***y*-axis:** Replace x with $-x$. If the equation is equivalent, then the relationship is symmetric with respect to the y-axis.

origin: Replace x with $-x$ and replace y with $-y$. If the equation is equivalent, then the relationship is symmetric with respect to the origin.

expl 4: Graph the equation and determine visually if it is symmetric with respect to the x-axis, y-axis, and/or origin.

a.) $y = |3x| + 4$

b.) $y = \dfrac{2}{x}$

expl 5: Graph the equation and determine visually if it is symmetric with respect to the x-axis, y-axis, and/or origin. Then verify your conclusion algebraically.

$y^3 = 2x^2$

If you show symmetry about both the x-axis and y-axis, then the relation has symmetry about the origin too.

expl 6: Consider the following points and assume the graph has the given symmetry. Give another point that must also be on the graph.

Plot each point.

a.) (5, -3); symmetric to y-axis

b.) (4, 2); symmetric to the origin

c.) (4, 2); symmetric to the x-axis

Graphing Key Equations:

We will want to have the picture of several functions in our heads as we go. We will work on this throughout the semester. Plotting the intercepts helps us quickly graph. Can you draw any graphs from memory? If not, use your calculator.

Identity function $y = x$	**Square function** $y = x^2$	**Square root relationship** $y^2 = x$
Cube function $y = x^3$	**Reciprocal function** $y = \frac{1}{x}$	