



$$\frac{(3x-5)}{2} = \frac{(x-15)}{1}$$
$$4(3x-5) = 2(x-15)$$
$$\begin{array}{r} 12x - 20 = 2x - 30 \\ -2x + 20 \quad -2x + 20 \\ \hline 10x = -10 \\ \frac{10x}{10} = \frac{-10}{10} \\ x = -1 \end{array}$$

LESSON **4-1** Graphing Quadratic Functions

**I can...** find and interpret maximum and minimum values by graphing.

#5

$$\frac{4}{(x-3)} = \frac{6}{(x+3)}$$

$$6(x-3) = 4(x+3)$$

$$6x + 18 = 4x + 12$$

$$\begin{array}{r} -4x + 18 \\ \hline 2x = 30 \\ \frac{2x}{2} = \frac{30}{2} \quad x = 15 \end{array}$$

$$\#2 \quad x - 4y = -20$$

$$+4y = +20 + x$$

$$y = 5 + \frac{1}{4}x$$

1. solve for y.

2. make table.

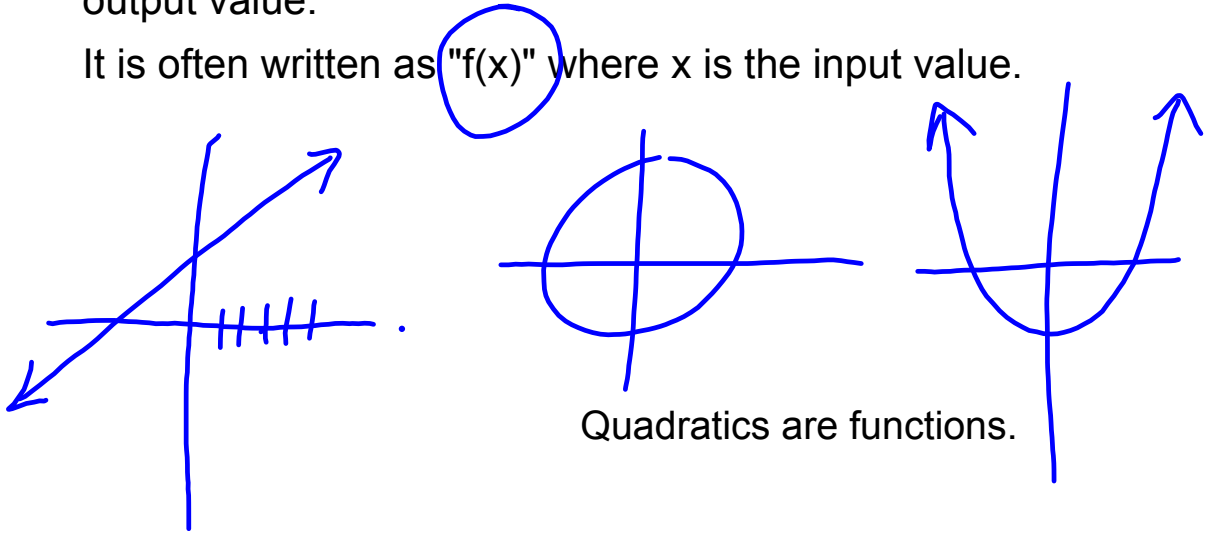
(0, 5)

x	y = 5 + $\frac{1}{4}x$	(x, y)
-4	5 + $\frac{1}{4}(-4)$	(-4, 4)
0	5 + $\frac{1}{4}(0)$	(0, 5)
4	5 + $\frac{1}{4}(4)$	(4, 6)

## First lets recall what a function is.

A function is a special relationship between values:  
Each of its input values gives back exactly one  
output value.

It is often written as "f(x)" where x is the input value.



### Quadratic functions

$$f(x) = ax^2 + bx + c$$

*Quadratic term*
*Linear term*
*constant*

Note:

$$f(x) = 3x^2 - 12x + 6$$

$$a = 3 \quad b = -12 \quad c = 6$$

$$f(x) = 1x^2 + 3x - 7$$

$$a = 1 \quad b = 3 \quad c = -7$$

Don't be fooled by the order!

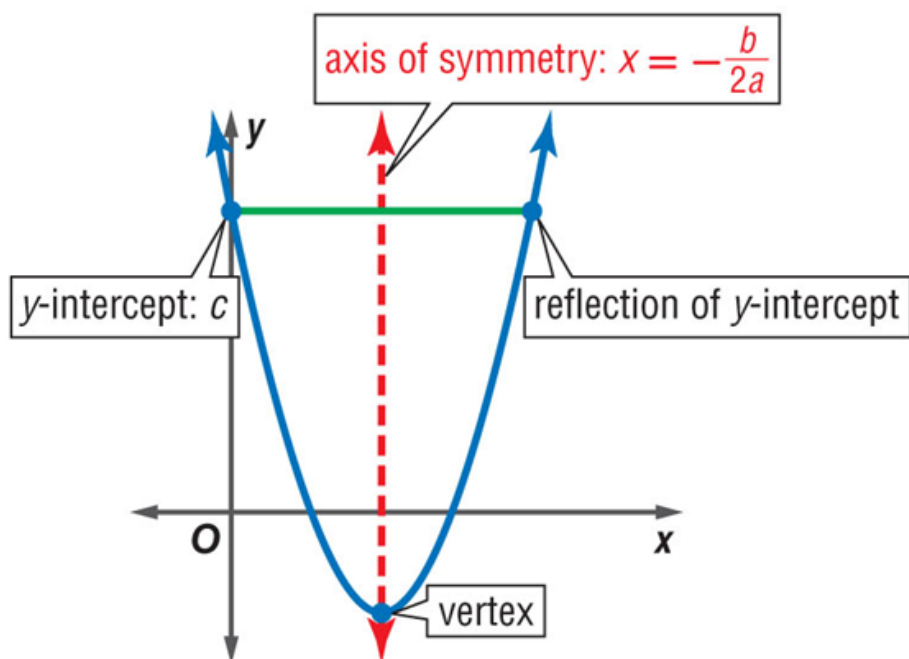
$$f(x) = 3 + 8x - 2x^2$$

$$a = -2 \quad b = 8 \quad c = 3$$

and

$$g(x) = 4x^2 + 0x + 0$$

$$a = 1 \quad b = 0 \quad c = 0$$



## Graphing a Quadratic (plot 5 points)

$$f(x) = ax^2 + bx + c \quad a \neq 0$$

y-intercept = (0, c)

Axis of Symmetry (AOS):  $x = \frac{-b}{2a}$ 

Note: -b means the opposite of b

**\*\*Also the x-coordinate of the vertex.\*\***

y-coordinate of the vertex, plug in AOS and solve.

$$f\left(\frac{-b}{2a}\right) =$$

So the vertex is:  $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$ 1. Graph  $f(x) = 3 - 6x + x^2$  by making a table of values.

$$a=1 \quad b=-6 \quad c=3$$

1. y-int (0, 3)

$$2. x = \frac{-b}{2a} = \frac{6}{2} = 3$$

$$x=3$$

x	y
1	-2
2	-5
3	-6 ✓
4	-5
5	-2

$$3. (3, -6) \quad f(3) = 3 - 6(3) + (3)^2$$

$$= 3 - 18 + 9$$

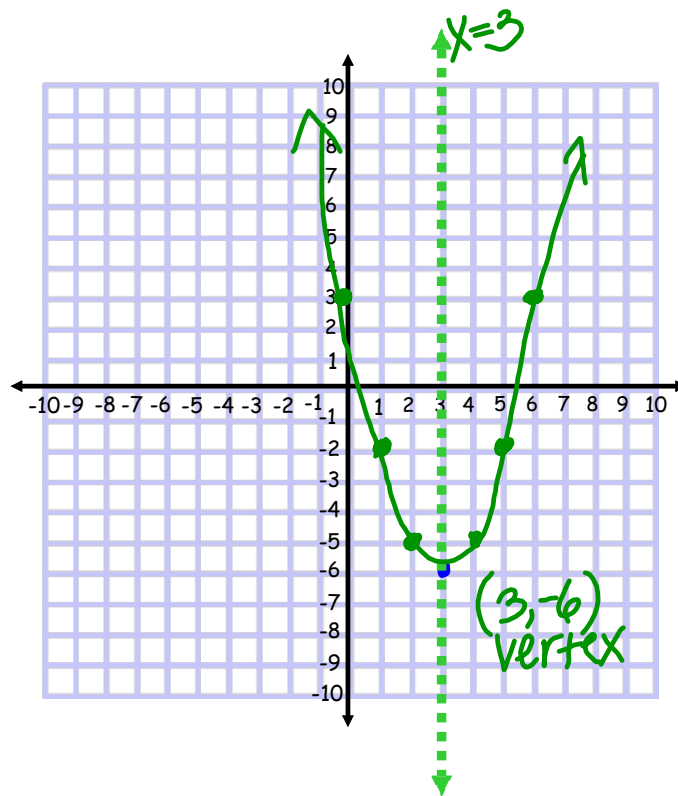
$$= -15 + 9$$

$$= -6$$

$$4. \begin{array}{c|c} x & y \\ \hline 3 & \end{array}$$

$(0, 3)$ 

x	y
1	-2
2	-5
3	-6 ✓
4	-5
5	-2

0.  $a = b = c =$ 1. y-int  $(0, c)$  label it2. AOS  $x = \frac{-b}{2a}$   
(label it)

3. vertex (label it!)

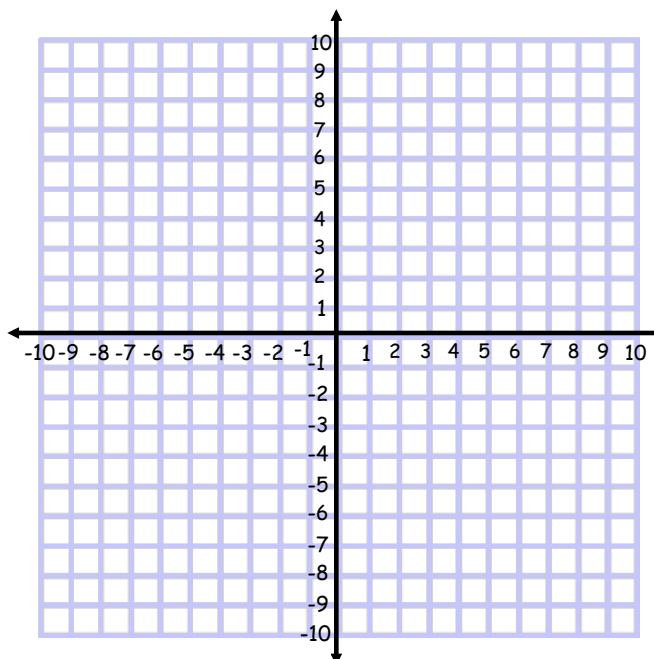
 $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$ 

4. Table

x	y
?	
?	
$-\frac{b}{2a}$	$f\left(-\frac{b}{2a}\right)$
?	
?	

5 graph (label it!)

2. Graph  $f(x) = 4x^2 - 8x - 1$  by making a table of values.



3. Find the  $y$ -intercept, the equation of the axis of symmetry, and the  $x$ -coordinate of the vertex. The graph.

$$f(x) = 2 - 4x + x^2$$

