$y = ax^2 + c$

This is a Quadratic Function in Standard Form where b=0

1. when b=0 LOS is always $x = 0$

2. This means the parabola hasn't shifted either left or right.

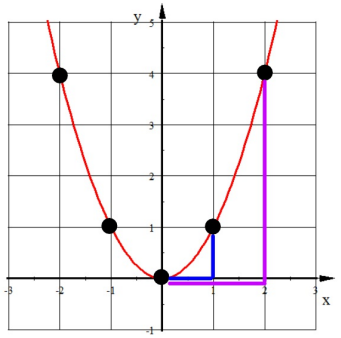
3. But, it has shifted up/down exactly c units.

   If c is Pos it has shifted up

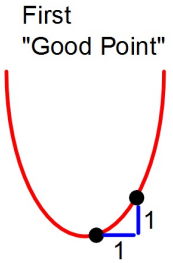
   If c is Neg it has shifed down.

4. This is the one case where the y-int and the vertex are the same point.

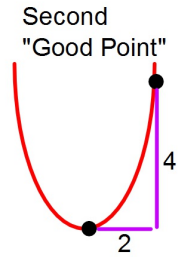
$y = x^2$ is the Parent Quadratic Function



The first two "good points" to the right of the Vertex for the Parent Function are:



"1 right then 1 up"



"2 right then 4 up"

$y = ax^2 + bx + c$

a tells us if a parabola opens up or down.

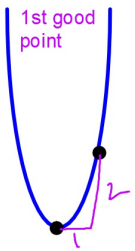
It's also a Vertical Stretch or Shrink Factor.

$y = x^2$ is the Parent Quadratic Function

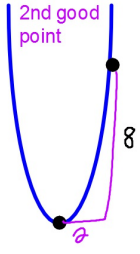
How is the graph of $y = 2x^2$ related to the Parent Function?

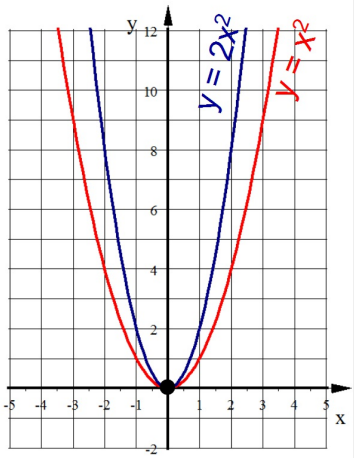
Two times taller than the Parent Function

Becomes



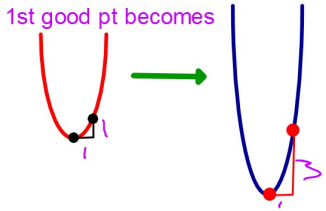
Becomes



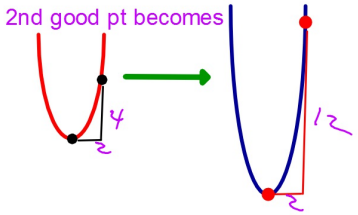


What will $y=3x^2$ look like?

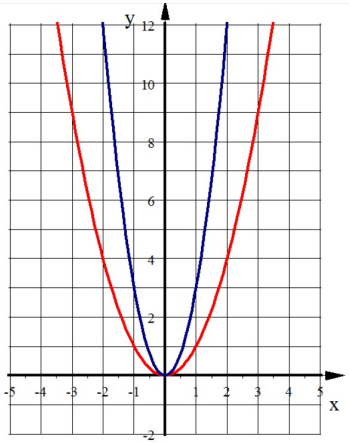
1st good pt becomes



2nd good pt becomes



3 times taller than the Parent Function



What will $y=0.5x^2$ look like?

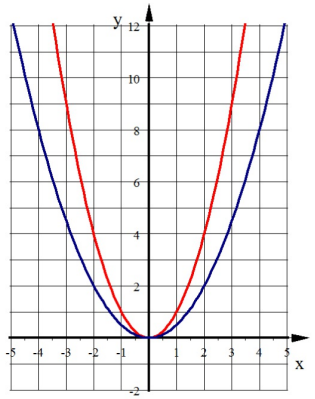
Half as tall as the Parent Function.

Parent Function → This Function

1 x .5 → .5

4 x .5 → 2

2



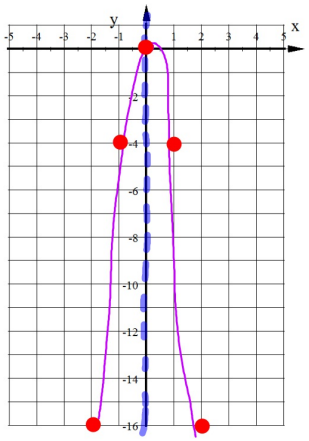
Without using a table of values graph the equation below using at least 5 points. $y = -4x^2$

Since both b and c are zero this parabola hasn't shifted horiz or vert. The vertex is still the origin. Now use the vertical stretch factor (a = -4) to find the two points on one side of the vertex then reflect them over the LOS.

Parent Function → This Function

1 x -4 → -4

4 x -4 → -16



the equation of a Quadrtic is: $y = 2x^2 - \square + \square$

The vertex of this parabola is (3, - 4)

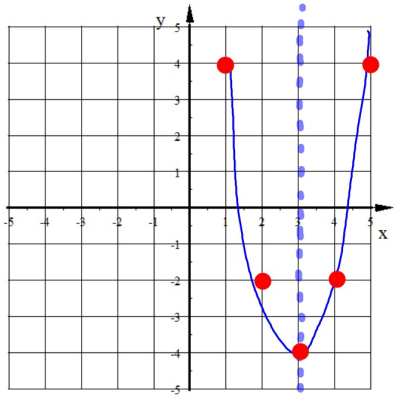
Graph the rest of this parabola.

Plot the vertex then use the vertical stretch factor (a = 2) to find the two points on one side of the vertex then reflect them over the LOS>

Parent Function → This Function

1 x 2 → 2

4 x 2 → 8

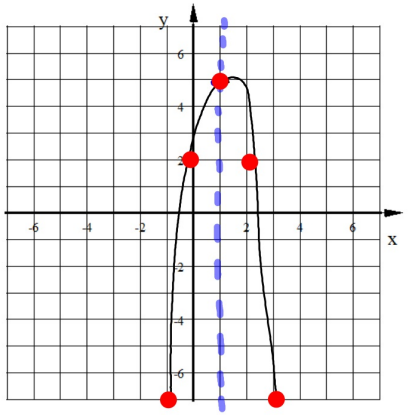


the equation of a Quadrtic is: $y = -3x^2 \square + \square$

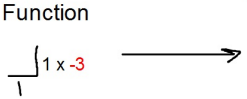
The vertex of this parabola is (1, 5)

Graph the rest of this parabola.

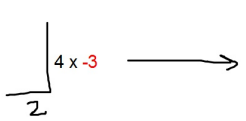
Plot the vertex then use the vertical stretch factor (a = -3) to find the two points on one side of the vertex then reflect them over the LOS>

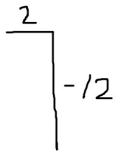


Parent Function



This Function





You can now finish Hwk#4

Practice Sheet

Sec 5-2

$y = ax^2 + bx + c$

What does a tell us about the parabola?

- if the parabola opens up or down
- It is also a Vertical stretch or shrink factor.

What does b tell us about the parabola?

It affects the Horizontal position

What does c tell us about the parabola?

- the y-intercept
- it affects the vertical position.

If b=0, this it is the exact vertical translation.

If b≠0 it is not the exact vertical translation

What is the equation for the LOS of this quadratic?

$y = ax^2 + c$

$x = 0$

What is the equation for the LOS of this quadratic?

$y = ax^2 + bx + c$

$$\text{LOS:} \quad x = \frac{-b}{2a}$$

Find the equation for the LOS for each quadratic function.

1. $y = 2x^2 + 18x - 14$

$X = \frac{-18}{2(2)} = -4.5$

2. $y = -\frac{1}{2}x^2 - 24x + 37$

$X = \frac{24}{2(-\frac{1}{2})} = \frac{24}{-1} = -24$

3. $y = 8.7x^2 - 20$

$X = \frac{0}{2(8.7)} = 0$

What is the equation for the LOS?

$y = -3x^2 + 12x - 22$

$X = \frac{-12}{2(-3)} = \frac{-12}{-6} = 2$

what can you now find?

The Vertex. Since the Vertex is a point on the LOS the x-coordinate of the Vertex is the same as the LOS. To find the y-coordinate of the Vertex you just evalute the quadratic equation using the x-coordinate

$(2, -10)$

$-3(2)^2 + 12(2) - 22$