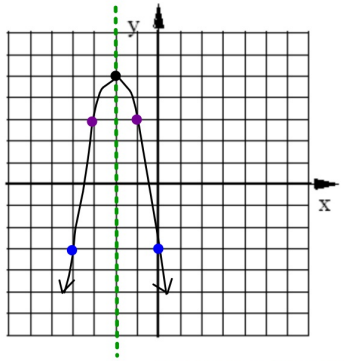
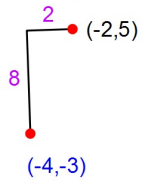
Given a parabola has a vertex at (-2,5) and it passes through the point (-4,-3) find three more points then plot and connect all five points to graph the parabola.



Given (-2,5) is the Vertex, the LOS is x=2

Plot the point (-4,-3) and its reflection.



comparing the distance from the vertex to the other point gives us these movements: 2 horizontally and 8 vertically.

The Parent Function has a pt that is also 2 horizontally but it is only 4 vertically. So this parabola is twic as tall as the Parent Function.

The first good point to the right of the vertex on the Parent Function is 1 right and 1 up. On this function it will be twice as tall but upside down: 1 right and 2 down.

$y = ax^2 + bx + c$

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?

$y = ax^2 + c$ $\quad x = 0$

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

$$x = \frac{-18}{4} = -4.5$$

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

$$x = \frac{24}{-1} = -(24)$$

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

$x = 0$

What is the equation for the LOS?

$y = 4x^2 - 48x + 17$

LOS: $x = \frac{48}{8} = 6$

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

Vertex: $(6, -127)$ $\quad 4(6)^2 - 48(6) + 17$

Find the equation of the LOS and coordinates of the Vertex for each quadratic equation.

1. $y = -4x^2 - 8x + 9$

LOS $x = \frac{8}{-8} = -1$

Vertex $(-1, 13)$

2. $y = \frac{1}{4}x^2 + 6x - 1$ $\quad 36 \quad -72 \quad -1$

LOS $x = \frac{-6}{\frac{1}{2}} = -12$

Vertex $(-12, -37)$

To find the y-coordinate of the vertex you substitute the x-coordinate into the equation for all x's and simplify.

One method to graph a quadratic in Standard Form:

1. Find the equation for the LOS and put it on the graph as a dashed line
2. Find the coordinates of the Vertex and plot it.
3. Find the y-intercept and plot it, if it fits.
4. Reflect the y-intercept over the LOS.
5. Use a table of values to find more points and reflect them over the LOS

Graph this Quadratic:

$y = x^2 - 4x - 1$

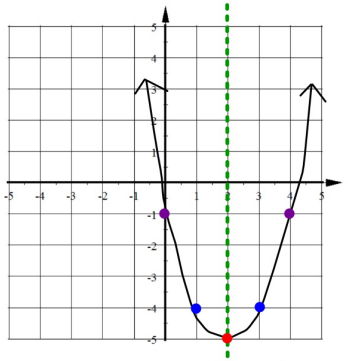
Los: $x = \frac{4}{2 \cdot 1} = 2$

Vertex: $(2, -5)$ $\quad (2)^2 - 4(2) - 1 = -5$

y - int = -1. Plot this and its reflection

x	y
1	-4

Pick a value for x and find the corresponding y. Plot this point then its reflection



Graph this Quadratic: $y = x^2 - 4x - 1$

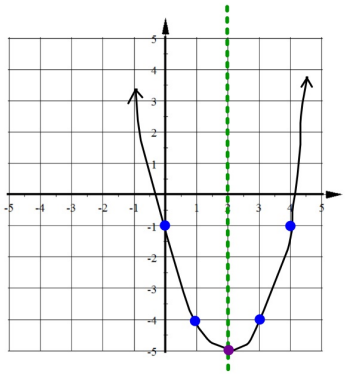
Another way to graph a parabola:

Step 1: Find the Vertex

Los: $x = \frac{4}{2 \cdot 1} = 2$

Vertex: (2, -5)

$(2)^2 - 4(2) - 1 = -5$



LOS: x = 2

Step 2: Use the Vertical Stretch or Shrink Factor to find the remaining points.

Because the coefficient of the quadratic term is 1 (a=1) this parabola is the same height as the Parent Function

First Good Point: 1 over 1

Second Good Point: 4 over 2

These vertical distances will remain the same.

Plot these points and their reflection over the LOS

You can now finish Hwk #5:

Practice Sheet Sec 5-2

Short Hwk Quiz tomorrow over:

- Graph a parabola w/o graphing calc.
- State Eq of LOS given the vertex.
- State Eq of LOS given eq.
- State the coordinates of the Vertex given eq.
- State the y-int given the eq.
- Determine if parabola opens UP/DOWN & if vertex is a MAX/MIN.
- Make a scatter plot & find regression eq that fits data.