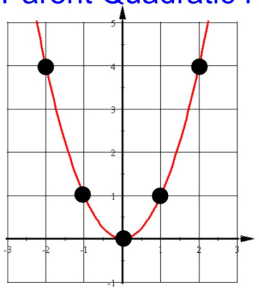
Parent Quadratic Function: $y = x^2$



x	y
-2	4
-1	1
0	0
1	1
2	4

Vertex: (0,0)

Line of Symmetry: x=0

First "good" from vertex:
1 right, 1 up

Second "good" point from vertex:
2 right, 4 up

Note sheet from yesterday

Sec 5-3: Transforming Parabolas

"Vertex Form" of a quadratic function

$$y = a(x - h)^2 + k$$

Vertex: (h , k) LOS: x = h

Translation:
h units horizontally
k units vertically

Vertical Stretch: a > 1

Vertical Shrink: 0 < a < 1

x-axis Reflection: a < 0

Describe the transformations shown in the equation and identify the vertex and the y-intercept of this quadratic:

$$y = -3(x + 2)^2 + 7$$

- x + 2 2 units left
- + 7 7 units up
- Vertical stretch factor of 3 (3 times taller)
- - Opens Down x-axis reflection (upside down)

Vertex: (-2, 7)

You can use all of this information to graph the parabola.

y-intercept: (0, -5)

Graph this quadratic using five points

$y = -3(x + 2)^2 + 7$

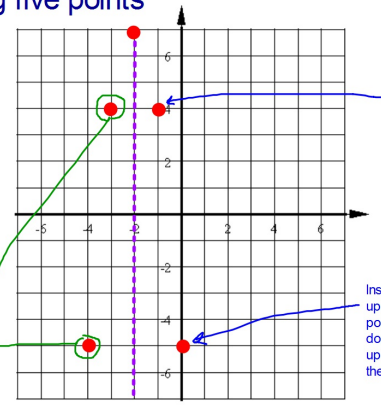
2 left and 7 up becomes (-2, 7) for the vertex.

Draw the Line of Symmetry through the vertex.

Vertical stretch factor of 3 makes every point three times as "tall" compared to the parent function.

The negative coefficient means the parabola opens down (upside down)

these points are reflections over the Line of Symmetry of the points on the right.



Instead of 1 right and 1 up from the vertex this point is 1 right and three down (3 times taller and upside down)

Instead of 2 right and 4 up from the vertex this point is 2 right and 12 down (3 times taller and upsidedown). It's also the y-intercept.

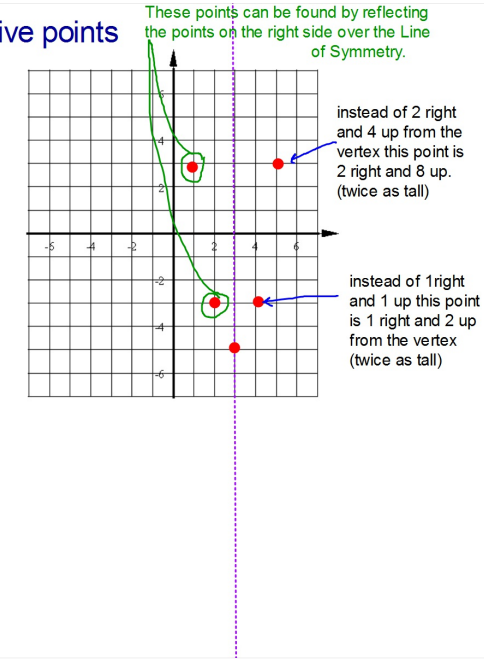
Graph this quadratic using five points

$y = 2(x - 3)^2 - 5$

3 right and five down becomes (3, -5) for the vertex.

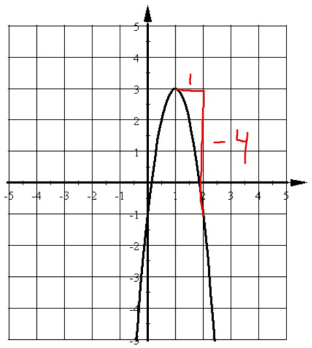
Draw the Line of Symmetry through the vertex.

Vertical stretch factor of 2 makes every point twice as "tall" compared to the parent function.



Write the equation of this parabola in Vertex Form.

1.



1 right, 3 up

Vertex (1, 3)

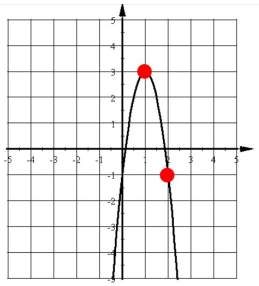
$y = a(x - 1)^2 + 3$

vertical stretch/shrink factor:

Just like similarity ratio from Geometry

$a = \frac{\text{Image measure}}{\text{Original measure}} = \frac{-4}{1} = -4$

$y = -4(x - 1)^2 + 3$



Another way to find a:

Using the vertex of (1,3) you can get this much of the equation:

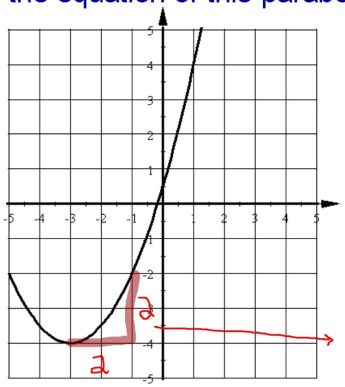
$y = a(x - 1)^2 + 3$

Use the coordinates of ANY other point on the graph: If you pick (2, -1)

replace x with 2 and y with -1 then solve for a. → $-1 = a(2 - 1)^2 + 3$

Write the equation of this parabola in Vertex Form.

2.



3 left and four down

Vertex: (-3, -4)

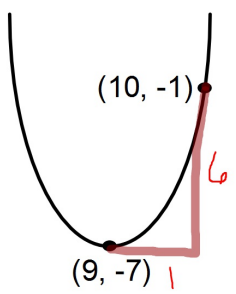
EQ: $y = 1/2(x + 3)^2 - 4$

Vertical shrink factor = 1/2

Parent function used to have a point that was 2 right and four up but right now it is 2 right and only 2 up --- so it is half as tall.

Write the equation of each parabola in Vertex Form.

3.



9 right, 7 down, vert stretch factor 6

$y = 6(x - 9)^2 - 7$