Today's Learning Goal(s):

By the end of the class, I will be able to:

a) sketch a parabola with ***and without*** a table of values
b) apply transformations to the "mother graph"
c) understand the roles of "*a*", "*h*" & "*k*" for vertex form: $y = a(x - h)^2 + k$

Please submit yesterday's computer work on gizmos.

MBF 3CI **Quadratic Relations: Vertex Form** Date: Apr 11/17

From the Gizmo's Activity A **quadratic relation** is expressed as...

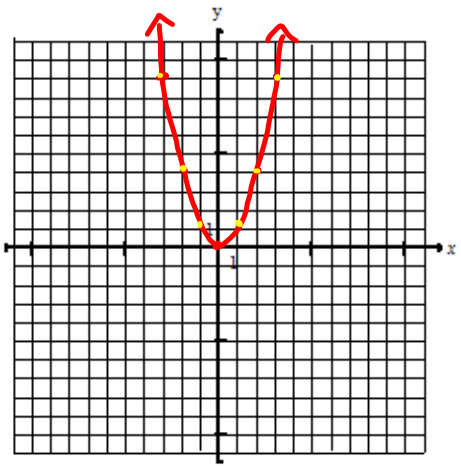
$$y = a(x-h)^2 + k$$

The mother graph $y = x^2$ is transformed "*h*" units to the right *or* left, "*k*" units up *or* down, and stretched *or* compressed by a factor of "*a*". Note: $a \neq 0$.
The above formula is the **vertex form** of a parabola.

(Do Page 212 #1, 2 orally)

Construct $y = x^2$ below. Assume that 1 block = 1 unit²

x	$y = x^2$
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

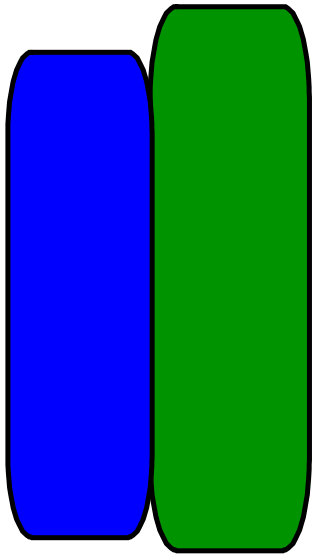


This is known as the **mother graph** for all parabolas.
Every parabola can be made once this graph is known.

Memorize

over	up
1	1
2	4
3	9
4	16
5	25

$1^2 = 1$
$2^2 = 4$
$3^2 = 9$
$4^2 = 16$
$5^2 = 25$
$6^2 = 36$



$y = a(x-h)^2 + k \quad v(h,k)$

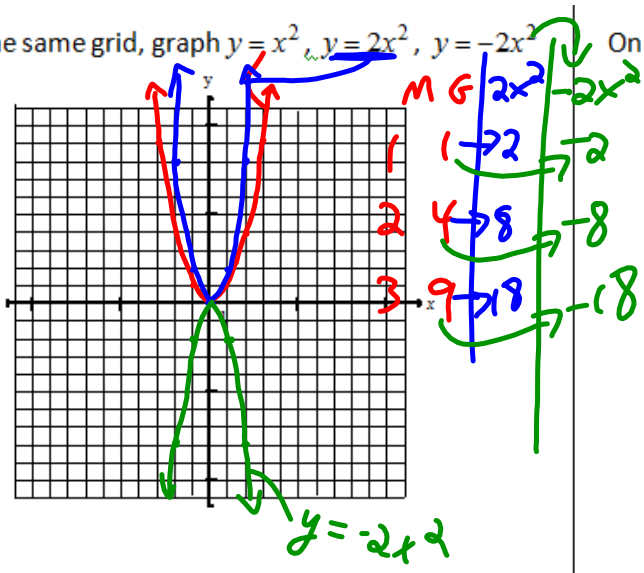
p.212

2a) $y = 2(x-3)^2 + 12$ $\quad v(3,12)$

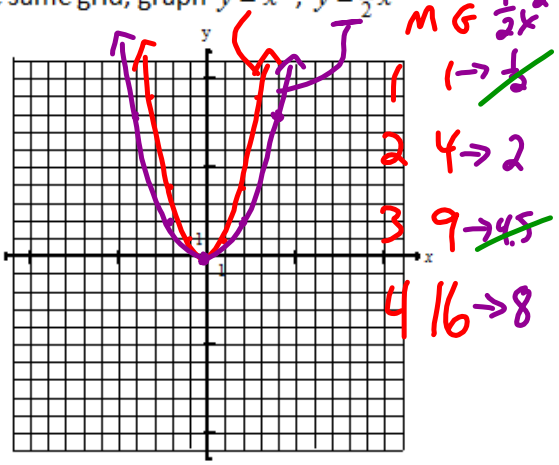
c) $y = -7(x+4)^2 - 8$ $\quad v(-4,-8)$

$(x-(-4))^2$

On the same grid, graph $y = x^2$, $y = 2x^2$, $y = -2x^2$



On the same grid, graph $y = x^2$, $y = \frac{1}{2}x^2$



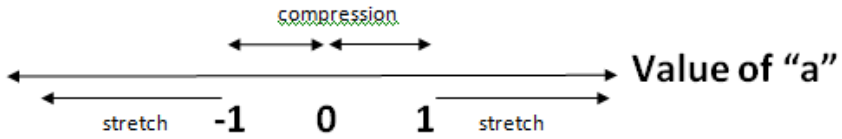
The "**a**" value will always determine the **step pattern**, and if the parabola opens up or down.
Remember, the step pattern of the mother graph is always: over 1 up 1

Also remember from yesterday:

2 4

3 9

Note: If a graph is wide, it is a vertical **compression**.
If the graph is narrow, it is a vertical **stretch**.
The value of "**a**" will decide whether or not it is a compression or a stretch.
Here is a visual aid:



On the grid below, graph $y = 2(x-4)^2 - 5$

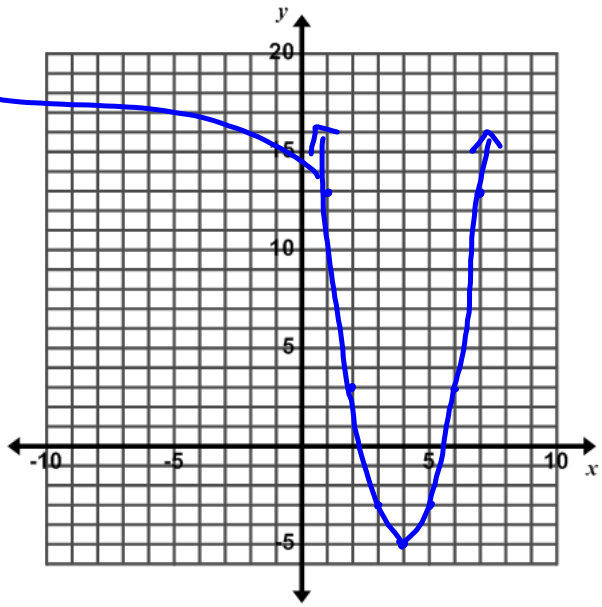
V(4, -5)

MG

1 → 2

2 → 8

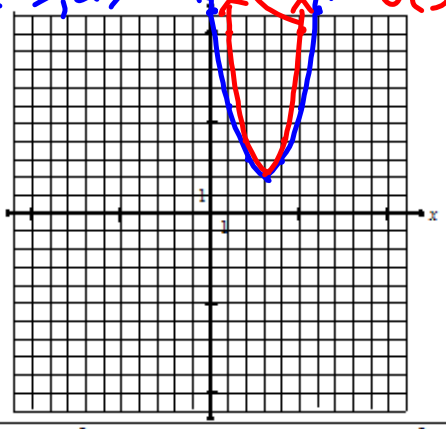
3 → 18



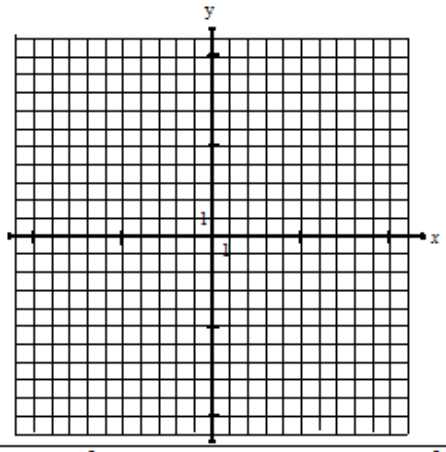
Graph two parabolas per grid:

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

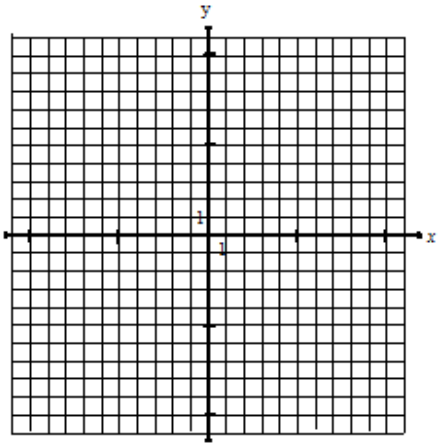
V(3,2) V(3,2)



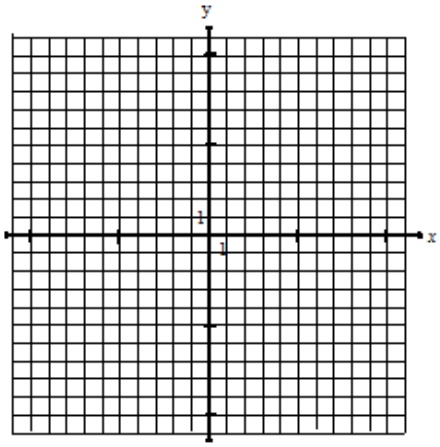
$y = (x+4)^2 - 5$ and $y = -(x+4)^2 - 5$



$y = 3(x-1)^2 - 7$ and $y = -3(x-1)^2 - 7$



$y = 2(x+3)^2 + 1$ and $y = 0.5(x+3)^2 + 1$



$y=(x-5)^2-6$ and $y=\frac{1}{3}(x-5)^2-6$