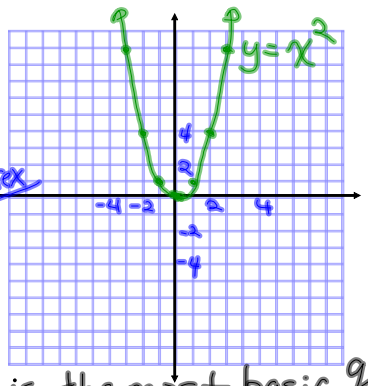
Graphing Quadratics Using Transformations

$y=x^2$ 1.5 Lesson

Example 1: Graph $f(x) = x^2$.

x	$f(x)$
-3	$(-3)^2 = 9$
-2	$(-2)^2 = 4$
-1	$(-1)^2 = 1$
0	$(0)^2 = 0$
1	$(1)^2 = 1$
2	$(2)^2 = 4$
3	$(3)^2 = 9$

vertex



* $f(x)=x^2$ is the most basic quad. function

Last day we looked at the affect of a, h and k on $f(x) = x^2$.

In Summary, for $g(x) = a(x - h)^2 + k$,

$y = a(x-p)^2+q$

When $h > 0$ (positive), the graph shifts to the right h units. $(x-3)^2$
When $h < 0$ (negative), the graph shifts to the left h units. $(x+3)^2$ $h=-3$

When $k > 0$ (positive), the graph moves up k units.
When $k < 0$ (negative), the graph moves down k units.

When $a > 1$, the graph is stretched vertically by a factor of a.
*(*Ignore the sign of a)*
When $0 < a < 1$, the graph is compressed vertically by a factor of a. (*ignore the sign of a)
When $a < 0$ (negative), the graph is reflected in the x-axis (vertical flip).

The vertex is (h, k). "k" optimal value
The axis of symmetry is $x =$ h.
The step pattern is a(1,3,5)

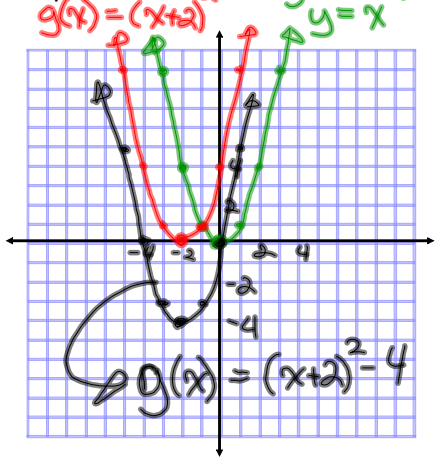
Example 2: Use transformations to sketch the graph of $g(x) = (x + 2)^2 - 4$.

$a =$ 1 $h =$ −2 $k =$ −4 Easy way

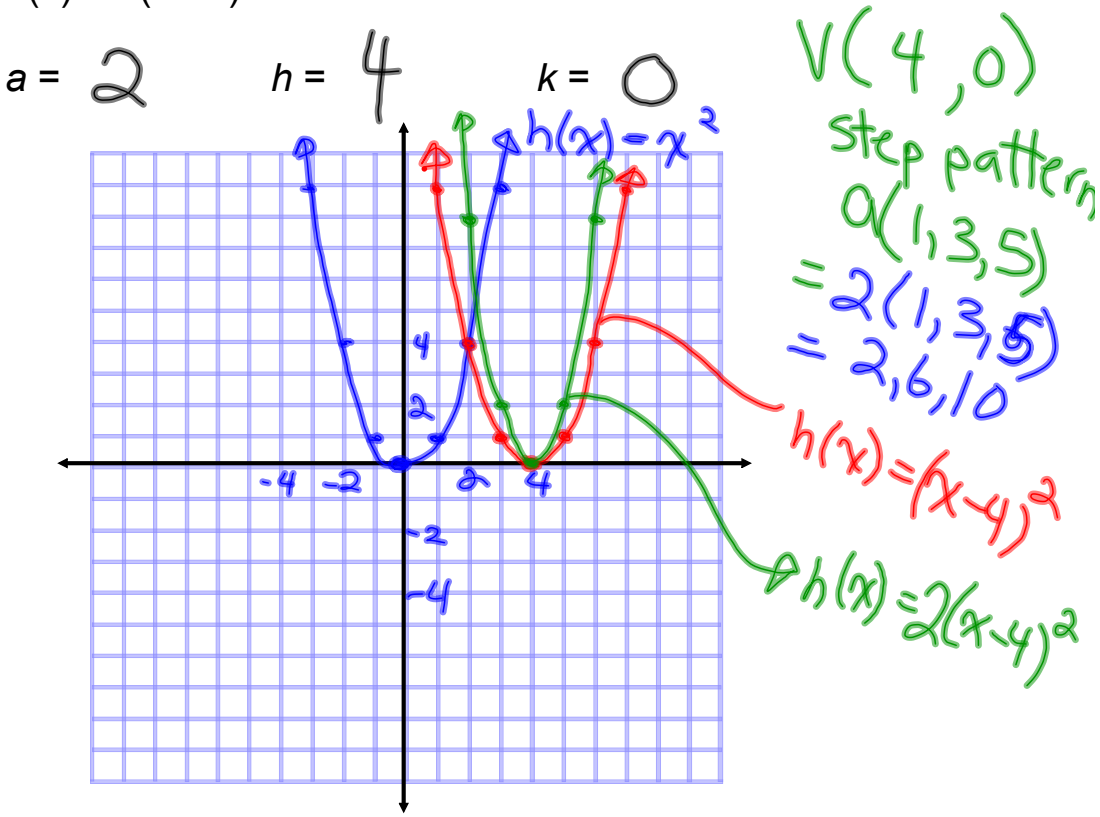
V(-2, -4)

Apply transformations in the order:
1. Graph $f(x) = x^2$ g
2. h - shift horizontally. *
3. a - stretch or compress. (N/A) step pattern 1, 3, 5
4. a - flip if $a < 0$. (N/A)
5. k - move up or down.

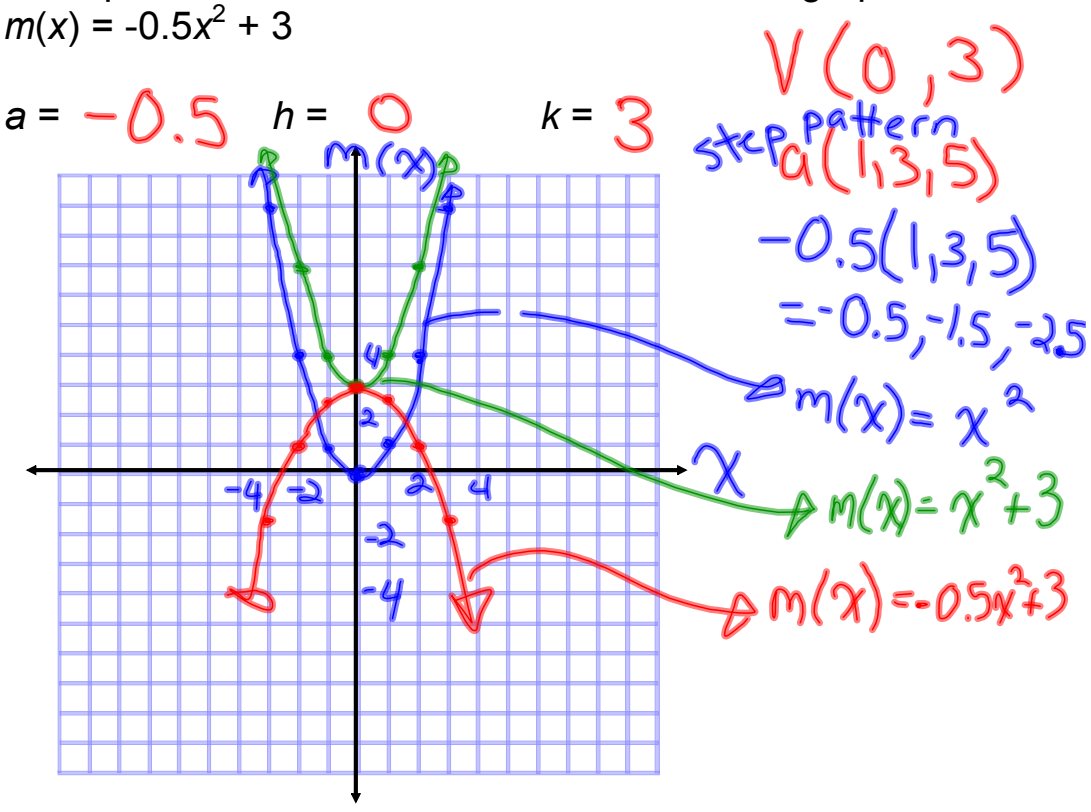
$g(x)=x^2$
$y=x$
$g(x)=(x+2)^2$



Example 3: Use transformations to sketch the graph of $h(x) = 2(x - 4)^2$



Example 4: Use transformations to sketch the graph of $m(x) = -0.5x^2 + 3$



Homework: p.47 #1,2,7,8 Challenge: #10