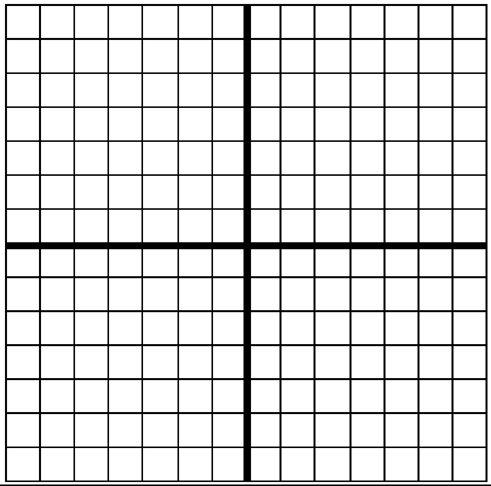
Algebra 1 Honors – Chapter 8.4 **Name:**______________________________________

Graphing Quadratic Functions in Vertex Form/Transformations **Per** _____

Basic or ***"parent"*** Graph: $f(x) = x^2$

Graph by a table of values:

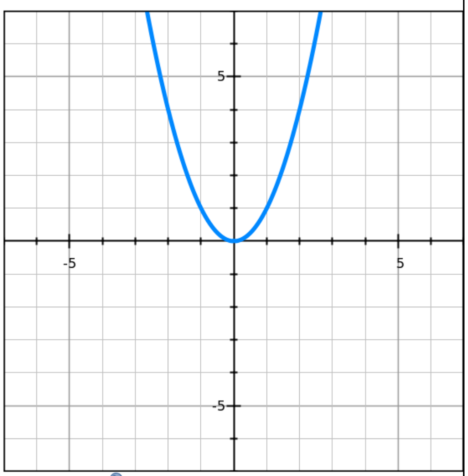
x	$f(x) = x^2$
-2	
-1	
0	
1	
2	



Important characteristics:

A. $g(x) = x^2 + 3$

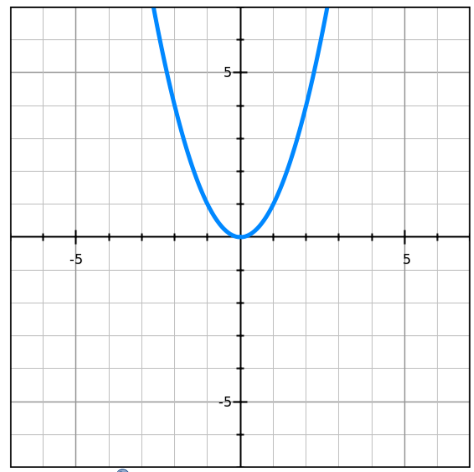
x	$g(x) = x^2 + 3$
-2	
-1	
0	
1	
2	



Contrast to Parent Function:

B. $g(x) = x^2 - 3$

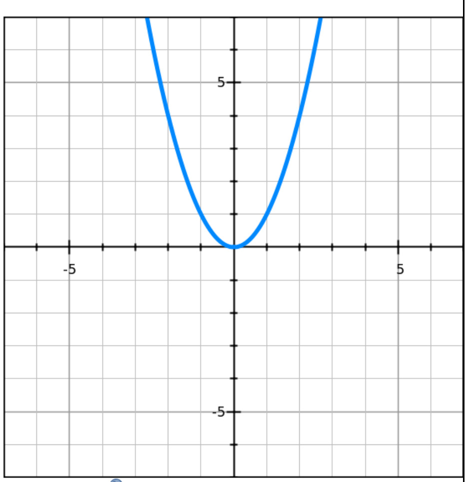
x	$g(x) = x^2 - 3$
-2	
-1	
0	
1	
2	



Contrast to Parent Function:

C. $g(x) = (x + 3)^2$

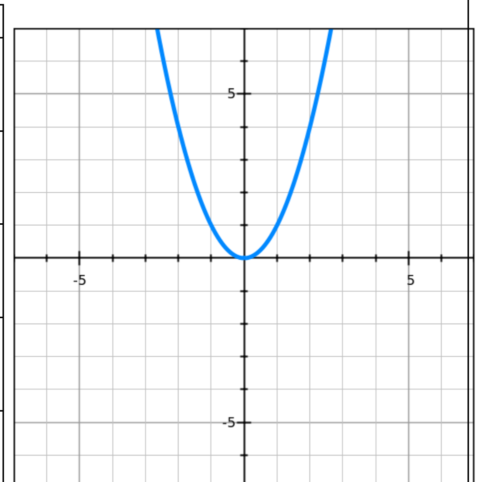
x	$g(x) = (x + 3)^2$
-5	
-4	
-3	
-2	
-1	



Contrast to Parent Function:

D. $g(x) = (x - 3)^2$

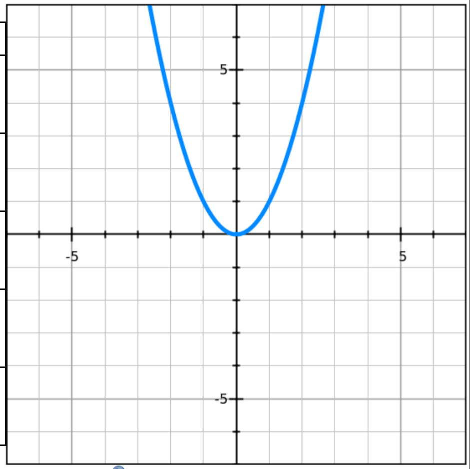
x	$g(x) = (x - 3)^2$
1	
2	
3	
4	
5	



Contrast to Parent Function:

E. $g(x) = 2(x+1)^2$

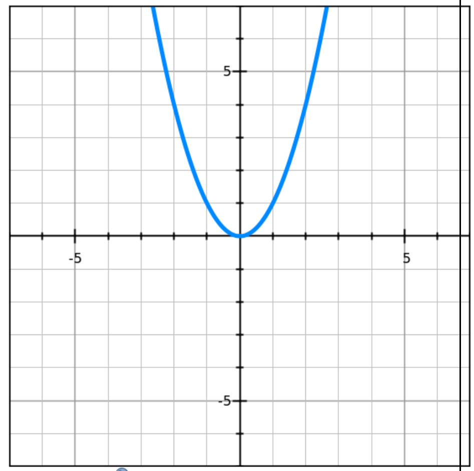
x	$g(x) = 2(x+1)^2$



Contrast to Parent Function:

F. $g(x) = \frac{1}{2}(x+1)^2$

x	$g(x) = \frac{1}{2}(x+1)^2$



Contrast to Parent Function:

<u>GRAPHING QUADRATIC FUNCTIONS IN VERTEX FORM</u>

Quadratic Functions, as well as linear, exponential, and polynomial functions, **can all undergo the same types of transformations.**

Type of Transformation	***Example*** *Parent function:* $f(x) = x^2$	***General Condition*** **Parent function: *f*(*x*)**
Vertical translation ***(up or down)***	$g(x) = x^2 + \mathbf{3}$ (3 units up) $h(x) = x^2 - \mathbf{1}$ (1 unit down)	*f*(*x*) + ***k*** *k* > 0 up *k* < 0 down
Horizontal translation ***(to the left or right)***	$g(x) = (x-4)^2$ (4 units right) $t(x) = (x+3)^2$ (3 units left)	***f*(*x* –*h*)** *h* > 0 right *h* < 0 left [*h* is positive if it's right after the minus sign.]
Vertical stretch or compression	$g(x) = \mathbf{3}x^2$ (stretch) $h(x) = \frac{1}{3}x^2$ (compression)	***a f*(*x*)** *a* > 1 stretch compression 0 < *a* < 1
Reflection	$g(x) = -x^2$	**–*f*(*x*)** over *x*-axis opposite of

Graph $\boldsymbol{g(x) = -\frac{1}{3}(x-6)^2 + 2}$