Desmos Activity Lab
Algebra II

Name _____

Period _____

Directions: General Vertex Form for both quadratic and absolute value functions is given below. Graph each equation using Desmos, starting with (A) the parent function. Sketch and label each equation on your paper.

Quadratic Functions:

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

Absolute Value Functions:

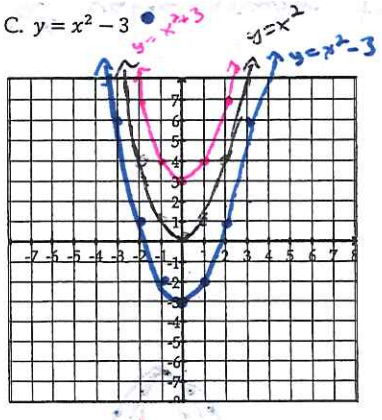
$y = \pm a|x-h| + k$

Part One: Vertical Translations:

A. $y = x^2$

B. $y = x^2 + 3$

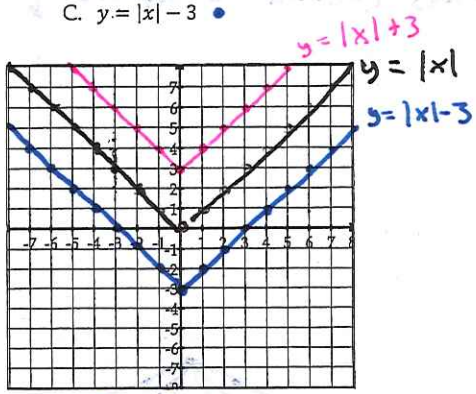
C. $y = x^2 - 3$



A. $y = |x|$

B. $y = |x| + 3$

C. $y = |x| - 3$



Conclusion: What effect does "k" have on the parent function graph?

"k" vertically translates the vertex up when adding and down when subtracting

General Vertex Form

Quadratic Functions:

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

Absolute Value Functions:

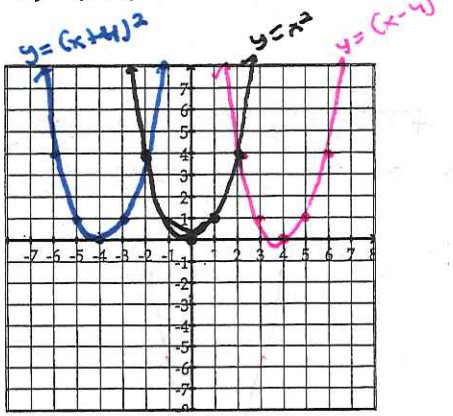
$y = \pm a|x-h| + k$

Part Two: Horizontal Translations:

A. $y = x^2$

B. $y = (x-4)^2$

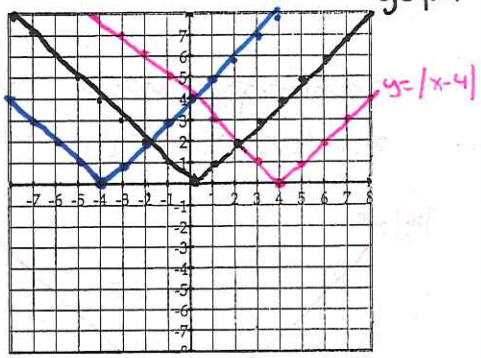
C. $y = (x+4)^2$



A. $y = |x|$

B. $y = |x-4|$

C. $y = |x+4|$



Conclusion: What effect does 'h' have on the parent function graph? Be specific about where the graph moves when 'h' appears to be negative vs. positive.

"h" horizontaly translates the vertex left when adding and right when subtracting

Can you guess what special point on the graph is created by the values of h & k?

The values of "h" and "k" are the "x" and "y" values of the vertex

General Vertex Form

Quadratic Functions:

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

Absolute Value Functions:

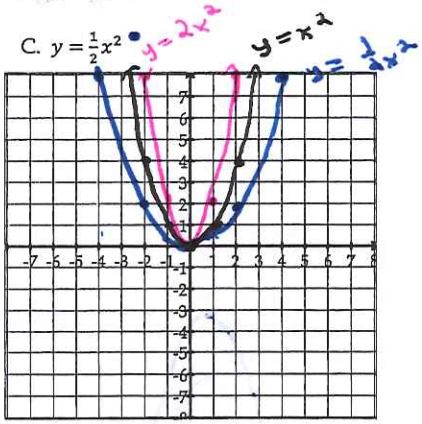
$y = \pm a|x-h| + k$

Part Three: Vertical Stretches and Compressions:

A. $y = x^2$

B. $y = 2x^2$

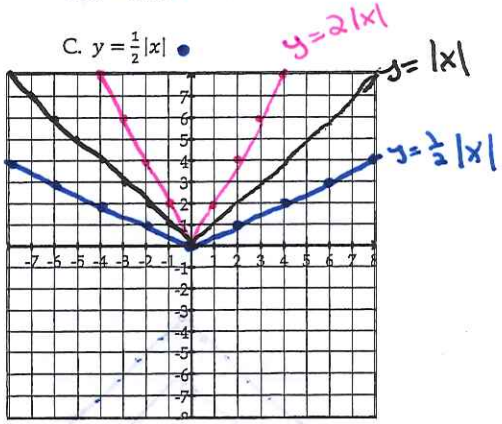
C. $y = \frac{1}{2}x^2$



A. $y = |x|$

B. $y = 2|x|$

C. $y = \frac{1}{2}|x|$



Conclusion: What effect does 'a' have on the parent function graph? Be specific regarding what happens when the value of 'a' is less than one and when the value of 'a' is greater than one.

An "a" value greater than 1 creates a vertical stretch.
An "a" value between 0 and 1 creates a vertical compression

General Vertex Form

Quadratic Functions:

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

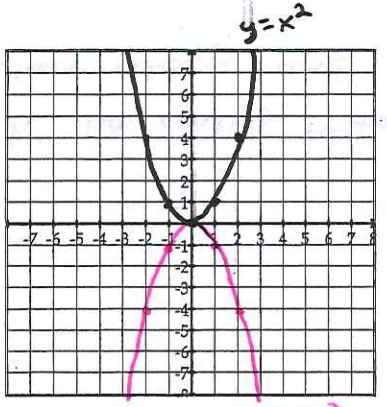
Absolute Value Functions:

$y = \pm a|x-h| + k$

Part Four: Vertical Reflections:

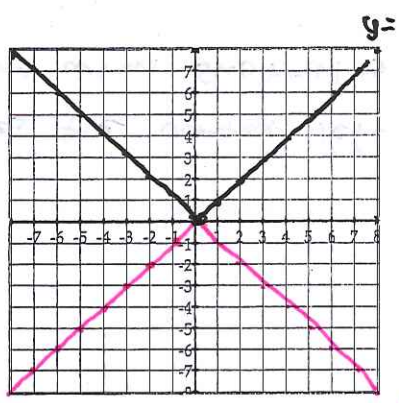
A. $y = x^2$

B. $y = -x^2$



A. $y = |x|$

B. $y = -|x|$



Conclusion: What effect does $\pm a$ have on the graph?

Positive "a" values open upward. Negative "a" values reflect and open downward

Stretch: Writing new functions:

Given the parent function: $f(x) = x^2$, can you write a new function, g(x), that represents transformation of the parent function, moving it two units left & four units down, then stretching it vertically by a factor of 5?

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