Pre-AP Algebra 2
Explore/Explain Transformations

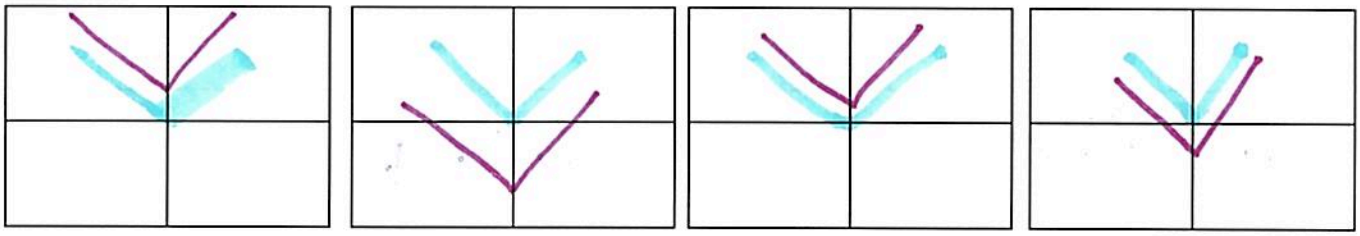
Name _____
Date _____ **Pd**___

(Use two different colors of pencils for sketching y_1 and y_2 on the graphs provided)

I. Explore Vertical Translations

1. Enter $y_1 = |x|$
2. Now, one at a time, enter the following 4 functions into y_2 and compare to the parent function $y_1 = |x|$. Record your observations below the graph.

a. $y_2 = |x| + 2$ b. $y_2 = |x| - 3$ c. $y_2 = |x| + 1$ d. $y_2 = |x| - 1$



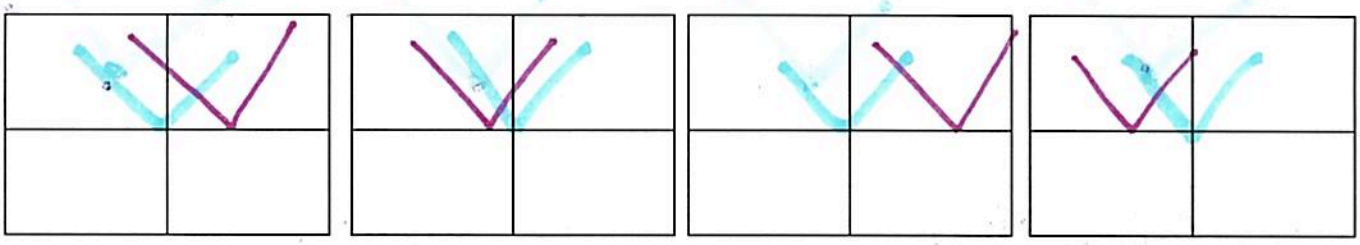
3. Generalize: What happens to the graph of a function when you add or subtract a constant to the function rule?

+ up
- down

II. Explore Horizontal Shifts

1. Enter $y_1 = |x|$
2. Now, one at a time, enter the following 4 functions into y_2 and compare to the parent function $y_1 = |x|$. Record your observations below the graph.

a. $y_2 = |x - 2|$ b. $y_2 = |x + 1|$ c. $y_2 = |x - 3|$ d. $y_2 = |x + 2|$



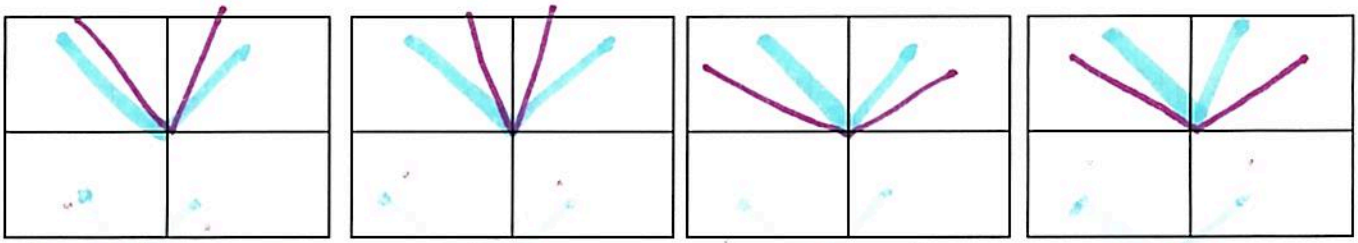
3. Generalize: What happens to the graph of a function when you add or subtract a number inside parenthesis with x?

- right
+ left

III. Explore Vertical Stretches and Compressions

1. Enter $y_1 = |x|$
2. Now, one at a time, enter the following 4 functions into y_2 and compare to the parent function $y_1 = |x|$. Record your observations below the graph.

a. $y_2 = 5|x|$ b. $y_2 = 25|x|$ a. $y_2 = \frac{1}{10}|x|$ b. $y_2 = 0.3|x|$



V. Stretch V. Comp

3. Generalize: What happens to the graph of a function when you multiply the function by a number not in parenthesis?

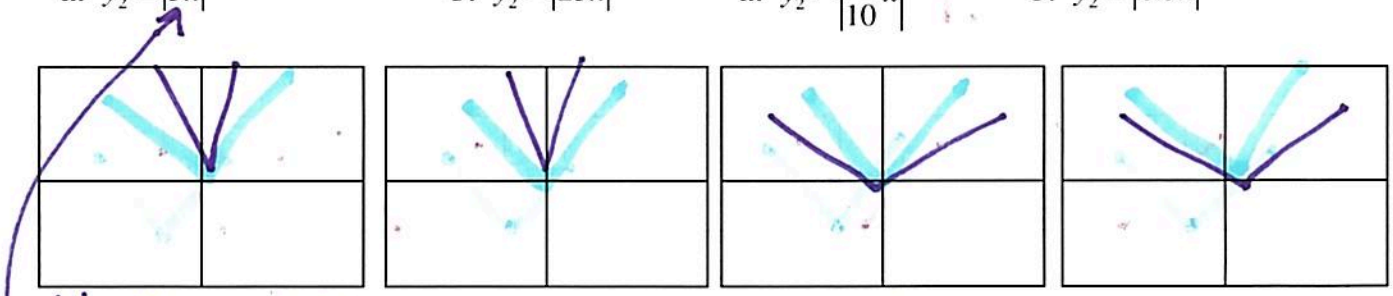
$a > 1$ Skinny V. Stretch

$0 < a < 1$ Wider V. compression

IV. Explore Horizontal Stretches and Compressions

1. Enter $y_1 = |x|$
2. Now, one at a time, enter the following 4 functions into y_2 and compare to the parent function $y_1 = |x|$. Record your observations below the graph.

a. $y_2 = |5x|$ b. $y_2 = |25x|$ a. $y_2 = \left|\frac{1}{10}x\right|$ b. $y_2 = |0.3x|$



H. Compression H. Stretch

3. Generalize: What happens to the graph of a function when you multiply x by a number inside the parenthesis?

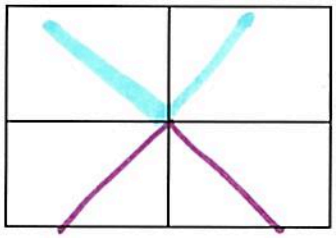
$b > 1$ Skinny H. Comp

$0 < b < 1$ Wider H. Stretch

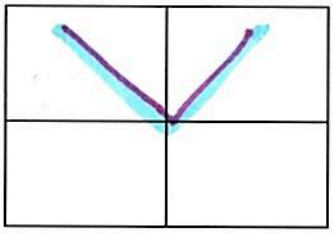
V. Explore Reflections

1. Enter the following into y_1 and y_2

a. $y_1 = |x|$ *and* $y_2 = -|x|$



b. $y_1 = |x|$ *and* $y_2 = |-x|$



2. Generalize: What happens to the graph of a function when you multiply the function by a negative outside of the function?

Flips over x-axis

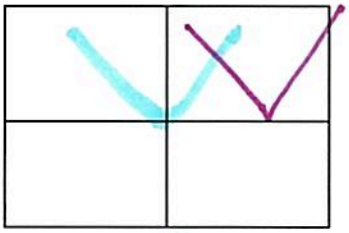
3. Generalize: What happens to the graph of a function when you multiply x by a negative inside of the function with x?

"no change" Flips over y-axis

VI. Multiple transformations

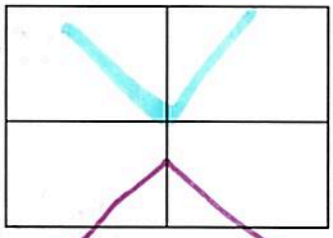
1. Enter the following into y_1 and y_2

a. $y_1 = |x|$ *and* $y_2 = |-(x-3)|$



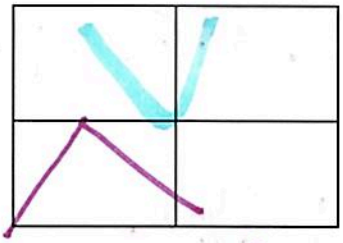
H. Flip, Right 3

b. $y_1 = |x|$ *and* $y_2 = -|x|-3$



V. Flip, down 3

c. $y_1 = |x|$ *and* $y_2 = -|(x+3)|$



V. Flip, Left 3

2. Generalize: What happens to the graph of a function when you multiply by a negative inside parenthesis and also subtract 3 inside the parenthesis? Which do you do first?

you must graph the reflection first

Pre-AP Algebra 2 **Name** _____
Evaluate **Date** _____ **Pd**___

Given the equation $y=|x|$ write the new equation, in y= form, after the following transformations. Also describe the transformation in words.

1. $f(x+2)$

Equation:

$y=|x+2|$

Words:

left 2

2. $f(x)+2$

Equation:

$y=|x|+2$

Words:

up 2

3. $-f(x+1)$

Equation:

$y=-|x+1|$

Words:

V. Flip, left 1 over x-axis

4. $f(-x)+5$

Equation:

$y=|-x|+5$

Words:

H. Reflection over y-axis, up 5

5. $f(-(x+2))+1$

Equation:

$y=|-(x+2)|+1$

Words:

H. Reflection over y-axis
Left 2, up 1

6. $2f(x)-3$

Equation:

$y=2|x|-3$

Words:

V. Stretch
down 3

7. $f(\frac{1}{2}x)$

Equation:

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

Words:

H. Stretch

8. $f(3x)+4$

Equation:

$y=|3x|+4$

Words:

H. compression
up 4

9. $\frac{1}{2}f(x)$

Equation:

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

Words:

V. Compression