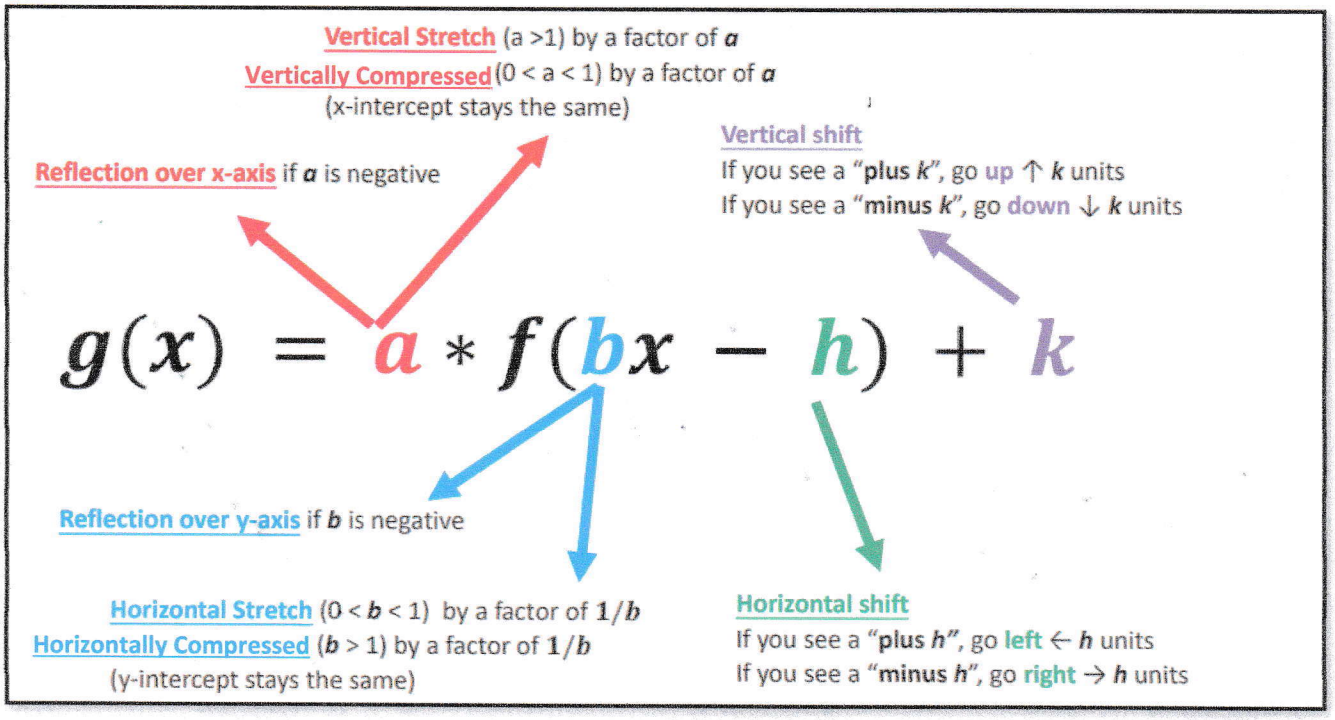
Transformations of the Parent Function Day 2

Unit 2

Lesson 8

Essential Question: How do the constants multiplied in an equation affect the graph of a line? Answer on your response card.

Yesterday we learned how adding or subtracting a number affects a function causing translations. Today we will learn about stretches and shrinks in a function.



For each of the following, describe the transformation(s).

$\overset{a}{-}f(x)$ • reflected over x-axis

$f\left(\overset{b}{\frac{1}{3}}x\right)$ • horizontal stretch

$\overset{a}{2}f(x-\overset{h}{5})$ • vertical stretch (narrow/steep)

• Shift left 5

$\overset{a}{-}f(\overset{b}{2}x)-\overset{k}{3}$

• reflection over x-axis

• Horizontally Compressed

• Shift Down 3

$\overset{a}{\frac{1}{2}}f(x+\overset{h}{4})-\overset{k}{2}$

• Vertical Compression (flatter/wider)

• Shift left 4

• Shift Down 2

$f(\overset{b}{3}x-\overset{h}{4})+\overset{k}{1}$

• Horizontal Compressed

• Shift right 4

• Shift Up 1

For the questions below, describe the transformation, complete the tables, sketch the resulting graphs.

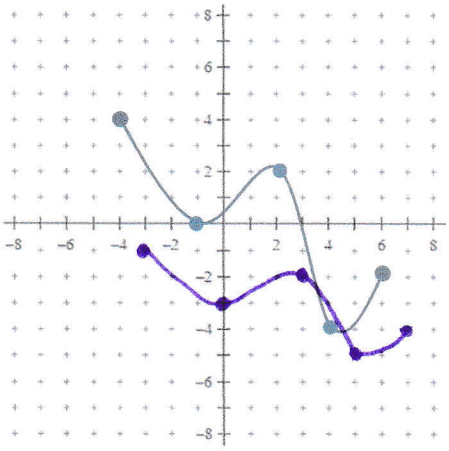
Use points from the linear parent function $y=x$

$y = \frac{1}{2}f(x-1) - 3$

Describe: Vertical compress, right 1, down 3

x	y
$-4+1$	$\frac{1}{2}(-4)-3$
$-1+1$	$\frac{1}{2}(0)-3$
$2+1$	$\frac{1}{2}(2)-3$
$4+1$	$\frac{1}{2}(4)-3$
$6+1$	$\frac{1}{2}(6)-3$

x	y
-3	-1
0	-3
3	-2
5	-5
7	-4



x-values

$x-1 = \#$

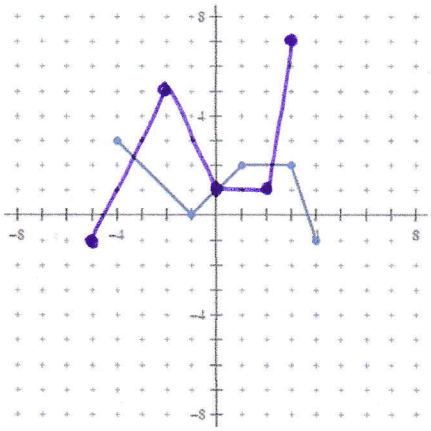
$x = \# + 1$

$y = -2f(x+1) + 5$

Describe: Vertical stretch, reflection, left 1, up 5

x	y
-1	$-2(-3)+5$
-1	$-2(0)+5$
-1	$-2(2)+5$
-1	$-2(3)+5$
-1	$-2(4)+5$

x	y
-5	-1
-2	5
0	1
2	1
3	7



x-values

$x+1 = \#$

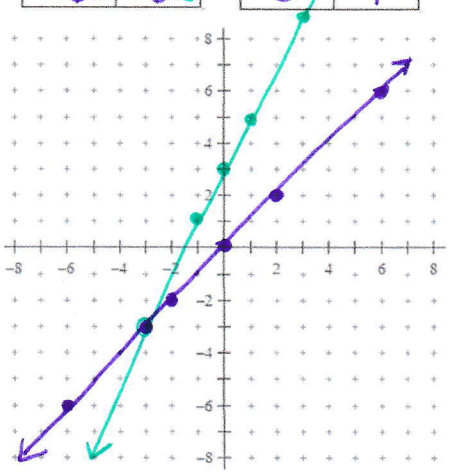
$x = \# - 1$

$y = f(2x) + 3$

Describe: Horizontal Compression, up 3

x	y
$-6\div 2$	$-6+3$
$-2\div 2$	$-2+3$
$0\div 2$	$0+3$
$2\div 2$	$2+3$
$6\div 2$	$6+3$

x	y
-3	-3
-1	1
0	3
1	5
3	9



x-values

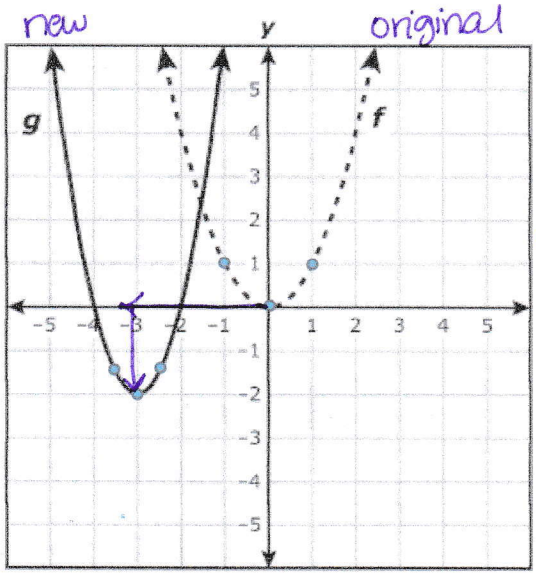
$2x = \#$

$x = \frac{\#}{2}$

Practice STAAR Question

The quadratic function $f(x) = x^2$ is transformed to create g as shown in the graph.

new original



left 3

down 2

narrower

What is the equation for g?

Ⓐ $g(x) = f(x+3) - 2$

Ⓑ $g(x) = 2f(x+3) - 2$

~~Ⓒ $g(x) = f(x-3) + 2$~~ up 2

~~Ⓓ $g(x) = 2f(x-3) + 2$~~ up 2