

**1.5 GRAPHICAL TRANSFORMATIONS**

Learning Targets for 1.5

1. Be able to graph transformations of parent functions
2. Be able to adjust the function when there is a horizontal stretch/shrink AND a left/right movement.

You **MUST** be able to graph the parent functions from 1.3 in order to successfully transform them.

A transformation is a stretch/shrink, a reflection, or simple movement of a parent function horizontally or vertically.

The general rule ... “Inside ...  $x$ 's ... opposite” and “Outside ...  $y$ 's ... same”

*Example 1:* Suppose you are given the function  $f(x)$ . If  $a$ ,  $b$ ,  $c$ , and  $d$  are real numbers, our transformed function is

$$a \cdot f(b(x+c)) + d$$

- a) Identify which letters are inside the function and which letters are outside.
- b) For the outside letters, describe how they transform the original function.
- c) For the inside letters, describe how they transform the original function.

Another way to look at this is with the following chart:

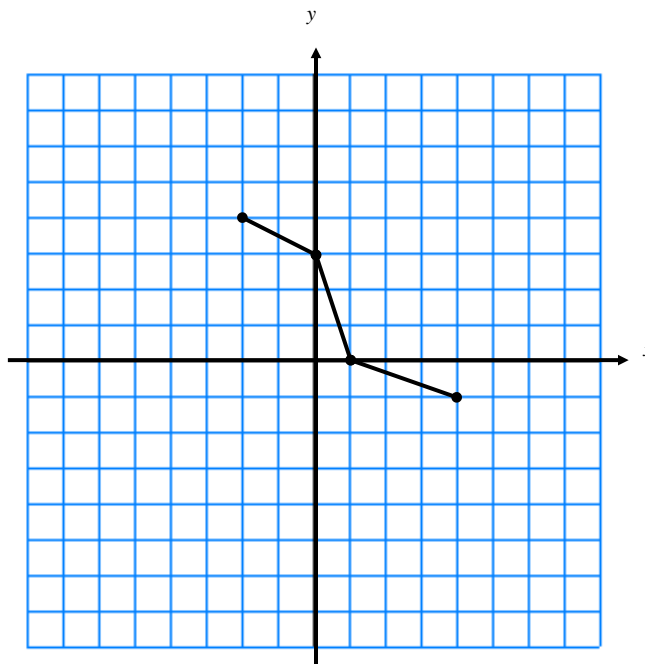
	Inside		Outside	
+/-	$f(x+c)$	$f(x-c)$	$f(x)+d$	$f(x)-d$
$\times/\div$	$f(bx)$	$f(-x)$	$a \cdot f(x)$	$-f(x)$

*Example 2:* Perform the following transformations on the graph of  $f(x)$  below:

a)  $f(x+3)+2$

b)  $-2f\left(\frac{x}{3}\right)$

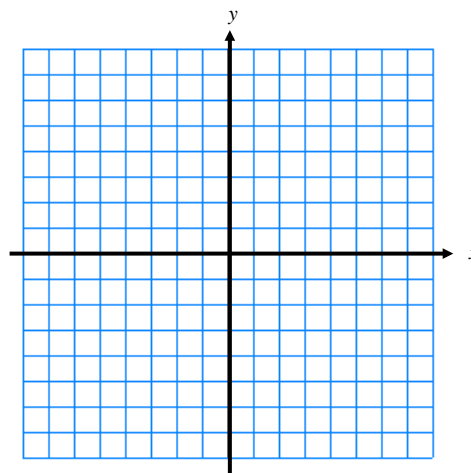
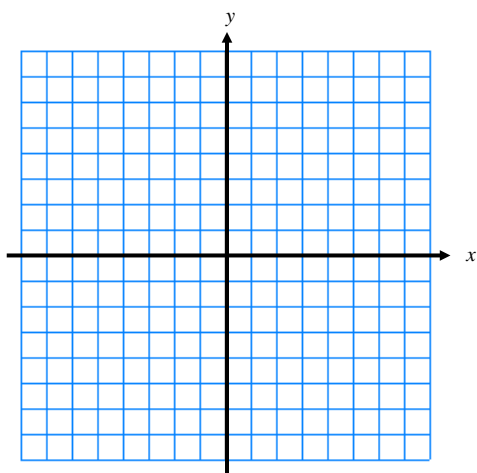
c)  $f(2x+6)$



*Example 3:* Graph the following functions by transforming their parent functions: **\*\*MOST OFTEN MISSED\*\***

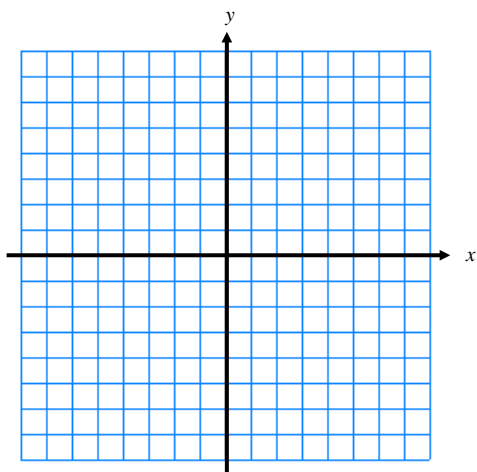
a)  $f(x) = \sqrt{3x-6}$

b)  $g(x) = \sqrt{5-x}$

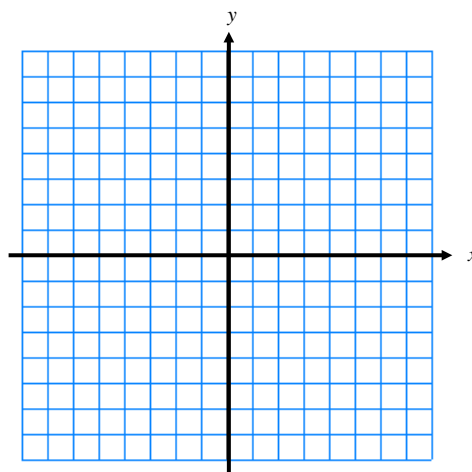


Example 4: Graph the following functions:

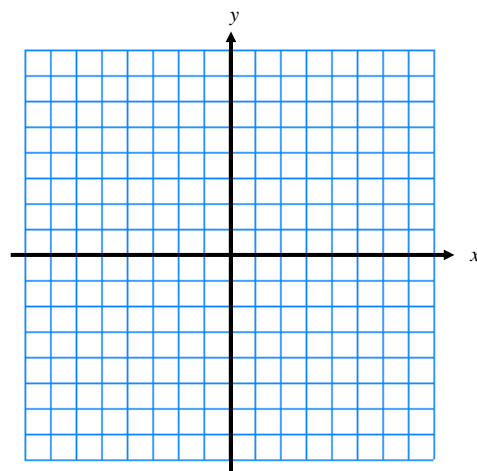
a)  $h(x) = \frac{1}{x+2} - 3$



b)  $k(x) = \log_4(x-2) + 1$



c)  $n(x) = 3|x-2| + 1$



d)  $p(x) = 3^{x/2} - 1$

