

TRANSFORMATIONS/PARENT FUNCTIONS (after §1.4)

If the parent function is $F(x)$, then the function

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

transforms the original function in the following ways:

a is a vertical stretch (if $a > 1$) or shrink (if $a < 1$) ... multiply y -values by a

b is a horizontal stretch (if $b < 1$) or shrink (if $b > 1$) ... divide x -values by b

c is a horizontal shift right (if $c < 0$) or left (if $c > 0$) ... $\pm c$ to x -values

d is a vertical shift up (if $d > 0$) or down (if $d < 0$) ... $\pm d$ to y -values

Be sure that b is factored ... If a is negative, the function is reflected across the x -axis, and if b is negative the function is reflected across the y -axis.

When given multiple transformations in the same problem, deal with the a and b first (reflections and stretching/shrinking), then with the translations c and d .

This chart says basically the same thing as the information on the previous card.

	Inside		Outside	
$+/-$	$f(x+c)$ Left	$f(x-c)$ Right	$f(x)+d$ Up	$f(x)-d$ Down
\times/\div	$f(bx)$ Horiz. Stretch if $b < 1$ Horiz. Shrink if $b > 1$	$f(-x)$ Reflects across the y -axis	$a \cdot f(x)$ Vertical Stretch if $a > 1$ Vertical Shrink if $a < 1$	$-f(x)$ Reflects across the x -axis.
	Inside changes the function in the x direction and is opposite		Outside changes the function in the y direction and is direct	

Parent Functions you should be able to recognize/graph WITHOUT a calculator:

$$y = x$$

$$y = |x|$$

$$y = x^2$$

$$y = |x|$$

$$y = \sqrt{x} = x^{1/2}$$

$$y = \sqrt[3]{x} = x^{1/3}$$

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

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

$$y = \log x$$

$$y = a \cdot b^x \text{ if } b > 1$$

$$y = a \cdot b^x \text{ if } 0 < b < 1$$

ALL 6 Trig Functions

ALL 6 Inverse Trig Functions