

Transformations of Functions

The following table summarizes the various transformations of the graph of $y = f(x)$ for any function f .

In all cases, assume that the constant c is a *positive* number. For the vertical and horizontal dilations, assume further that $c > 1$.

Transformation	Function	Description
Horizontal Shift	$f(x - c)$	Shift right c units
	$f(x + c)$	Shift left c units
Vertical Shift	$f(x) + c$	Shift up c units
	$f(x) - c$	Shift down c units
Reflection	$f(-x)$	Reflect across the y -axis
	$-f(x)$	Reflect across the x -axis
Vertical Dilation	$cf(x)$	Stretch vertically by a factor of c
	$\frac{1}{c}f(x)$	Compress vertically by a factor of c
Horizontal Dilation	$f(cx)$	Compress horizontally by a factor of c
	$f(\frac{1}{c}x)$	Stretch horizontally by a factor of c