

Transformations

Operation	Change in	Change in Coordinates	Change in Graph
$f(x)+c$	y	Add c	Shift Up
$f(x)-c$	y	Subtract c	Shift Down
$f(x+c)$	x	Subtract c	Shift Left
$f(x-c)$	x	Add c	Shift Right
$-f(x)$	y	Change sign	Reflect over x-axis
$f(-x)$	x	Change sign	Reflect over y-axis
$c \cdot f(x)$	y	Multiply by c	Vertical Stretch or Compression
$f(c \cdot x)$	x	Multiply by $\frac{1}{c}$	Horizontal Stretch or Compression

Vertical Compression (widens)	Vertical Stretch (narrows)	Horizontal Compression (narrows)	Horizontal Stretch (Widens)
Δy	Δy	Δx	Δx
$c < 1$	$c > 1$	$c > 1$	$c < 1$