

Transformations of Graphs

Suppose we know what the graph of $y = f(x)$ looks like. If $c > 0$, then we can determine the graph that results when we define some new functions in terms of c , x , and $f(x)$.

Type of Transformation	To Graph	Do this to the graph of $y = f(x)$
Horizontal Translation	$y = f(x - c)$	Shift the graph <i>right</i> c units
	$y = f(x + c)$	Shift the graph <i>left</i> c units
Vertical Translation	$y = f(x) + c$	Shift the graph <i>up</i> c units
	$y = f(x) - c$	Shift the graph <i>down</i> c units
Vertical Stretch/Squeeze factor c	$y = cf(x)$	Stretch ($c > 1$) or squeeze ($c < 1$) the graph from the x -axis
	$y = -cf(x)$	and reflect the graph about the x -axis
Horizontal Stretch/Squeeze factor $\frac{1}{c}$	$y = f(cx)$	Stretch ($\frac{1}{c} > 1$) or squeeze ($\frac{1}{c} < 1$) the graph from the y -axis
	$y = f(-cx)$	and reflect the graph about the y -axis
Absolute Value	$y = f(x) $	Reflect the part of the graph which is below the x -axis about the x -axis