

Function Translations

A. I. Assistant

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Function Translation Rules

Transformation Rules

The following table summarizes the rules for vertical translation of a function $y = f(x)$.

Table 1: Translation Rules

Function	Vertical Translation	Result	Point
$y = f(x)$	Upward by k units	$y = f(x) + k$	$(x, y + k)$
$y = f(x)$	Downward by k units	$y = f(x) - k$	$(x, y - k)$
$y = f(x)$	Right by h units	$y = f(x - h)$	$(x - h, y)$
$y = f(x)$	Left by h units	$y = f(x + h)$	$(x + h, y)$
$y = f(x)$	Stretch by h units	$y = f(x/h)$	$(x/h, y)$
$y = f(x)$	LeSft by h units	$y = f(x + h)$	$(x + h, y)$

Parent Translation

The following table summarizes the rules for horizontal translation of a function $y = f(x)$.

Table 2: Translating $f(x) = x^2$

Function	Vertical Translation	Result	Point
$y = x^2$	Upward by k units	$y = x^2 + k$	$(x, y + k)$
$y = x^2$	Downward by k units	$y = x^2 - k$	$(x, y - k)$
$y = x^2$	Right by h units	$y = (x - h)^2$	$(x - h, y)$
$y = x^2$	Left by h units	$y = (x + h)^2$	$(x + h, y)$
$y = x^2$	Stretch for $c \geq 1$	$y = 2f(x)$	$(x, 2y)$
$y = x^2$	Shrink for $0 < c < 1$	$y = \frac{1}{2}f(x)$	$(x, \frac{1}{2}y)$

Quadratic Function Transformations

Function	Vertical Translation	Resulting Equation	Transformed Point
$y = x^2$	Upward by k units	$y = x^2 + k$	$(x, y + k)$
$y = x^2$	Downward by k units	$y = x^2 - k$	$(x, y - k)$

Quadratic Function Transformations

Convert each of the following Transformations from function notation to words

$y = \frac{1}{2}f(x - 1) + 2$	$y = 5f(x) + 3$	$y = -2f(x + 1) - 2$	$y = f(x - 3) + 4$

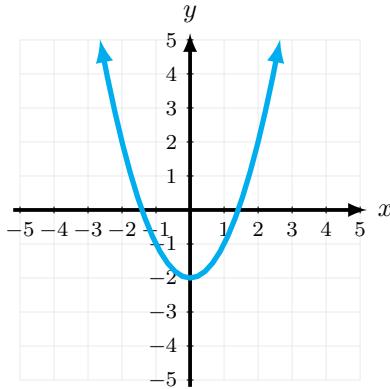
Quadratic Function Transformations

If $(3, 4)$ is a point on the graph $f(x)$, what ordered pair must also be on the graph of y using the same Transformation from above

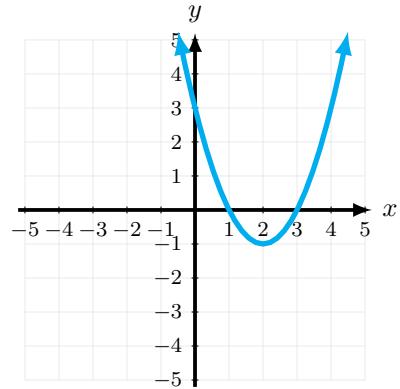
$y = \frac{1}{2}f(x - 1) + 2$	$y = 5f(x) + 3$	$y = -2f(x + 1) - 2$	$y = f(x - 3) + 4$
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Quadratic Function Transformations

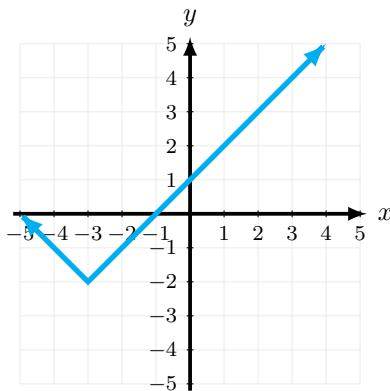
Adjust $y = f(x)$ below with transformation $y = 2f(x)$



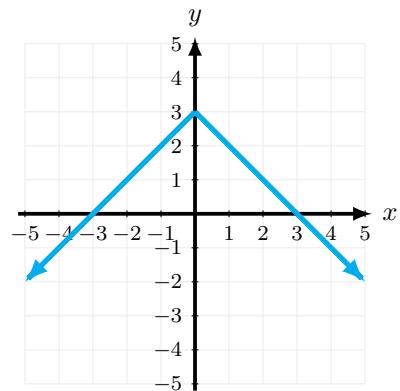
Adjust $y = g(x)$ below with transformation $y = -g(x)$



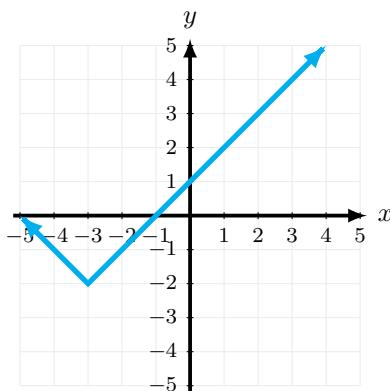
Adjust $y = h(x)$ below with transformation $y = h(x - 3)$



Adjust $y = k(x)$ below with transformation $y = -k(x) - 3$



Adjust $y = h(x)$ below with transformation $y = h(x - 3)$



Adjust $y = k(x)$ below with transformation $y = -k(x) - 3$

