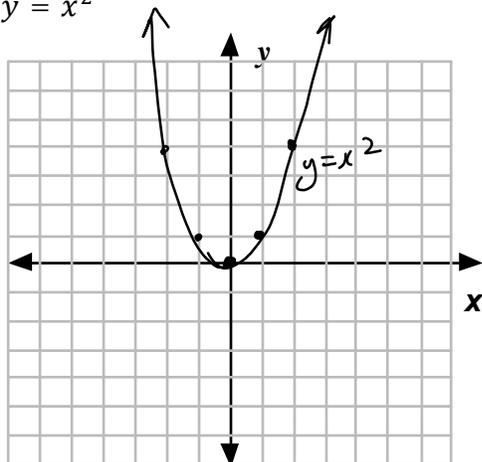


Unit 1: Function Transformations

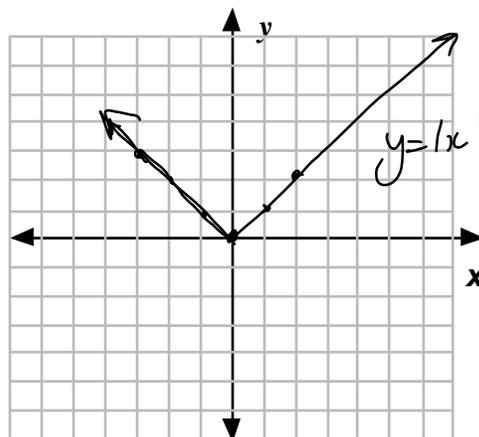
1.1 Horizontal & Vertical Translations

Recall:

$$y = x^2$$

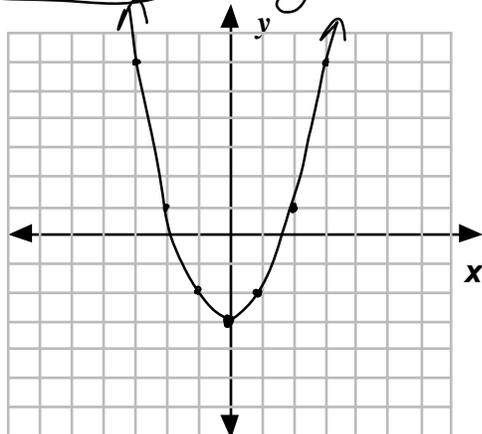


$$y = |x|$$

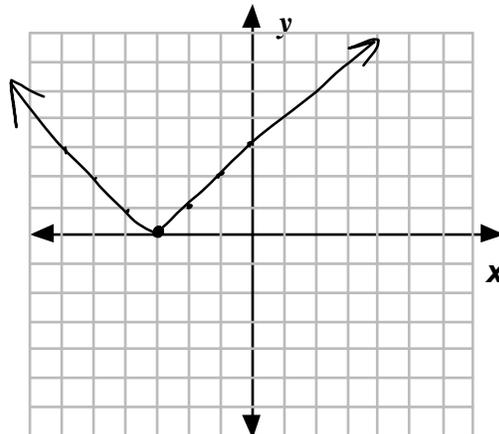


What about?

$$y + 3 = x^2 \Rightarrow y = x^2 - 3$$



$$y = |x + 3|$$



Transformation: change made to a figure or a relation such that the figure or the graph of the relation is shifted or changed in shape

Mapping: the relationship between an original set of points and their image set under a transformation

Translation: slide transformation that moves a graph without changing its shape or orientation

Horizontal Translation:

$$y = f(x - h)$$

Vertical Translation:

$$y = f(x) + k \text{ OR } y - k = f(x)$$

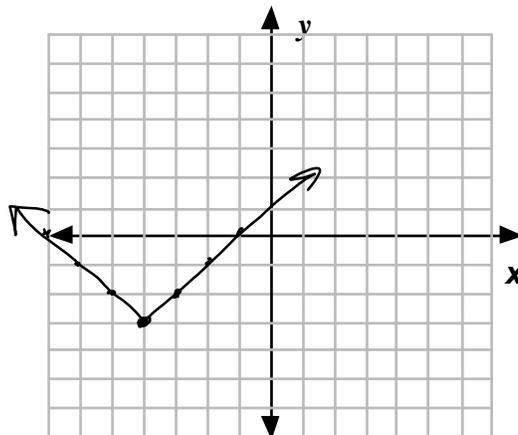
* vertex form
quadratics

$$y = a(x - p)^2 + q$$

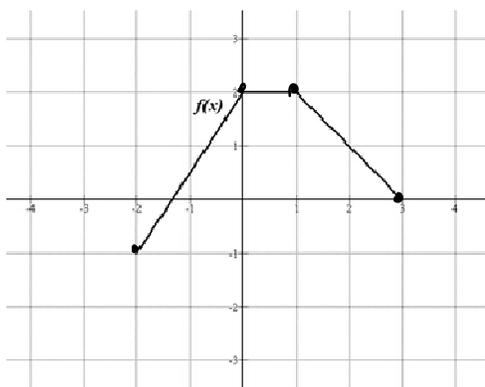
An alternate way of demonstrating a translation is by using mapping notation. A translation of "5 to the right and 4 up" would be written as $(x, y) \rightarrow (x+5, y+4)$, but in function notation, we would change $y = f(x)$ to $y = f(x-5) + 4$ or $y-4 = f(x-5)$.

Ex. Sketch a graph of $y = |x + 4| - 3$, and describe it in mapping notation: 4 left + 3 down

$$(x, y) \rightarrow (x-4, y-3)$$

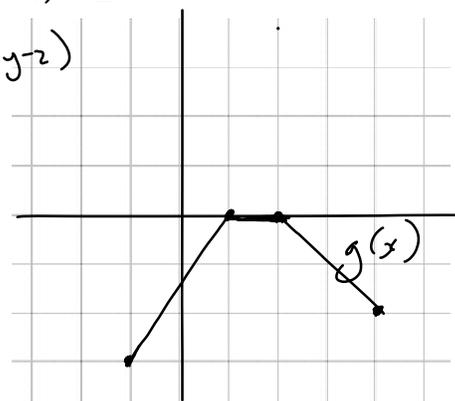


Ex. Given the graph of $f(x)$ shown sketch the graph of $g(x) = f(x-1) - 2$

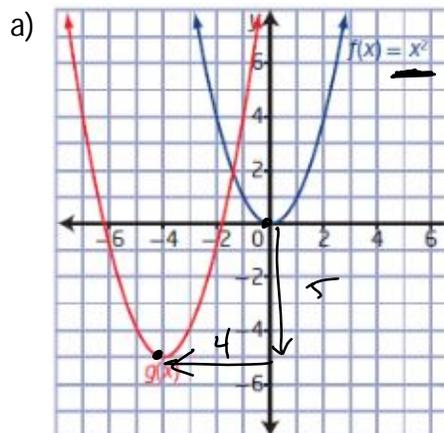


Mapping notation: $(x, y) \rightarrow (x+1, y-2)$

$f(x)$		$g(x)$	
x	y	$x+1$	$y-2$
-2	-1	-1	-3
0	2	1	0
1	2	2	0
3	0	4	-2



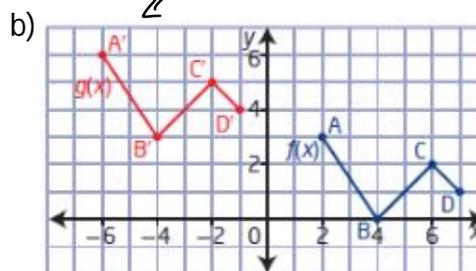
Ex. Determine the new equation of $g(x)$ from the original $f(x)$ in: $A' = \text{"A prime"}$



mapping notation: $(x, y) \rightarrow (x-4, y-5)$

translated $f(x)$ form: $g(x) = f(x+4) - 5$

explicit $g(x) = (x+4)^2 - 5$



mapping notation: $(x, y) \rightarrow (x-8, y+3)$

translated $f(x)$ form $g(x) = f(x+8) + 3$

~~explicit~~ $g(x) =$