1-3 NOTES Linear functions

Horizontal Translation ⇔

Use $f(x) \rightarrow f(x - h)$.

$h > 0$ right, $h < 0$ left

$f(x) = 3x + 1$

translate right by 2

$g(x) = 3(x - 2) + 1$

$\boxed{g(x) = 3x - 5}$

same slope, diff. y-int.

Vertical Translation ⇕

Use $f(x) \rightarrow f(x) + k$.

$K > 0$, up

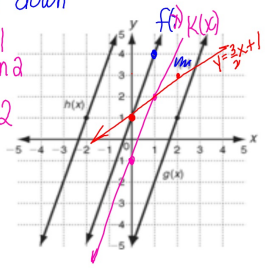
$K < 0$ down

$f(x) = 3x + 1$

translate down 2

$K(x) = (3x + 1) - 2$

$\boxed{K(x) = 3x - 1}$



Horizontal stretch or compression by a factor of *b*

Use $f(x) \rightarrow f\left(\frac{1}{b}x\right)$.

$b > 1$ stretch

$0 < b < 1$ compression

$f(x) = 3x + 1$

horiz. stretch factor 2

$g(x) = 3\left(\frac{1}{2}x\right) + 1$

$g(x) = \frac{3}{2}x + 1$

Vertical stretch or compression by a factor of *a*

Use $f(x) \rightarrow a \cdot f(x)$.

$a > 1$ or $a < -1$ vert stretch

$0 < a < 1$ or $-1 < a < 0$ vert. compression

$f(x) = 2x + 1$

vert. compression by factor of $\frac{1}{4}$

$g(x) = \frac{1}{4}(2x + 1) = \frac{1}{2}x + \frac{1}{4}$