1.4 Graphing Functions

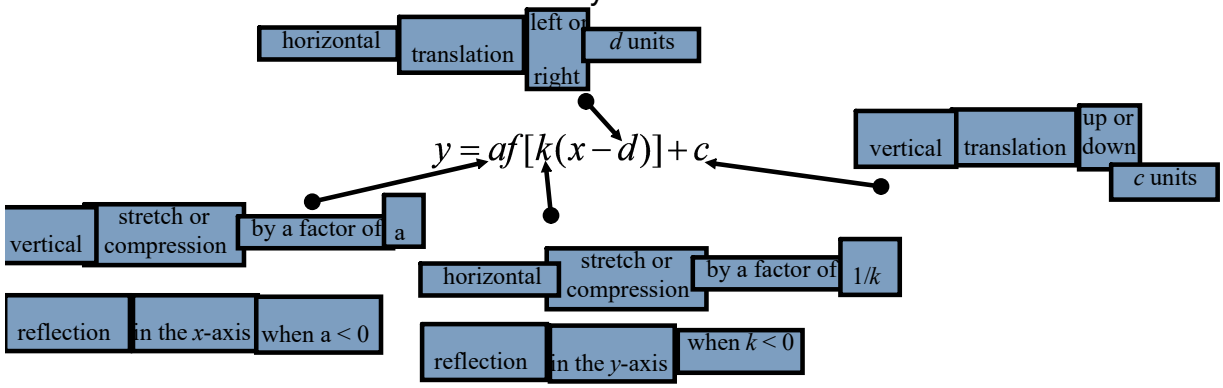
Math Learning Target:

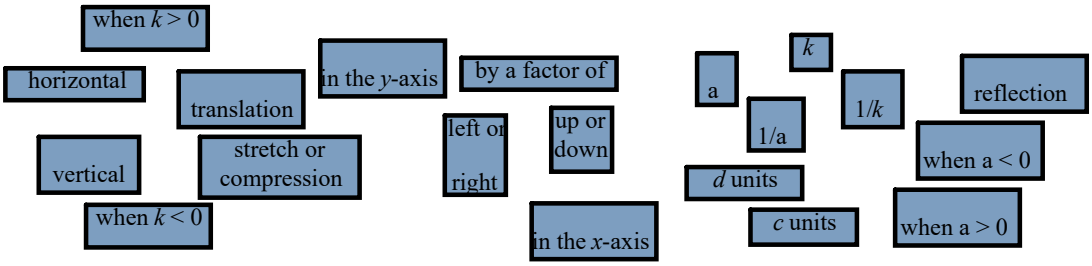
"When I am given the equation of a transformed parent function, I can describe all transformations in order, determine a mapping formula, and graph the function.
When transformations are described, I can find its equation and graph.
I can state all properties about a transformed parent function."

The function $y = f(x)$ can be transformed into $y = af[k(x-d)]+c$

Use as many terms and values below to describe all of the possible transformations

Some may not be used.





Ex. 1 State the function that would result from horizontally compressing $y = f(x)$ by a factor of 1/4, and then translating it 3 units left.

$k = 4$

$d = -3$

$y = f[4(x-(-3))]$

$= f[4(x+3)]$

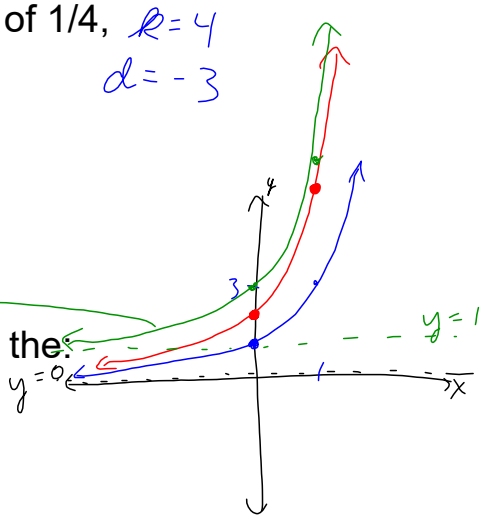
Ex. 2 For the function $y = 2 \cdot 3^x + 1$, state the:

a) parent function $y = 3^x$

b) domain and range

c) intervals of increase/decrease

d) end behaviours

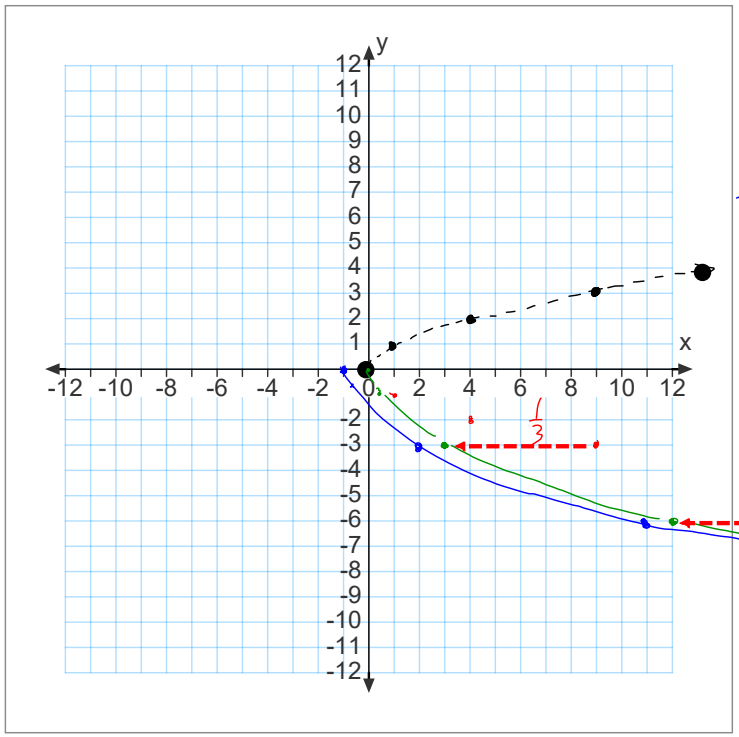


b) D: $(-\infty, \infty)$ R: $(1, \infty)$

c) Inc: $(-\infty, \infty)$ Dec: NONE

d) as $x \to \infty$, $y \to \infty$; $x \to -\infty$, $y \to 1$

Ex. 3 Describe, in order of application, thetransformations of $f(x)=\sqrt{x}$ defined by $y=-f[3x+3]$.
Graph the transformed function, and state the equation.



$y=-f[3(x+1)]$

$a=-1$ reflection in the x-axis

$k=3$ h.c. by a factor of $\frac{1}{3}$

$d=-1$ h.t. 1 unit left

$f(x)=-\sqrt{3(x+1)}$

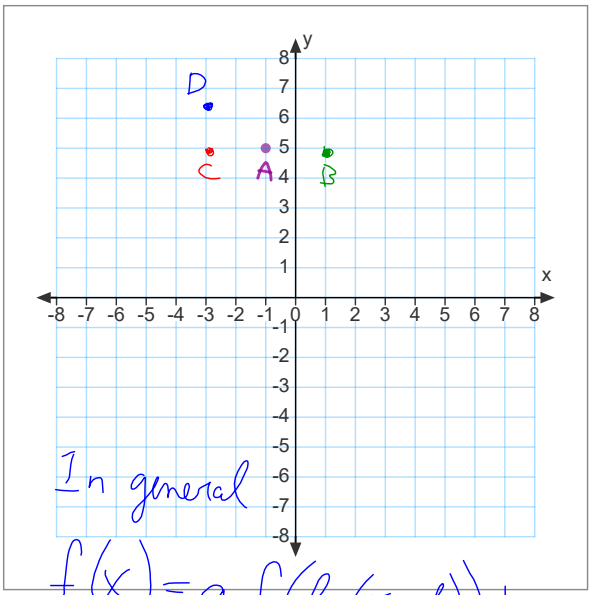
$\frac{1}{3}$

(36,-6)

Ex. 4 The point (-1, 5) belongs to the function $y=f(x)$.
Determine its corresponding coordinates for the function $y=f(-x-4)+\frac{3}{2}$.

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

Graphically



In general

$f(x)=af(k(x-d))+c$

$(x,y)\rightarrow\left(\frac{1}{k}x+d,\ ay+c\right)$

Numerically

x	y
$-1(-1)-4$	$(5)+\frac{3}{2}$
$=1-4$	$=6\frac{1}{2}$
$=-3$	

$\therefore(-1,5)\rightarrow\left(-3,6\frac{1}{2}\right)$

Algebraically
(mapping formula)

$(x,y)\rightarrow\left(-x-4,\ y+\frac{3}{2}\right)$

$(-1,5)\rightarrow\left(-(-1)-4,\ (5)+\frac{3}{2}\right)$

$\rightarrow\left(-3,\ 6\frac{1}{2}\right)$

Do all questions on the worksheet