Graphing Functions by Transforming Basic Functions

Making the Moves:

METHOD 1

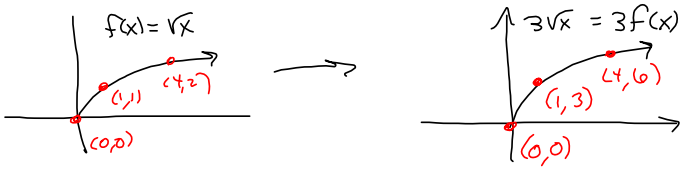
1. Vertical stretch (shrink) $af(x)$ $(x,y) \longmapsto (x, ay)$
2. Horizontal stretch (shrink) $f(bx)$ $(x,y) \longmapsto (\frac{1}{b}x, y)$
3. Horizontal shift $f(x+c)$ $(x,y) \longmapsto (x-c, y)$
4. Vertical shift $f(x)+d$ $(x,y) \longmapsto (x, y+d)$

METHOD 2

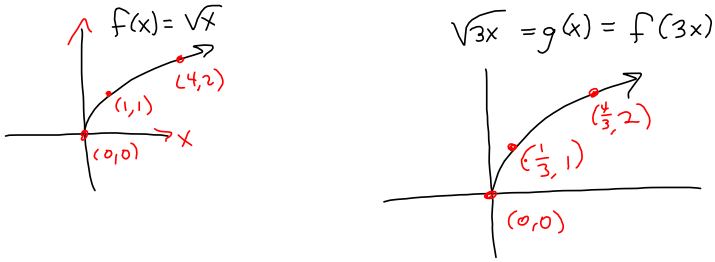
1. Vertical stretch
2. Horizontal shift
3. Horizontal stretch
4. Vertical shift

Vertical $f(x) = \sqrt{x}$

$g(x) = 3\sqrt{x} = 3f(x)$



HORIZONTAL STRETCH $g(x) = \sqrt{3x} = f(3x)$

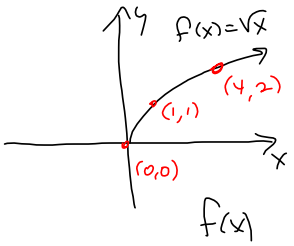


$g(x) = \sqrt{3x}$

x	y
0	0
$\frac{1}{3}$	1
$\frac{4}{3}$	2

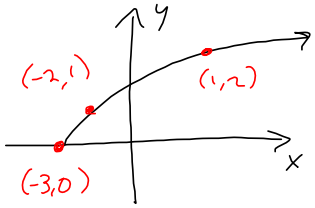
$\sqrt{3(\frac{1}{3})} = \sqrt{1} = 1$

$f(x+c)$



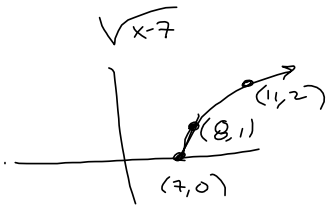
$g(x) = \sqrt{x+3}$

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



LEFT 3

$(x,y) \longmapsto (x-3,y)$



VERTICAL SHIFT $f(x) + d$

$\sqrt{x} + 3$ ← NOT INSIDE THE RADICAL