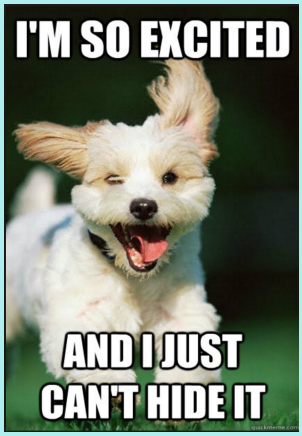


Transformations!

Transformations of the Square-Root Parent Function $f(x) = \sqrt{x}$		
Transformation	$f(x)$ Notation	Examples
Vertical translation	$f(x) + k$	$y = \sqrt{x} + 3$ 3 units up $y = \sqrt{x} - 4$ 4 units down
Horizontal translation	$f(x - h)$	$y = \sqrt{x - 2}$ 2 units right $y = \sqrt{x + 1}$ 1 unit left
Vertical stretch/ compression	$af(x)$	$y = 6\sqrt{x}$ vertical stretch by 6 $y = \frac{1}{2}\sqrt{x}$ vertical compression by $\frac{1}{2}$
Horizontal stretch/ compression	$f\left(\frac{1}{b}x\right)$	$y = \sqrt{\frac{1}{5}x}$ horizontal stretch by 5 $y = \sqrt{3x}$ horizontal compression by $\frac{1}{3}$
Reflection	$-f(x)$ $f(-x)$	$y = -\sqrt{x}$ across x-axis $y = \sqrt{-x}$ across y-axis

Try Some

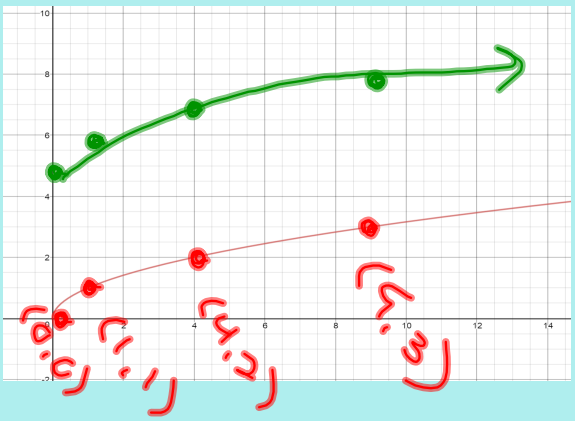
Using the graph of $f(x) = \sqrt{x}$ as a guide, describe the transformation and graph the function.

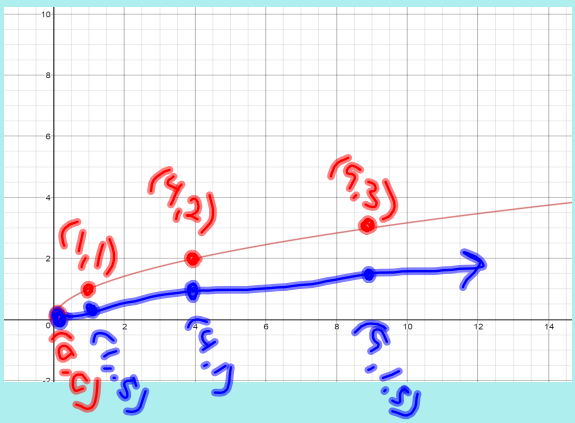
a) $g(x) = \sqrt{x} + 5$ g+5

• Vertical translation up 5

b) $g(x) = \frac{1}{2}\sqrt{x}$ y→½y

Vert. comp. factor ½





Why Stop at One Transformation?

$|a| \rightarrow$ vertical stretch or compression factor
$a < 0 \rightarrow$ reflection across the x-axis

$h \rightarrow$ horizontal translation

$$f(x) = a\sqrt{\frac{1}{b}(x - h)} + k$$

$|b| \rightarrow$ horizontal stretch or compression factor
$b < 0 \rightarrow$ reflection across the y-axis

$k \rightarrow$ vertical translation

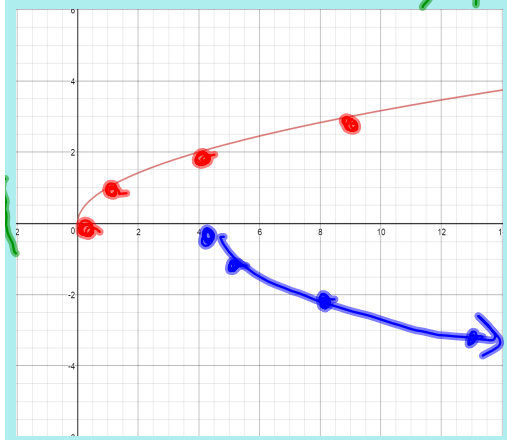
Using the graph of $f(x) = \sqrt{x}$ as a guide, describe the transformation and graph the function.

a) $g(x) = -\sqrt{x-4}$

y→-y

•Reflect over x-axis

•Horizontal transl right by 4 → x+4



b) $g(x) = -3\sqrt{x} - 1$ y→-y

① Reflect over x-axis

② Vert. stretch by 3 y→3y

③ Down 1 → y-1