Transformations of $\sqrt{x}$ - Worksheet

SOLUTIONS

MCR3U

Jensen

Key points of $y = \sqrt{x}$

x	y
0	0
1	1
4	2
9	3

1) 1) State the transformations to the parent function $f(x) = \sqrt{x}$ in the order that you would do them.

a) $f(x) = 2\sqrt{x+1} - 3$

- Vertical stretch bafo 2
- shift left 1 unit
- shift down 3 units

b) $f(x) = 3\sqrt{\frac{1}{2}(x-5)} + 4$

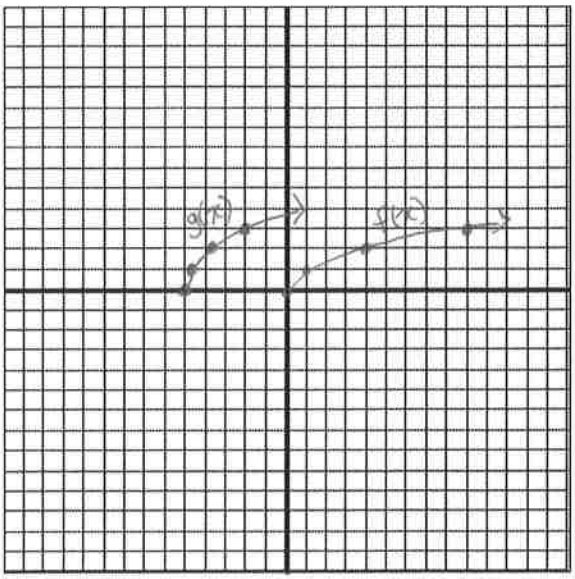
- vertical stretch bafo 3
- horizontal stretch bafo 2
- shift right 5 units
- shift up 4 units

c) $f(x) = -\frac{1}{2}\sqrt{-3(x)} - 6$

- vertical compression bafo $\frac{1}{2}$
- vertical reflection
- horizontal compression bafo $\frac{1}{3}$
- horizontal reflection
- shift down 6 units.

2) Graph the parent function, $f(x) = \sqrt{x}$. Describe the transformations in order, make a table of values of image points, write the equation of the transformed function and graph it.

a) $g(x) = f[3(x+5)]$



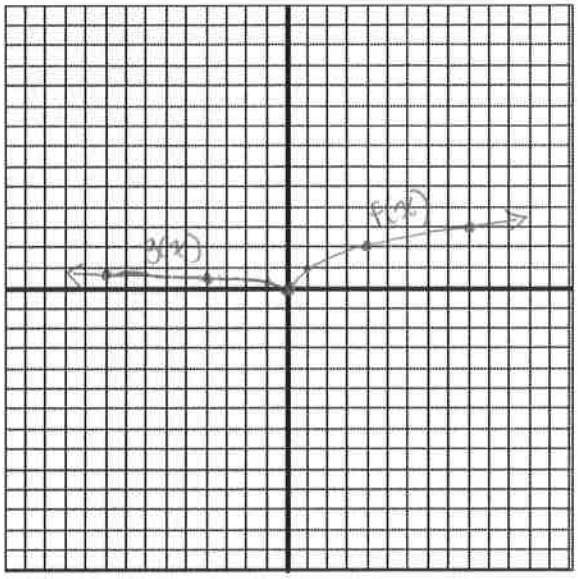
1) horizontal compression by a factor of $\frac{1}{3}$ $\left(\frac{x}{3}\right)$

2) shift left 5 units $(x+5)$

f(x)	$\frac{x}{3}-5$	y
(0,0)	-5	0
(1,1)	-4.7	1
(4,2)	-3.7	2
(9,3)	-2	3

$g(x) = \sqrt{3(x+5)}$

b) $g(x) = \frac{1}{4}f(-x)$



1) vertical compression by a factor of $\frac{1}{4}$ $\left(\frac{y}{4}\right)$

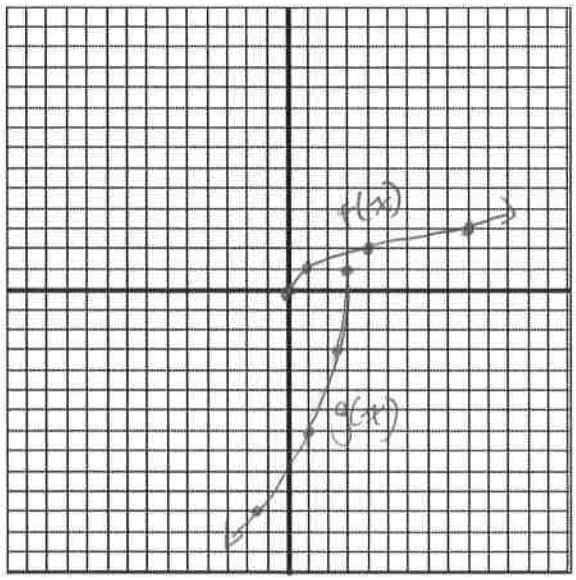
2) horizontal reflection $(-x)$

f(x)	-x	$\frac{y}{4}$
(0,0)	0	0
(1,1)	-1	0.25
(4,2)	-4	0.5
(9,3)	-9	0.75

$g(x) = \frac{1}{4}\sqrt{(-x)}$

c) $g(x) = -4f[-2(x-3)] + 1$

- vertical stretch bafo 4; vertical reflection $(-4y)$
- horizontal compression bafo $\frac{1}{2}$; horizontal reflection $\left(\frac{x}{-2}\right)$
- shift right 3 units $(x+3)$
- shift up 1 unit $(y+1)$



f(x)	g(x)	
	$\frac{x}{2}+3$	$-4y+1$
(0,0)	3	1
(1,1)	2.5	-3
(4,2)	1	-7
(9,3)	-1.5	-11

$g(x) = -4\sqrt{-2(x-3)} + 1$

3) Use the description to write the transformed function, *g(x)*.

a) The parent function $f(x) = \sqrt{x}$ is compressed vertically by a factor of $\frac{1}{3}$ and then translated (shifted) 3 units left.

$a = \frac{1}{3}$

$d = -3$

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

b) The parent function $f(x) = \sqrt{x}$ is reflected over the x-axis, stretch horizontally by a factor of 3 and then translated 1 unit left and 4 units down.

$a = -1$

$K = \frac{1}{3}$

$d = -1$

$c = -4$

$g(x) = -1\sqrt{\frac{1}{3}(x+1)} - 4$