Warm-Up...

Given that (-2 , 5) is a point on the graph of $y = f(x)$, determine the coordinates of this point once the following transformations are applied...

"Reciprocal" *

(1) $y = 3f(x)$

$(x,y) \to (x, 3y)$

$(-2,5) \to (-2, 3(+5))$

$\to (-2, 15)$

(2) $y = f\left(-\frac{1}{3}x\right)$

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

$(-2,5) \to (-3(-2), 5)$

$\to (6, 5)$

(3) $y = 4f\left[\frac{1}{2}(x+5)\right] - 3$

$(x,y) \to (2x-5, 4y-3)$

$(-2,5) \to (2(-2)-5, 4(5)-3)$

$\to (-9, 17)$

(4) $y - 5 = -2f(-2x+6)$

$y = -2f(-2(x-3)) + 5$

$(x,y) \to \left(-\frac{1}{2}x+3, -2y+5\right)$

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

$\to (4, -5)$

(5) * $3y - 8 = -6f(3x-9) + 1$

$\frac{3y}{3} = \frac{-6f(3x-9)}{3} + \frac{9}{3}$

$y = -2f(3x-9) + 3$

$y = -2f[3(x-3)] + 3$

$(x,y) \to \left(\frac{1}{3}x + 3, -2y + 3\right)$

$(-2,5) \to \left(\frac{1}{3}(-2) + \frac{9}{3}, -2(5)+3\right)$

$\to \left(\frac{7}{3}, -7\right)$

Summary of Transformations…

Transformations of the graphs of functions	
$f(x)+c$	shift $f(x)$ up c units
$f(x)-c$	shift $f(x)$ down c units
$f(x+c)$	shift $f(x)$ left c units
$f(x-c)$	shift $f(x)$ right c units
$f(-x)$	reflect $f(x)$ about the y-axis
$-f(x)$	reflect $f(x)$ about the x-axis
$cf(x)$	When $0 < c < 1$ – vertical shrinking of $f(x)$ When $c > 1$ – vertical stretching of $f(x)$ **Multiply the y values by c**
$f(cx)$	When $0 < c < 1$ – horizontal stretching of $f(x)$ When $c > 1$ – horizontal shrinking of $f(x)$ **Divide the x values by c**

$f(6x-12)$
$f(6(x-2)$

$$y = f(x) \longrightarrow y = af\left(b\left(x-c\right)\right)+d$$

Mapping Rule: $(x, y) \rightarrow \left(\frac{1}{b}x + c, ay + d\right)$

Important note for sketching...

Transformations should be applied in following order:

1. **Reflections**
2. **Stretches**
3. **Translations**

Remember....RST

The function $y = f(x)$ is transformed to the function $g(x) = -3f(4x - 16) - 10$. Copy and complete the following statements by filling in the blanks.

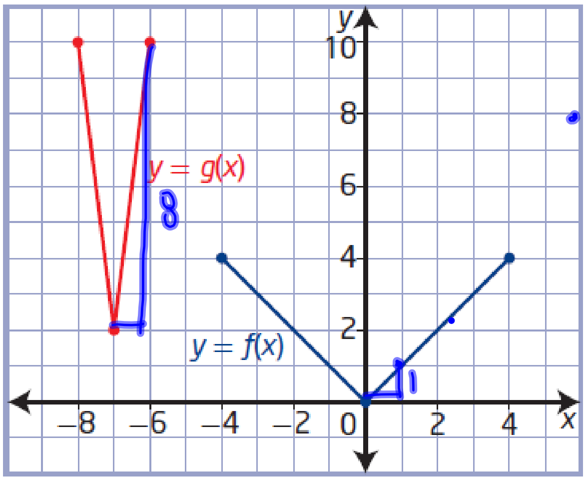
$4(x-4)$

The function $f(x)$ is transformed to the function $g(x)$ by a horizontal stretch about the $\boxed{a}$ by a factor of $\boxed{b}$. It is vertically stretched about the $\boxed{c}$ by a factor of $\boxed{d}$. It is reflected in the $\boxed{e}$, and then translated $\boxed{f}$ units to the right and $\boxed{g}$ units down.

a) y-axis
b) $\frac{1}{4}$
c) x-axis
d) 3
e) x-axis
f) 4
g) 10

Write the Equation of a Transformed Function Graph

The graph of the function $y = g(x)$ represents a transformation of the graph of $y = f(x)$. Determine the equation of $g(x)$ in the form $y = af(b(x - h)) + k$. Explain your answer.

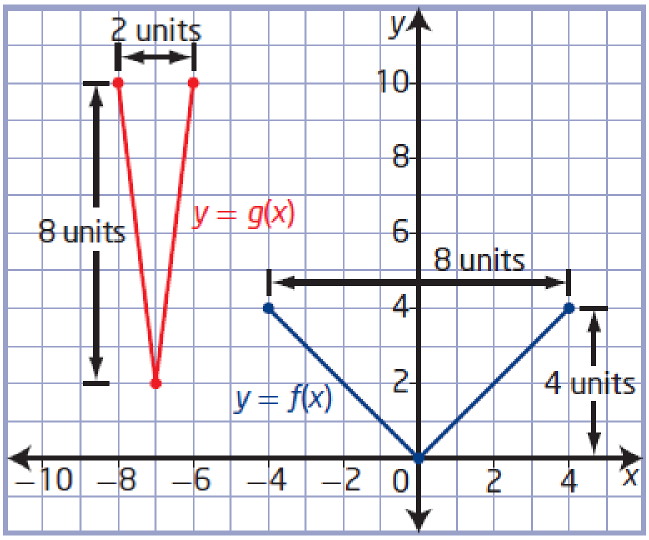


$y = 8f(x+7) + 2$

$y = f(8(x+7)) + 2$

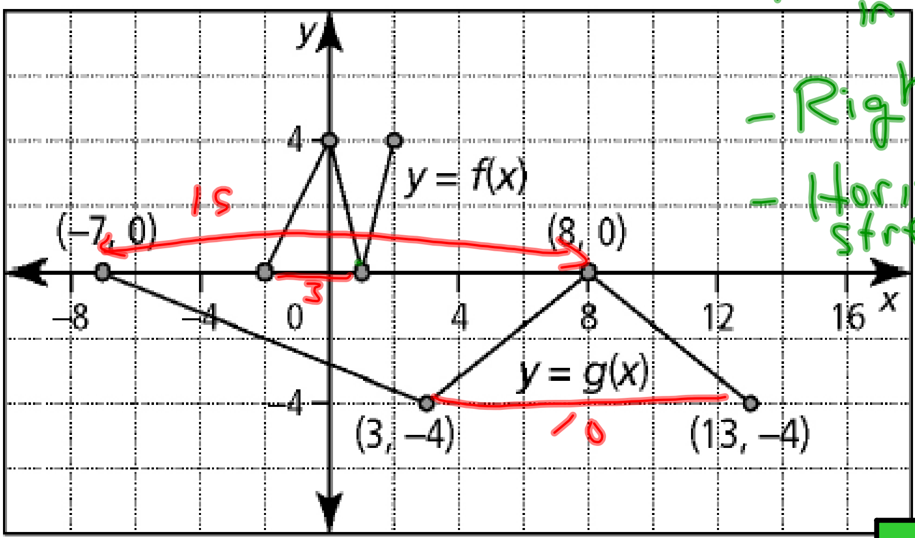
Solution

The equation of the transformed function is $g(x) = 2f(4(x + 7)) + 2$.



How could you use the mapping $(x, y) \rightarrow \left(\frac{1}{b}x + h, ay + k\right)$ to verify this equation?

The graph of the function $y = g(x)$ represents a transformation of the graph of $y = f(x)$. Determine the equation of $g(x)$ in the form $y = af(b(x - h)) + k$.



- Reflected in x-axis
- Right 3
- Horizontal stretch of 5

$$y = -f\left(\frac{1}{5}(x-3)\right)$$

Quiz Monday

Practice Problems...

Pages 39 - 41

#3, 4, 6, 7, 8, 10, 13, 14