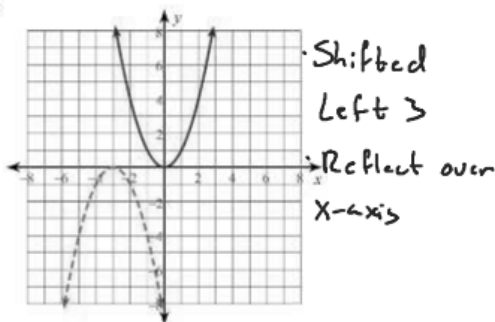


## Transformations of Graphs

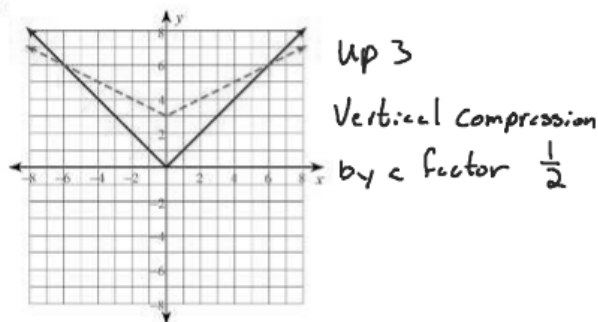
Date \_\_\_\_\_ Period \_\_\_\_\_

Describe the transformations necessary to transform the graph of  $f(x)$  (solid line) into that of  $g(x)$  (dashed line).

1)



2)



Describe the transformations necessary to transform the graph of  $f(x)$  into that of  $g(x)$ .

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

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

Reflection over x-axis  
Vert Stretch by factor 3  
Shift Down 1

$$4) f(x) = x^3$$

$$g(x) = 3(x+1)^3$$

• Vertical Stretch by factor of 3  
• Shift Left 1

Transform the given function  $f(x)$  as described and write the resulting function as an equation.

$$5) f(x) = x^2$$

expand vertically by a factor of 3  
translate down 3 units

$$g(x) = 3x^2 - 3$$

$$6) f(x) = \frac{1}{x}$$

~~compress horizontally by a factor of 2  
translate left 3 units~~

$$7) f(x) = |x|$$

expand ~~horizontally~~ <sup>vertically</sup> by a factor of 2  
translate right 1 unit  
translate up 3 units

$$g(x) = 2|x-1| + 3$$

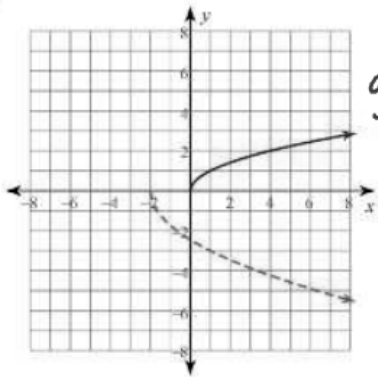
$$8) f(x) = \sqrt{x}$$

compress vertically by a factor of  $\frac{1}{3}$   
reflect across the x-axis  
translate right 2 units  
translate down 3 units

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

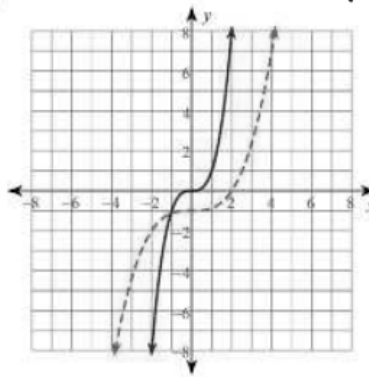
Write  $g(x)$  (dashed line) in terms of  $f(x)$  (solid line).

9)



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

10)

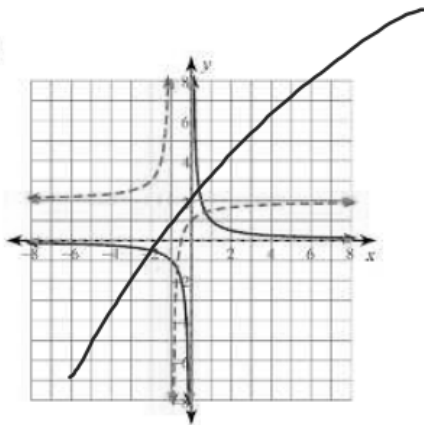


$$f(x) = x^3$$

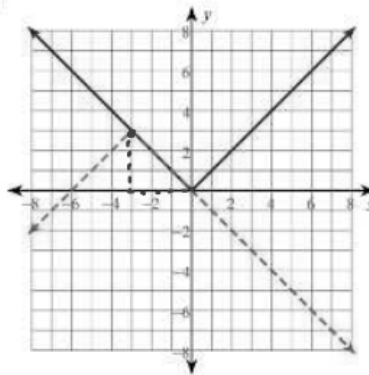
$$g(x) = \frac{1}{2}(x)^3 - 1$$

$$\frac{1}{2}x^3 - 1$$

11)



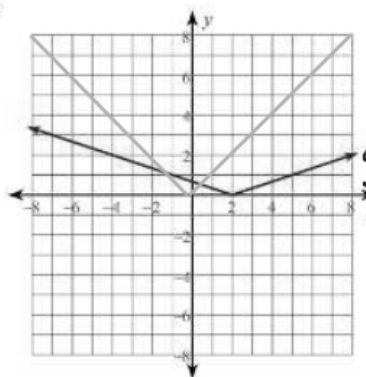
12)



$$g(x) = -|x+3|+3$$

Identify the parent function  $f(x)$  and write an equation for the function given.

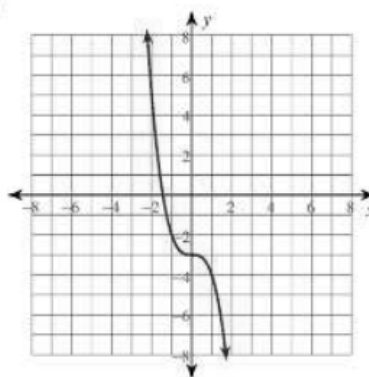
13)



$$f(x) = |x|$$

$$g(x) = \frac{1}{3}|x-2|$$

14)



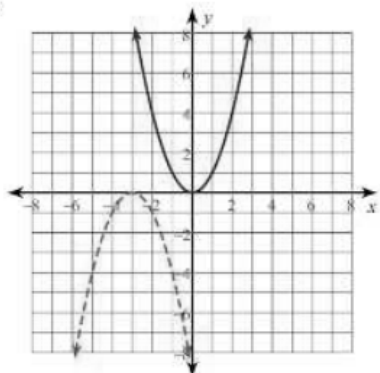
$$f(x) = x^3$$

$$g(x) = -x^3 - 3$$

## Transformations of Graphs

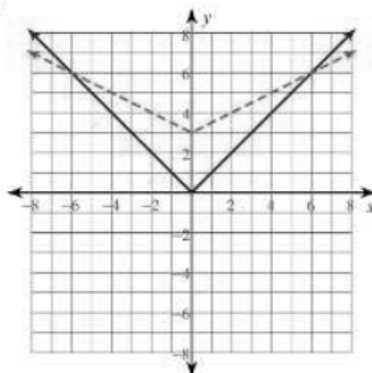
Describe the transformations necessary to transform the graph of  $f(x)$  (solid line) into that of  $g(x)$  (dashed line).

1)



reflect across the x-axis  
translate left 3 units

2)



compress vertically by a factor of 2  
translate up 3 units

Describe the transformations necessary to transform the graph of  $f(x)$  into that of  $g(x)$ .

$$3) \begin{aligned} f(x) &= \sqrt{x} \\ g(x) &= -3\sqrt{x} - 1 \end{aligned}$$

expand vertically by a factor of 3  
reflect across the x-axis  
translate down 1 unit

$$4) \begin{aligned} f(x) &= x^3 \\ g(x) &= 3(x+1)^3 \end{aligned}$$

expand vertically by a factor of 3  
translate left 1 unit

Transform the given function  $f(x)$  as described and write the resulting function as an equation.

$$5) \begin{aligned} f(x) &= x^2 \\ &\text{expand vertically by a factor of 3} \\ &\text{translate down 3 units} \end{aligned}$$

$$g(x) = 3x^2 - 3$$

$$6) \begin{aligned} f(x) &= \frac{1}{x} \\ &\text{compress horizontally by a factor of 2} \\ &\text{translate left 3 units} \end{aligned}$$

$$g(x) = \frac{1}{2(x+3)}$$

$$7) \begin{aligned} f(x) &= |x| \\ &\text{expand horizontally by a factor of 2} \\ &\text{translate right 1 unit} \\ &\text{translate up 3 units} \end{aligned}$$

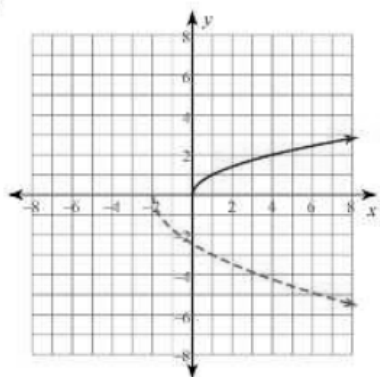
$$g(x) = \left| \frac{1}{2}(x-1) \right| + 3$$

$$8) \begin{aligned} f(x) &= \sqrt{x} \\ &\text{compress vertically by a factor of 3} \\ &\text{reflect across the x-axis} \\ &\text{translate right 2 units} \\ &\text{translate down 3 units} \end{aligned}$$

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

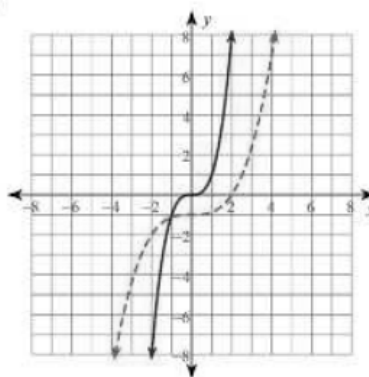
Write  $g(x)$  (dashed line) in terms of  $f(x)$  (solid line).

9)



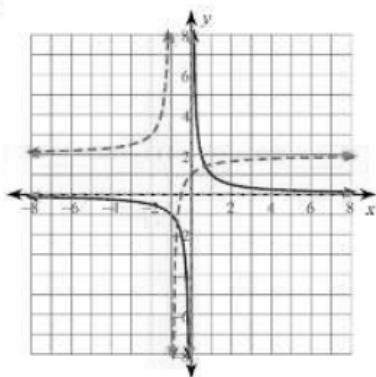
$$g(x) = -f(3(x+2))$$

10)



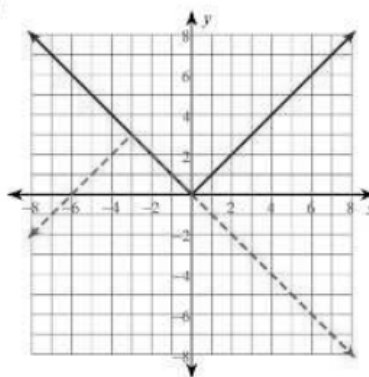
$$g(x) = f\left(\frac{1}{2}x\right) - 1$$

11)



$$g(x) = -f(x+1) + 2$$

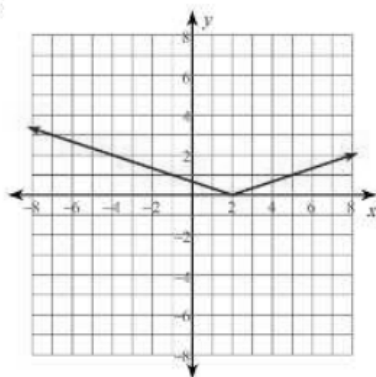
12)



$$g(x) = -f(x+3) + 3$$

Identify the parent function  $f(x)$  and write an equation for the function given.

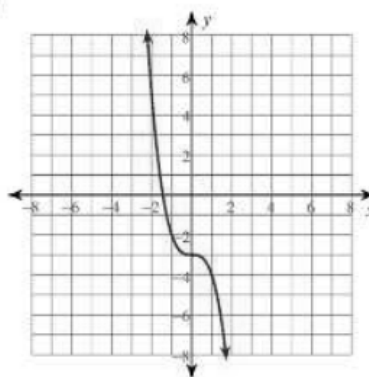
13)



$$\text{Parent: } f(x) = |x|$$

$$g(x) = \left| \frac{1}{3}(x-2) \right|$$

14)



$$\text{Parent: } f(x) = x^3$$

$$g(x) = -x^3 - 3$$