

## Individual Test 6.6 and 6.7

Given the functions  $f(x) = x^2 - 4$  and  $g(x) = x + 2$ . Perform the indicated operations. Make sure you simplify your final answers and **write them in standard form**.

1.  $(f + g)(x)$

$$x^2 - 4 + x + 2$$

1.  $x^2 + x - 2$

2.  $(g - f)(x)$

$$x + 2 - (x^2 - 4)$$
$$x + 2 - x^2 + 4$$

2.  $-x^2 + x + 6$

3.  $(f \cdot g)(x)$

$$(x^2 - 4)(x + 2)$$
$$x^3 + 2x^2 - 4x - 8$$

3.  $x^3 + 2x^2 - 4x - 8$

4.  $(g \cdot g)(x)$

$$(x + 2)(x + 2)$$
$$x^2 + 4x + 4$$

4.  $x^2 + 4x + 4$

5.  $\frac{f}{g}(x)$

$$\frac{x^2 - 4}{x - 2}$$
$$\frac{(x - 2)(x + 2)}{\cancel{x - 2}}$$

5.  $x + 2$

6.  $g \circ f(x)$

$$g(f(x))$$
$$(x^2 - 4) + 2$$

6.  $x^2 - 2$

7.  $f(g(x))$

$$(x + 2)^2 - 4$$
$$x + 4x + 4 - 4$$

7.  $x + 4x$

8.  $g(f(-1))$

$$f(-1) = (-1)^2 - 4$$
$$= 1 - 4 = -3$$
$$g(-3) = -3 + 2 = -1$$

8.  $-1$

9.  $f(g(1))$

$$g(1) = 1 + 2 = 3$$
$$f(3) = 3^2 - 4$$
$$= 9 - 4 = 5$$

9.  $5$

10.  $5(g(3)) + f(3)$

$$g(3) = 3 + 2 = 5$$
$$5 \cdot 5 = 25$$

$$f(3) = 3^2 - 4 = 9 - 4 = 5$$
$$25 + 5 = 30$$

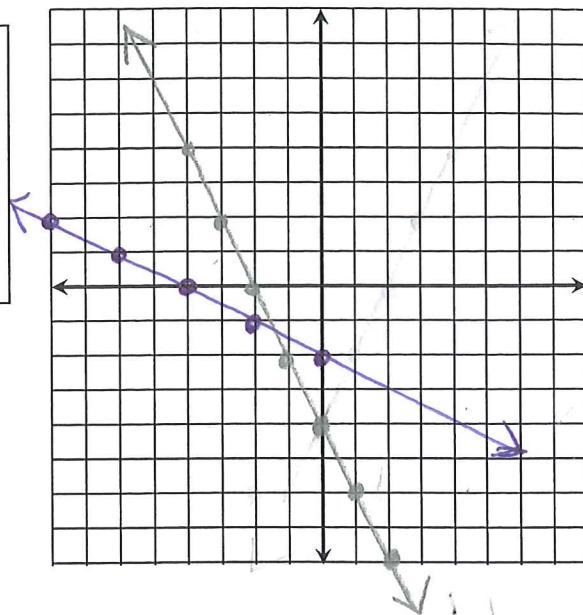
10.

$30$

Graph the functions and state the domain and range. Then find the inverse relation of the functions and state whether or not the inverse is a function. Find the inverse relation's domain and range. Label your graphs.

11.  $f(x) = -2x - 4$

Inverse relation:  
 $y = -2x - 4$   
 $x = -2y - 4$   
 $x + 4 = -2y$   
 $y = -\frac{1}{2}x - 2$



x	y
0	-4
1	-6
2	-8
-1	-2
-2	0

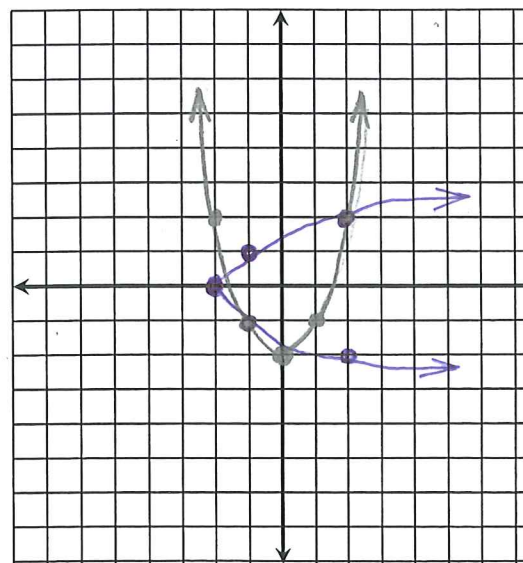
x	y
-4	0
-6	1
-8	2
-2	-1
0	-2

$f(x) = \left\{ \begin{array}{l} \text{domain} = \text{all real numbers} \\ \text{range} = \text{all real numbers} \end{array} \right\}$

$f^{-1}(x) = \left\{ \begin{array}{l} \text{domain} = \text{all real numbers} \\ \text{range} = \text{all real numbers} \end{array} \right\}$

12.  $f(x) = x^2 - 2$

Inverse relation:  
 $y = x^2 - 2$   
 $x = y^2 - 2$   
 $x + 2 = y^2$   
 $\pm\sqrt{x+2} = y$



x	y
-2	2
-1	-1
0	-2
1	-1
2	2

x	y
2	-2
-1	-1
-2	0
-1	1
2	2

$f(x) = \left\{ \begin{array}{l} \text{domain} = \text{all real numbers} \\ \text{range} = y \geq -2 \end{array} \right\}$

$f^{-1}(x) = \left\{ \begin{array}{l} \text{domain} = x \geq -2 \\ \text{range} = \text{all real numbers} \end{array} \right\}$

13.  $f(x) = \sqrt{x+4}$

Inverse relation:

$$y = -\sqrt{x+4}$$

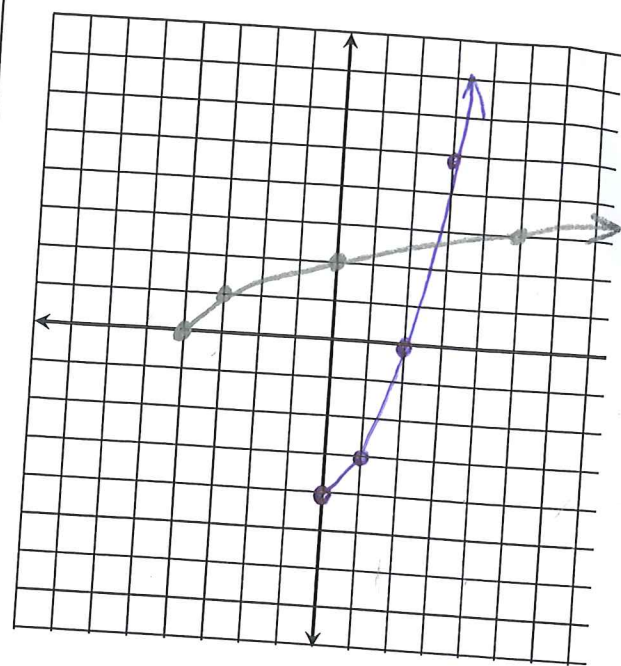
$$x = \sqrt{y+4}$$

$$x^2 = y+4$$

$$x^2 - 4 = y$$

x	y
-4	0
-3	1
-0	2
5	3
0	

x	y
0	-4
1	-3
2	0
3	5



$$f(x) = \left\{ \begin{array}{l} \text{domain} = x \geq -4 \\ \text{range} = y \geq 0 \end{array} \right\}$$

$$f^{-1}(x) = \left\{ \begin{array}{l} \text{domain} = x \geq 0 \\ \text{range} = y \geq -4 \end{array} \right\}$$

