

Chapter 2 Review Practice Questions

Transformations of Functions

1. Describe the transformations of the following:

a. $y - 4 = f(x - 2)$

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

2 right + 4 up.

b. $y = 3f(-2x + 10) + 7$

$$y = 3f(-2(x - 5)) + 7$$

VE of 3
HC of 2
& ref. over y-axis
5 right
7 up.

2. Write the mapping notation for the following transformations:

$$y = -f\left(\frac{1}{2}(x - 6)\right) + 2$$

ref. in x-axis
HE of 2
6 right
2 up

$(2x + 6, -y + 2)$

3. Given then mapping notation, write the corresponding function in the form of $y = f(x)$.

a. $(x, y) \rightarrow (2x, y - 4)$

HE of 2
4 down

$y = f\left(\frac{1}{2}x\right) - 4$

b. $(x, y) \rightarrow (-x + 3, -2y - 4)$

ref. in y-axis
3 right
VE of 2 + ref. in x-axis
4 down

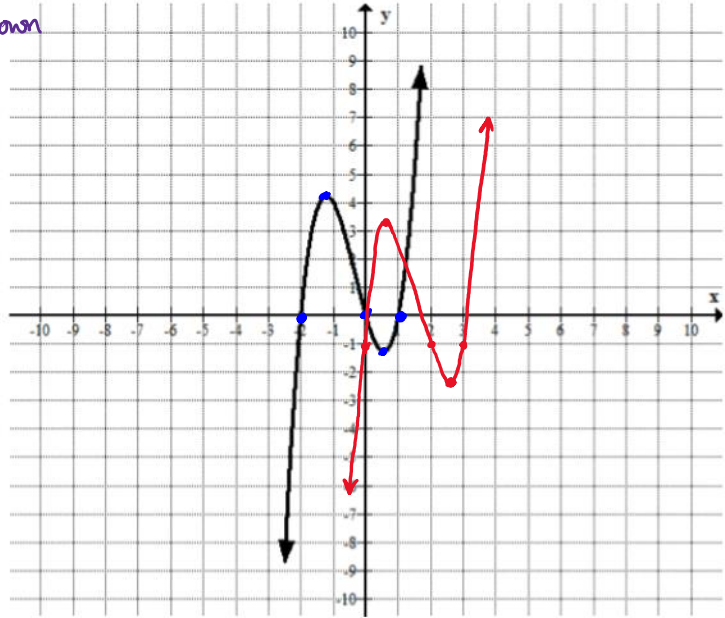
$y = -2f(-(x - 3)) - 4$

4. Given the function $y = f(x)$ below, perform the following transformations and show your table of values.

$$y = f(x-2) - 1$$

x	y	$x-2$	$y-1$
-2	0	0	-1
-1.3	4.3	0.7	3.3
0	0	2	-1
0.5	-1.2	2.5	-2.2
1	0	3	-1

2 right
1 down



State the domain and range (in set notation).

$$\{x \mid x \in \mathbb{R}\} \quad \{y \mid y \in \mathbb{R}\}$$

5. Given the function $y = |x|$ write the function with the following transformation and, using the point $(-2, 2)$ from the base function, determine the image point.

a. $y = f(x-2) + 7$

2 right 7 up

$(-2, 2)$
+2 +7
 $= (0, 9)$

- b. Vertically translated 9 units down and horizontally translated 3 left

$(-2, 2)$
-3 -9
 $= (-5, -7)$

- c. Horizontally translated 5 right and vertically translated 2 up

$(-2, 2)$
+5 +2
 $= (3, 4)$

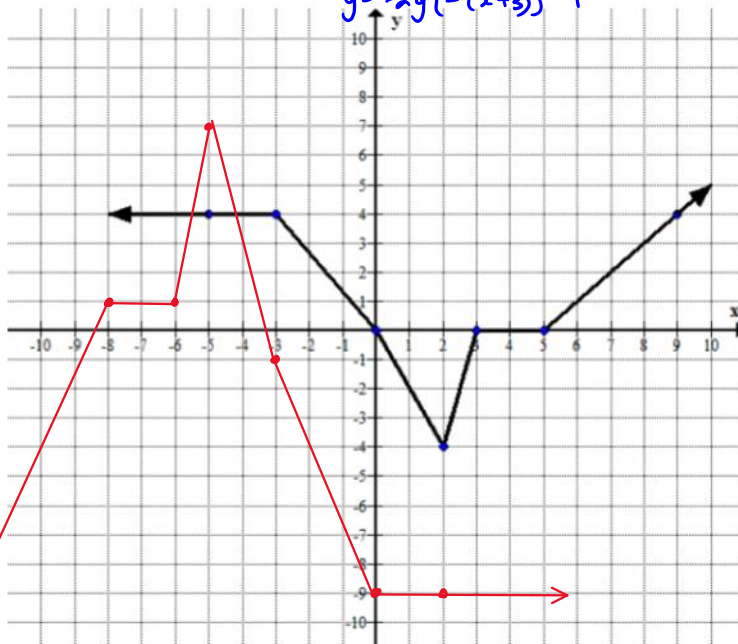
6. Given the function $y = f(x)$ below, graph the equation $y = -2g(-x-3) - 1$

Factor
 $y = -2g(-x-3) - 1$
 $y = -2g(-(x+3)) - 1$

x	y
-5	4
-3	4
0	0
2	-4
3	0
5	0
9	4

-x	-2y
5	-8
3	-8
0	0
-2	8
-3	0
-5	0
-9	-8

-x-3	-2y-1
2	-9
0	-9
-3	-1
-5	7
-6	-1
-8	-1
-12	-9



State the domain and range:

$\{x | x \in \mathbb{R}\}$ $\{y | y \leq 7, y \in \mathbb{R}\}$

7. Graph the function $y = -\frac{1}{2}(x-3)^2 + 6$ AND state the domain and range.

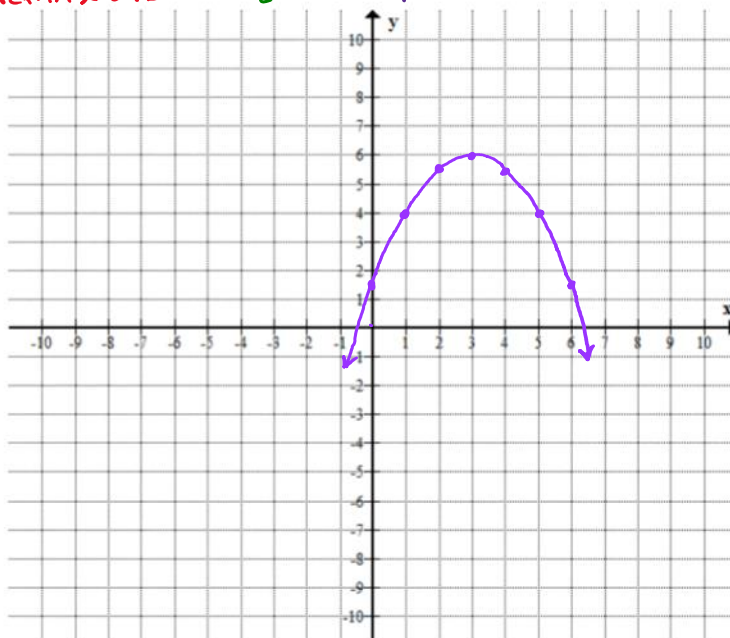
Base
 $y = x^2$

vert. $\frac{1}{2}$ + ref. in x-axis 3 right 6 up

x	y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

x	$\frac{1}{2}y$
-3	$-\frac{9}{2}$
-2	-2
-1	$-\frac{1}{2}$
0	0
1	$-\frac{1}{2}$
2	-2
3	$-\frac{9}{2}$

$x+3$	$\frac{1}{2}y+6$
0	$\frac{3}{2}$
1	4
2	$\frac{11}{2}$
3	6
4	$\frac{15}{2}$
5	4
6	$\frac{3}{2}$



State the domain and range:

$\{x | x \in \mathbb{R}\}$ $\{y | y \leq 6, y \in \mathbb{R}\}$

8. Write the equation $y = f(x)$ with the transformations described below:

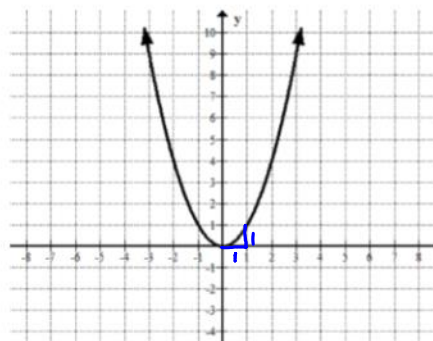
- a. A reflection about the x-axis, vertically compressed by a factor of $\frac{1}{3}$, horizontally expanded by a factor of 2, and translated 3 units left and 4 units up.

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

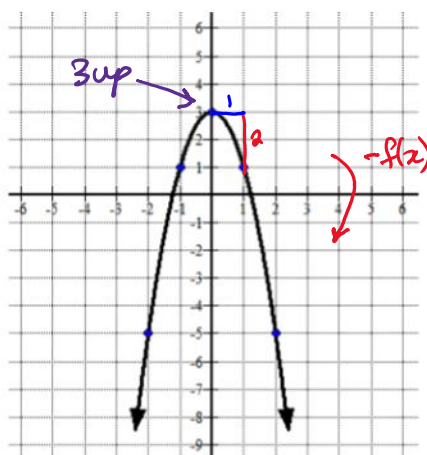
- b. A reflection about the y-axis, vertically expanded by a factor of 2, horizontally compressed by a factor of $\frac{1}{2}$, and translated 2 units right and 1 unit down.

$$y = 2f(-2(x-2)) - 1$$

9. Given the following graph of the function $y = x^2$, determine the equation of the transformed functions below.



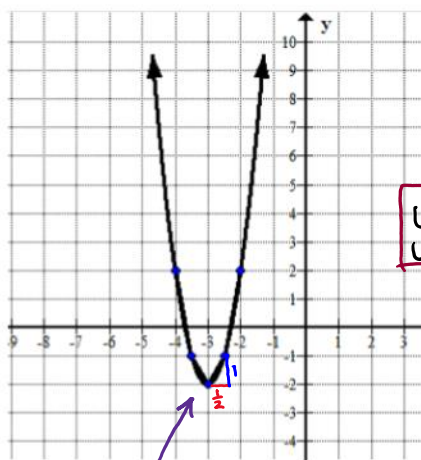
$$y = -2x^2 + 3$$



a.

State the domain and range of each:

$$\begin{aligned} \{x \mid x \in \mathbb{R}\} \\ \{y \mid y \leq 3\} \end{aligned}$$



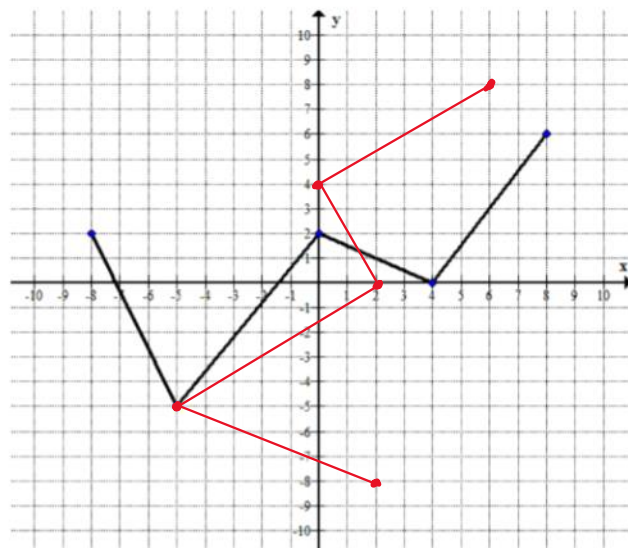
b.

3 left 2 down

$$\begin{aligned} \{x \mid x \in \mathbb{R}\} \\ \{y \mid y \geq -2\} \end{aligned}$$

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

10. Graph the inverse of the given function, $y = f(x)$:



$y = f(x)$

x	y
-8	2
-5	-5
0	2
4	0
8	6

$\{x \mid -8 \leq x \leq 8\}$
 $\{y \mid -5 \leq y \leq 6\}$

$y = f^{-1}(x)$

x	y
2	-8
-5	-5
2	0
0	4
6	8

$\{x \mid -5 \leq x \leq 6\}$
 $\{y \mid -8 \leq y \leq 8\}$

11. Determine the equation of the inverse for each of the following:

a. $y = -2x + 3$
 $x = -\frac{y-3}{2}$
 $x - 3 = -2y$
 $\frac{x-3}{-2} = \frac{-2y}{-2}$
 $y = -\frac{x-3}{2}$
 $f^{-1}(x) = -\frac{x-3}{2}$
 or
 $f^{-1}(x) = -\frac{1}{2}x + \frac{3}{2}$

b. $y = \frac{1}{2}(x-4)^2 - 3$
 $x = \frac{1}{2}(y+3)^2 - 3$
 $x + 3 = \frac{1}{2}(y+3)^2$
 $2(x+3) = (y+3)^2$
 $\sqrt{2(x+3)} = \sqrt{(y+3)^2}$
 $\pm \sqrt{2(x+3)} = y + 3$
 $f^{-1}(x) = \pm \sqrt{2(x+3)} + 3$

c. $y = \sqrt{2x-1} + 4$
 $x = \frac{(y-4)^2 + 1}{2}$
 $(x-4)^2 = 2y - 1$
 $(x-4)^2 + 1 = 2y$
 $f^{-1}(x) = \frac{(x-4)^2 + 1}{2}$
 or
 $f^{-1}(x) = \frac{(x-4)^2 + 1}{2}$

d. $y = \frac{2x}{3x-1}$
 $x = \frac{2y}{3y-1}$
 $x(3y-1) = 2y$
 $3xy - x = 2y$
 $3xy - 2y = x$ (factor)
 $y(3x-2) = \frac{x}{3x-2}$
 $f^{-1}(x) = \frac{x}{3x-2}$