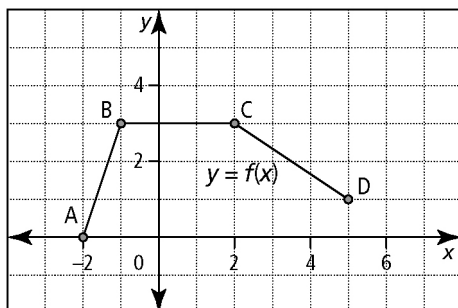


## Section 1.2 Extra Practice

- Consider  $f(x) = 2x - 4$ .
  - Create a table of values for  $f(x)$ .
  - Graph  $f(x)$  and  $g(x) = -f(x)$  on the same grid.
  - How is the graph of  $g(x)$  related to  $f(x)$ ?
  - Name the invariant point(s), if any.
- Consider the function  $f(x) = (x - 4)^2$ .
  - Create a table of values for  $f(x)$ .
  - Graph  $f(x)$  and  $h(x) = f(-x)$  on the same grid.
  - How is the graph of  $h(x)$  related to  $f(x)$ ?
  - Name the invariant point(s), if any.

- Consider the graph of  $y = f(x)$ .

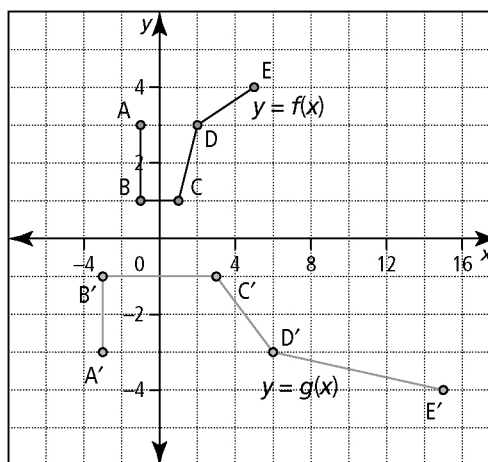


- Graph  $y = 2f(x)$ .
  - How is the graph of  $y = 2f(x)$  related to  $y = f(x)$ ?
  - Name the invariant point(s), if any.
- Consider the graph of  $y = f(x)$  in #3.
    - Graph  $y = f\left(\frac{1}{3}x\right)$ .
    - How is the graph of  $y = f\left(\frac{1}{3}x\right)$  related to  $y = f(x)$ ?
    - Name the invariant point(s), if any.
  - Using mapping notation, describe how the graphs of the following can be obtained from the graph of  $y = f(x)$ .
    - $g(x) = 3f(x)$
    - $h(x) = f(-x)$
    - $y = -f(x)$
    - $g(x) = f(3x)$

- For the graph of  $y = f(x)$ , describe the effect of making the replacement described.

- |                   |                             |
|-------------------|-----------------------------|
| a) $x$ with $3x$  | b) $x$ with $\frac{1}{4}x$  |
| c) $y$ with $-2y$ | d) $x$ with $-\frac{1}{2}x$ |
| e) $y$ with $4y$  | f) $y$ with $\frac{1}{5}y$  |

- Describe the transformation that must be applied to the graph of  $f(x)$  to obtain the graph of  $g(x)$ . Then, determine an equation for  $g(x)$ .



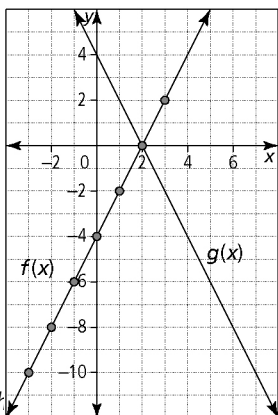
- The domain of  $y = f(x)$  is  $\{x \mid -4 \leq x \leq 8, x \in \mathbb{R}\}$  and the range is  $\{y \mid -6 \leq y \leq 12, y \in \mathbb{R}\}$ . What are the domain and range of  $g(x) = \frac{1}{3}f\left(\frac{1}{2}x\right)$ ?
- The domain of  $y = f(x)$  is  $\{x \mid -12 \leq x \leq 18, x \in \mathbb{R}\}$  and the range is  $\{y \mid -3 \leq y \leq 6, y \in \mathbb{R}\}$ . What are the domain and range of  $g(x) = -2f(3x)$ ?
- Consider the function  $f(x) = (x + 4)(x - 5)$ . What are the zeros of the function if the graph is transformed by a horizontal stretch about the  $y$ -axis by a factor of 3 and reflected over the  $y$ -axis?

## KEY

1. a)

| $x$ | $f(x)$ |
|-----|--------|
| -3  | -10    |
| -2  | -8     |
| -1  | -6     |
| 0   | -4     |
| 1   | -2     |
| 2   | 0      |
| 3   | 2      |

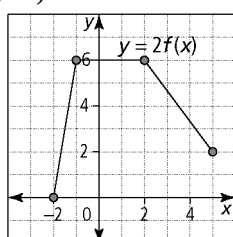
b)



c)  $h(x)$  is the reflection of  $f(x)$  in the y-axis.

d) (0, 16)

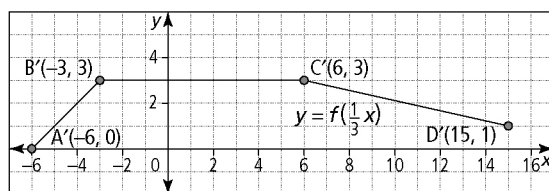
3. a)



b) It is the graph of  $y = f(x)$  after a vertical stretch about the x-axis by a factor of 2.

c) A(-2, 0)

4. a)



b) It is the graph of  $y = f(x)$  after a horizontal stretch about the y-axis by a factor of 3.

c) (0, 3)

5. a)  $(x, y) \rightarrow (x, 3y)$  b)  $(x, y) \rightarrow (-x, y)$

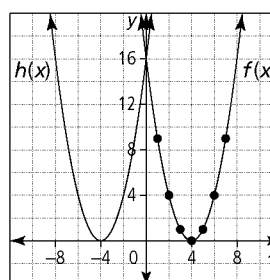
c)  $g(x)$  is a reflection of  $f(x)$  in the x-axis.

d) (2, 0)

2. a)

| $x$ | $f(x)$ |
|-----|--------|
| 1   | 9      |
| 2   | 4      |
| 3   | 1      |
| 4   | 0      |
| 5   | 1      |
| 6   | 4      |
| 7   | 9      |

b)



c)  $(x, y) \rightarrow (x, -y)$  d)  $(x, y) \rightarrow \left(\frac{1}{3}x, y\right)$

6. a) a horizontal stretch about the y-axis by a factor of  $\frac{1}{3}$

b) a horizontal stretch about the y-axis by a factor of 4

c) a reflection in the x-axis, a vertical stretch about the x-axis by a factor of  $\frac{1}{2}$

d) a reflection in the y-axis, a horizontal stretch about the y-axis by a factor of 2

e) a vertical stretch about the x-axis by a factor of  $\frac{1}{4}$

f) a vertical stretch about the x-axis by a factor of 5

7. a reflection in the x-axis, a horizontal stretch about the y-axis by a factor of 3;  $h(x) = -f\left(\frac{1}{3}x\right)$

8. The domain of  $y = g(x)$  is  $\{x \mid -8 \leq x \leq 16, x \in \mathbb{R}\}$ ; the range is  $\{y \mid -2 \leq y \leq 4, y \in \mathbb{R}\}$ .

9. The domain of  $y = g(x)$  is  $\{x \mid -4 \leq x \leq 6, x \in \mathbb{R}\}$ ; the range is  $\{y \mid -12 \leq y \leq 6, y \in \mathbb{R}\}$ .

10. (-15, 0), (12, 0)