1.2 Start Thinking

Graph the line $h(x) = \frac{2}{3}x + 2$ in a coordinate plane. What happens if 1 is added to the right side of the equation? What happens if -1 is added? Explain what happens to each point on the line when a number is added to one side of the equation of the line.

1.2 Warm Up

Graph the point and its reflection.

1. point $(5, 2)$ reflected in the x-axis
2. point $(-1, 0)$ reflected in the y-axis
3. point $(1, 2)$ reflected in the y-axis
4. point $(3, -3)$ reflected in the x-axis
5. point $(-3, 3)$ reflected in the line through $(-5, 1)$ and $(-2, 1)$
6. point $(-4, 3)$ reflected in the line through $(2, 2)$ and $(4, 2)$

1.2 Cumulative Review Warm Up

Determine the number of lines of symmetry, if any, for the letter. Draw each line of symmetry.

1. T
2. E
3. L
4. W
5. H
6. R

Name _____ Date _____

1.2 Practice A

In Exercises 1–4, write a function *g* whose graph represents the indicated transformation of the graph of *f*. Use a graphing calculator to check your answer.

1. $f(x) = x - 2$; translation 5 units left

2. $f(x) = x + 1$; translation 4 units right

3. $f(x) = |3x + 2| + 4$; translation 3 units down

4. $f(x) = 4x - 5$; translation 3 units up

In Exercises 5–8, write a function *g* whose graph represents the indicated transformation of the graph of *f*. Use a graphing calculator to check your answer.

5. $f(x) = -3x + 7$; reflection in the x-axis

6. $f(x) = \frac{1}{3}x - 2$; reflection in the x-axis

7. $f(x) = |4x| - 6$; reflection in the y-axis

8. $f(x) = |3x - 5| + 3$; reflection in the y-axis

In Exercises 9–12, write a function *g* whose graph represents the indicated transformation of the graph of *f*. Use a graphing calculator to check your answer.

9. $f(x) = x + 3$; vertical stretch by a factor of 4

10. $f(x) = 4x + 3$; vertical shrink by a factor of $\frac{1}{3}$

11. $f(x) = |3x| + 2$; horizontal shrink by a factor of $\frac{1}{3}$

12. $f(x) = |x + 1|$; horizontal stretch by a factor of 3

In Exercises 13 and 14, write a function *g* whose graph represents the indicated transformation of the graph of *f*.

13. $f(x) = x$; vertical shrink by a factor of $\frac{1}{3}$ followed by a translation 4 units down

14. $f(x) = |x|$; translation 3 units left followed by a horizontal shrink by a factor of $\frac{1}{2}$

Name_____ Date _____

1.2 Practice B

In Exercises 1–4, write a function *g* whose graph represents the indicated transformation of the graph of *f*. Use a graphing calculator to check your answer.

1. $f(x) = 5x - 2$; translation 5 units right

2. $f(x) = 3x + 6$; translation 4 units up

3. $f(x) = 3 - |x - 2|$; translation 2 units left

4. $f(x) = |2x| + 3$; translation 2 units down

In Exercises 5–8, write a function *g* whose graph represents the indicated transformation of the graph of *f*. Use a graphing calculator to check your answer.

5. $f(x) = -x + 3$; reflection in the y-axis

6. $f(x) = \frac{2}{3}x - 4$; reflection in the x-axis

7. $f(x) = -5 + |x - 8|$; reflection in the y-axis

8. $f(x) = |4x - 1| + 2$; reflection in the y-axis

In Exercises 9–12, write a function *g* whose graph represents the indicated transformation of the graph of *f*. Use a graphing calculator to check your answer.

9. $f(x) = 3 - x$; horizontal stretch by a factor of 2

10. $f(x) = 3x + 5$; vertical shrink by a factor of $\frac{1}{3}$

11. $f(x) = |3x| + 2$; horizontal shrink by a factor of $\frac{1}{3}$

12. $f(x) = -2|x - 2| + 4$; vertical stretch by a factor of 2

In Exercises 13 and 14, write a function *g* whose graph represents the indicated transformation of the graph of *f*.

13. $f(x) = x$; translation 5 units up followed by a vertical shrink by a factor of $\frac{1}{4}$

14. $f(x) = |x|$; reflection in the x-axis followed by a translation 2 units left

Name _____ Date _____

1.2 Enrichment and Extension

Transformations of Linear and Absolute Value Functions

In Exercises 1–6, write a function *g* whose graph represents the indicated transformation of the graph of *f*. Then find the *x*-intercept of *g*(*x*). Use a graphing calculator to check your answer.

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

1. translation 3 units right followed by a translation 1 unit down
2. translation 1 unit left followed by a reflection in the x-axis
3. vertical stretch by a factor of 3 followed by a translation 3 units down
4. horizontal shrink by a factor of $\frac{1}{3}$ followed by a translation 5 units up
5. translation 3 units right followed by a vertical stretch by a factor of 2
6. translation 1 unit up followed by a reflection in the x-axis and a translation 3 units left

In Exercises 7–12, write a function *g* whose graph represents the indicated transformation of the graph of *f*. Then find the *x*-intercept of *g*(*x*). Use a graphing calculator to check your answer.

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

7. translation 3 units right followed by a translation 1 unit down
8. translation 1 unit left followed by a translation 2 units up
9. translation 1 unit up followed by a reflection in the x-axis and a translation 3 units left
10. translation 1 unit right followed by a vertical stretch by a factor of 2 and a translation 4 units down
11. horizontal shrink by a factor of $\frac{1}{4}$ followed by a translation 10 units right and 1 unit up, and a reflection in the x-axis
12. translation 5 units right followed by a translation 3 units down, a vertical shrink by a factor of $\frac{1}{2}$, and a reflection in the x-axis

Name_____ Date _____

1.2 Puzzle Time

What U.S. President Died July 4, 1831?

Write the letter of each answer in the box containing the exercise number.

Write a function *g* whose graph represents the indicated transformation of the graph of *f*.

1. $f(x) = x + 4$; translation 3 units left
2. $f(x) = x - 7$; translation 5 units right
3. $f(x) = |2x - 5| + 3$; translation 2 units up
4. $f(x) = -4x - 8$; reflection in the x-axis
5. $f(x) = |2x + 1| - 6$; reflection in the y-axis
6. $f(x) = -x + 5$; horizontal shrink by a factor of $\frac{1}{2}$
7. $f(x) = |2x - 4|$; vertical stretch by a factor of 4

Write a function *g* whose graph represents the indicated transformation of the graph of *f*.

8. $f(x) = x$; vertical stretch by a factor of 3 followed by a translation 2 units down
9. $f(x) = x$; translation 1 unit up followed by a vertical shrink by a factor of $\frac{1}{4}$
10. $f(x) = |x|$; reflection in the x-axis followed by a translation 2 units right
11. $f(x) = |x|$; vertical shrink by a factor of $\frac{1}{2}$ followed by a translation 5 units up and 1 unit left

Answers

R. $g(x) = \frac{1}{4}x + \frac{1}{4}$

O. $g(x) = -|x - 2|$

A. $g(x) = x - 12$

M. $g(x) = |2x - 5| + 5$

M. $g(x) = -2x + 5$

E. $g(x) = 4x + 8$

E. $g(x) = \frac{1}{2}|x + 1| + 5$

S. $g(x) = |-2x + 1| - 6$

N. $g(x) = 3x - 2$

J. $g(x) = x + 7$

O. $g(x) = 4|2x - 4|$

1	2	3	4	5		6	7	8	9	10	11