3 Chapter Review

Dynamic Solutions available at *BigIdeasMath.com*

3.1 Functions *(pp. 103–110)*

Determine whether the relation is a function. Explain.

Input, x	2	5	7	9	14
Output, y	5	11	19	12	3

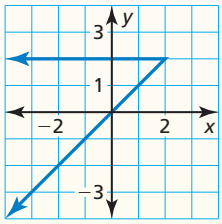
Every input has exactly one output.

▶ So, the relation is a function.

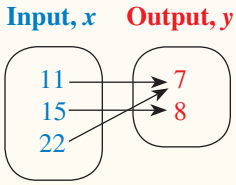
Determine whether the relation is a function. Explain.

1. (0, 1), (5, 6), (7, 9)

2.



3.



4. The function $y = 10x + 100$ represents the amount y (in dollars) of money in your bank account after you babysit for x hours.

a. Identify the independent and dependent variables.

b. You babysit for 4 hours. Find the domain and range of the function.

3.2 Linear Functions *(pp. 111–120)*

Does the table or equation represent a *linear* or *nonlinear* function? Explain.

a.

		+4	+4	+4
x	6	10	14	18
y	5	9	14	20
		+4	+5	+6

As x increases by 4, y increases by different amounts. The rate of change is *not* constant.

▶ So, the function is nonlinear.

b. $y = 3x - 4$

The equation is in the form $y = mx + b$.

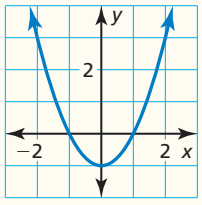
▶ So, the equation represents a linear function.

Does the table or graph represent a *linear* or *nonlinear* function? Explain.

5.

x	2	7	12	17
y	2	−1	−4	−7

6.



7. The function $y = 60 - 8x$ represents the amount y (in dollars) of money you have after buying x movie tickets. (a) Find the domain of the function. Is the domain discrete or continuous? Explain. (b) Graph the function using its domain.

3.3 Function Notation *(pp. 121–126)*

a. Evaluate $f(x) = 3x - 9$ when $x = 2$.

$f(x) = 3x - 9$	Write the function.
$f(2) = 3(2) - 9$	Substitute 2 for x.
$= 6 - 9$	Multiply.
$= -3$	Subtract.

▶ When $x = 2$, $f(x) = -3$.

b. For $f(x) = 4x$, find the value of x for which $f(x) = 12$.

$f(x) = 4x$	Write the function.
$12 = 4x$	Substitute 12 for $f(x)$.
$3 = x$	Divide each side by 4.

▶ When $x = 3$, $f(x) = 12$.

Evaluate the function when $x = -3$, 0, and 5.

8. $f(x) = x + 8$ **9.** $g(x) = 4 - 3x$

Find the value of x so that the function has the given value.

10. $k(x) = 7x$; $k(x) = 49$ **11.** $r(x) = -5x - 1$; $r(x) = 19$

Graph the linear function.

12. $g(x) = -2x - 3$ **13.** $h(x) = \frac{2}{3}x + 4$

3.4 Graphing Linear Equations in Standard Form *(pp. 129–134)*

Use intercepts to graph the equation $2x + 3y = 6$.

Step 1 Find the intercepts.

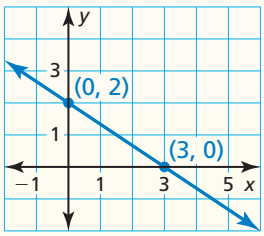
To find the x-intercept, substitute 0 for y and solve for x.

$$2x + 3y = 6$$
$$2x + 3(0) = 6$$
$$x = 3$$

To find the y-intercept, substitute 0 for x and solve for y.

$$2x + 3y = 6$$
$$2(0) + 3y = 6$$
$$y = 2$$

Step 2 Plot the points and draw the line.
The x-intercept is 3, so plot the point (3, 0).
The y-intercept is 2, so plot the point (0, 2).
Draw a line through the points.



Graph the linear equation.

14. $8x - 4y = 16$ **15.** $-12x - 3y = 36$ **16.** $y = -5$ **17.** $x = 6$

3.5 Graphing Linear Equations in Slope-Intercept Form *(pp. 135–144)*

a. The points represented by the table lie on a line. How can you find the slope of the line from the table? What is the slope of the line?

Choose any two points from the table and use the slope formula. Use the points $(x_1, y_1) = (1, -7)$ and $(x_2, y_2) = (4, 2)$.

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - (-7)}{4 - 1} = \frac{9}{3}, \text{ or } 3$$

x	y
1	−7
4	2
7	11
10	20

▶ The slope is 3.

b. Graph $-\frac{1}{2}x + y = 1$. Identify the x-intercept.

Step 1 Rewrite the equation in slope-intercept form.

$$y = \frac{1}{2}x + 1$$

Step 2 Find the slope and the y-intercept.

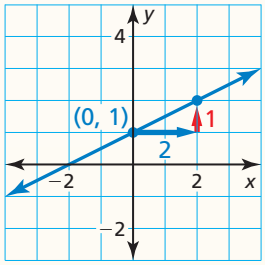
$$m = \frac{1}{2} \text{ and } b = 1$$

Step 3 The y-intercept is 1. So, plot (0, 1).

Step 4 Use the slope to find another point on the line.

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{1}{2}$$

Plot the point that is 2 units right and 1 unit up from (0, 1). Draw a line through the two points.



▶ The line crosses the x-axis at $(-2, 0)$. So, the x-intercept is -2.

The points represented by the table lie on a line. Find the slope of the line.

18.

x	y
6	9
11	15
16	21
21	27

19.

x	y
3	−5
3	−2
3	5
3	8

20.

x	y
−4	−1
−3	−1
1	−1
9	−1

Graph the linear equation. Identify the x-intercept.

21. $y = 2x + 4$

22. $-5x + y = -10$

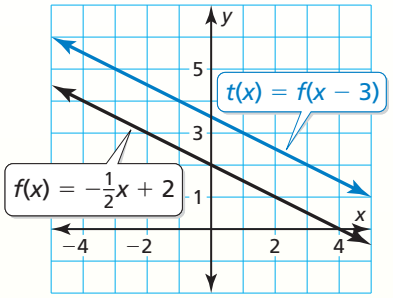
23. $x + 3y = 9$

24. A linear function h models a relationship in which the dependent variable decreases 2 units for every 3 units the independent variable increases. Graph h when $h(0) = 2$. Identify the slope, y-intercept, and x-intercept of the graph.

3.6 Transformations of Graphs of Linear Functions *(pp. 145–154)*

a. Let $f(x) = -\frac{1}{2}x + 2$. Graph $t(x) = f(x - 3)$. Describe the transformation from the graph of f to the graph of t.

The function t is of the form $y = f(x - h)$, where $h = 3$. So, the graph of t is a horizontal translation 3 units right of the graph of f.



b. Graph $f(x) = x$ and $g(x) = -3x - 2$. Describe the transformations from the graph of f to the graph of g.

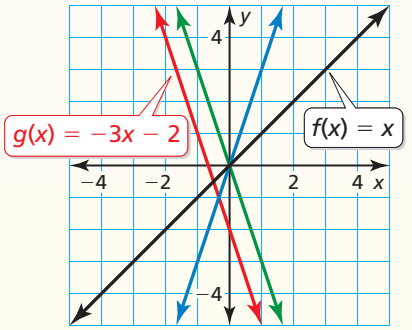
Note that you can rewrite g as $g(x) = -3f(x) - 2$.

Step 1 There is no horizontal translation from the graph of f to the graph of g.

Step 2 Stretch the graph of f vertically by a factor of 3 to get the graph of $h(x) = 3x$.

Step 3 Reflect the graph of h in the x-axis to get the graph of $r(x) = -3x$.

Step 4 Translate the graph of r vertically 2 units down to get the graph of $g(x) = -3x - 2$.



Let $f(x) = 3x + 4$. Graph f and h. Describe the transformation from the graph of f to the graph of h.

25. $h(x) = f(x + 3)$

26. $h(x) = f(x) + 1$

27. $h(x) = f(-x)$

28. $h(x) = -f(x)$

29. $h(x) = 3f(x)$

30. $h(x) = f(6x)$

31. Graph $f(x) = x$ and $g(x) = 5x + 1$. Describe the transformations from the graph of f to the graph of g.

3.7 Graphing Absolute Value Functions *(pp. 155–162)*

Let $g(x) = -3|x + 1| + 2$. (a) Describe the transformations from the graph of $f(x) = |x|$ to the graph of g. (b) Graph g.

a. Step 1 Translate the graph of f horizontally 1 unit left to get the graph of $t(x) = |x + 1|$.

Step 2 Stretch the graph of t vertically by a factor of 3 to get the graph of $h(x) = 3|x + 1|$.

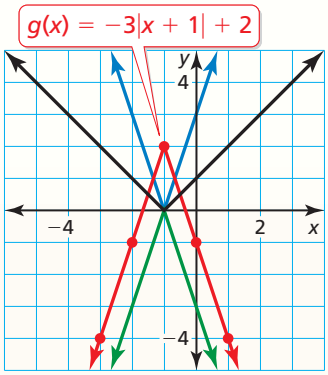
Step 3 Reflect the graph of h in the x-axis to get the graph of $r(x) = -3|x + 1|$.

Step 4 Translate the graph of r vertically 2 units up to get the graph of $g(x) = -3|x + 1| + 2$.

b. Method 1

Step 1 Make a table of values.

x	-3	-2	-1	0	1
$g(x)$	-4	-1	2	-1	-4



Step 2 Plot the ordered pairs.

Step 3 Draw the V-shaped graph.

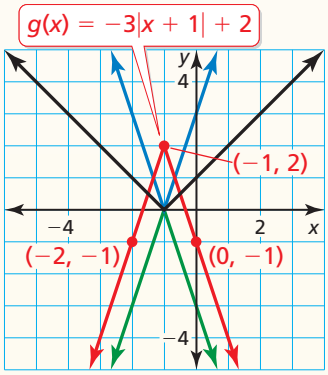
Method 2

Step 1 Identify and plot the vertex.

$(h, k) = (-1, 2)$

Step 2 Plot another point on the graph such as $(0, -1)$. Because the graph is symmetric about the line $x = -1$, you can use symmetry to plot a third point, $(-2, -1)$.

Step 3 Draw the V-shaped graph.



Graph the function. Compare the graph to the graph of $f(x) = |x|$. Describe the domain and range.

32. $m(x) = |x| + 6$ **33.** $p(x) = |x - 4|$ **34.** $q(x) = 4|x|$ **35.** $r(x) = -\frac{1}{4}|x|$

36. Graph $f(x) = |x - 2| + 4$ and $g(x) = |3x - 2| + 4$. Compare the graph of g to the graph of f.

37. Let $g(x) = \frac{1}{3}|x - 1| - 2$. (a) Describe the transformations from the graph of $f(x) = |x|$ to the graph of g. (b) Graph g.

3 Chapter Test

Determine whether the relation is a function. If the relation is a function, determine whether the function is *linear* or *nonlinear*. Explain.

1.

x	-1	0	1	2
y	6	5	9	14

2. $y = -2x + 3$

3. $x = -2$

Graph the equation and identify the intercept(s). If the equation is linear, find the slope of the line.

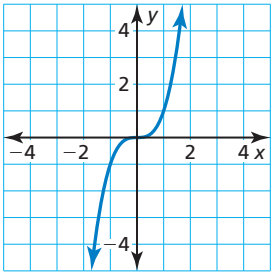
4. $2x - 3y = 6$

5. $y = 4.5$

6. $y = |x - 1| - 2$

Find the domain and range of the function represented by the graph. Determine whether the domain is *discrete* or *continuous*. Explain.

7.



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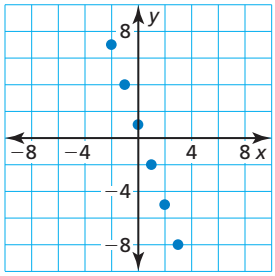


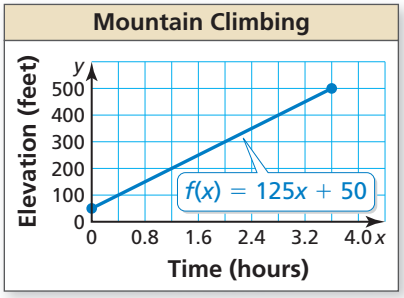
Graph f and g. Describe the transformations from the graph of f to the graph of g.

9. $f(x) = x$; $g(x) = -x + 3$

10. $f(x) = |x|$; $g(x) = |2x + 4|$

11. Function A represents the amount of money in a jar based on the number of quarters in the jar. Function B represents your distance from home over time. Compare the domains.

12. A mountain climber is scaling a 500-foot cliff. The graph shows the elevation of the climber over time.



a. Find and interpret the slope and the y-intercept of the graph.

b. Explain two ways to find $f(3)$. Then find $f(3)$ and interpret its meaning.

c. How long does it take the climber to reach the top of the cliff? Justify your answer.

13. Without graphing, compare the slopes and the intercepts of the graphs of the functions $f(x) = x + 1$ and $g(x) = f(2x)$.

14. A rock band releases a new single. Weekly sales s (in thousands of dollars) increase and then decrease as described by the function $s(t) = -2|t - 20| + 40$, where t is the time (in weeks).

a. Identify the independent and dependent variables.

b. Graph s. Describe the transformations from the graph of $f(x) = |x|$ to the graph of s.