



Reveal **MATH**TM

Integrated I

Sampler



Linear and Nonlinear Functions

e Essential Question

What can a function tell you about the relationship that it represents?

What Will You Learn?

How much do you already know about each topic **before** starting this module?

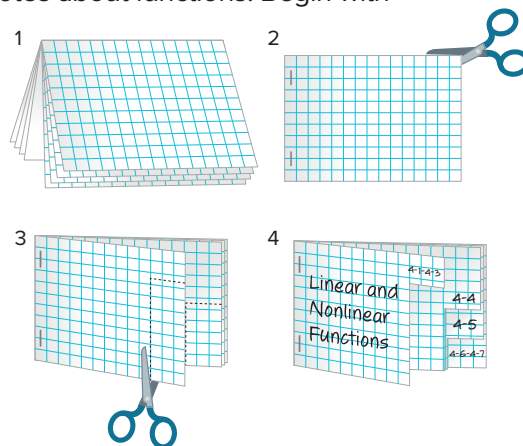
KEY

— I don't know. — I've heard of it. — I know it!

	Before			After		
graph linear equations by using a table						
graph linear equations by using intercepts						
find rates of change						
determine slopes of linear equations						
write linear equations in slope-intercept form						
graph linear functions in slope-intercept form						
translate, dilate, and reflect linear functions						
identify and find missing terms in arithmetic sequences						
write arithmetic sequences as linear functions						
model and use piecewise functions, step functions, and absolute value functions						
translate absolute value functions						

Foldables Make this Foldable to help you organize your notes about functions. Begin with five sheets of grid paper.

- 1. Fold** five sheets of grid paper in half from top to bottom.
- 2. Cut** along fold. Staple the eight half-sheets together to form a booklet.
- 3. Cut** tabs into margin. The top tab is 4 lines wide, the next tab is 8 lines wide, and so on. When you reach the bottom of a sheet, start the next tab at the top of the page.
- 4. Label** each tab with a lesson number. Use the extra pages for vocabulary.



What Vocabulary Will You Learn?

- absolute value function
- arithmetic sequence
- common difference
- constant function
- dilation
- family of graphs
- greatest integer function
- interval
- identity function
- n th term of an arithmetic sequence
- parameter
- parent function
- piecewise-defined function
- piecewise-linear function
- rate of change
- reflection
- sequence
- slope
- step function
- term of a sequence
- transformation
- translation
- vertex

Are You Ready?

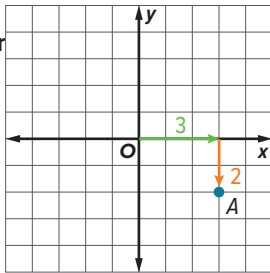
Complete the Quick Review to see if you are ready to start this module.
Then complete the Quick Check.

Quick Review

Example 1

Graph $A(3, -2)$ on a coordinate plane.

Start at the origin. Since the x -coordinate is positive, move 3 units to the right. Then move 2 units down since the y -coordinate is negative. Draw a dot and label it A .



Example 2

Solve $x - 2y = 8$ for y .

$$\begin{aligned}
 x - 2y &= 8 && \text{Original expression} \\
 x - x - 2y &= 8 - x && \text{Subtract } x \text{ from each side.} \\
 -2y &= 8 - x && \text{Simplify.} \\
 \frac{-2y}{-2} &= \frac{8 - x}{-2} && \text{Divide each side by } -2. \\
 y &= \frac{1}{2}x - 4 && \text{Simplify.}
 \end{aligned}$$

Quick Check

Graph and label each point on the coordinate plane.

- $B(-3, 3)$
- $C(-2, 1)$
- $D(3, 0)$
- $E(-5, -4)$
- $F(0, -3)$
- $G(2, -1)$

Solve each equation for y .

- $3x + y = 1$
- $8 - y = x$
- $5x - 2y = 12$
- $3x + 4y = 10$
- $3 - \frac{1}{2}y = 5x$
- $\frac{y+1}{3} = x + 2$

How did you do?

Which exercises did you answer correctly in the Quick Check?

Rate of Change and Slope

Learn Rate of Change of a Linear Function

The **rate of change** is how a quantity is changing with respect to a change in another quantity.

If x is the independent variable and y is the dependent variable, then
 rate of change = $\frac{\text{change in } y}{\text{change in } x}$.

Example 1 Find the Rate of Change

COOKING Find the rate of change of the function by using two points from the table.

Amount of Flour x (cups)	Pancakes y
2	12
4	24
6	36

$$\begin{aligned} \text{rate of change} &= \frac{\text{change in } y}{\text{change in } x} \\ &= \frac{\text{change in pancakes}}{\text{change in flour}} \\ &= \frac{24 - 12}{4 - 2} \\ &= \frac{12}{2} \text{ or } \frac{6}{1} \end{aligned}$$

The rate is $\frac{6}{1}$ or 6. This means that you could make 6 pancakes for each cup of flour.

Check

Find the rate of change.

$\frac{\text{?}}{\text{?}}$ $\frac{\text{dollars}}{\text{gallons}}$

Amount of Gasoline Purchased (Gallons)	Cost (Dollars)
4.75	15.77
6	19.92
7.25	24.07
8.5	28.22

Today's Goals

- Calculate and interpret rate of change.
- Calculate and interpret slope.

Today's Vocabulary

rate of change
slope

Think About It!

Suppose you found a new recipe that makes 6 pancakes when using 2 cups of flour, 12 pancakes when using 4 cups of flour, and 18 pancakes when using 6 cups of flour. How does this change the rate you found for the original recipe?

Study Tip

Placement Be sure that the dependent variable is in the numerator and the independent variable is in the denominator. In this example, the number of pancakes you can make *depends* on the amount of flour you can use.

 **Go Online** You can complete an Extra Example online.

Think About It!

How is a greater increase or decrease of funds represented graphically?

Study Tip

Assumptions In this example, we assumed that the rate of change for the budget was constant between each 5-year period. Although the budget might have varied from year to year, analyzing in larger periods of time allows us to see trends within data.

Example 2 Compare Rates of Change

STUDENT COUNCIL The Jackson High School Student Council budget varies based on the fundraising of the previous year.

Part A Find the rate of change for 2000–2005 and describe its meaning in the context of the situation.

$$\frac{\text{change in budget}}{\text{change in time}} = \frac{1675 - 1350}{2005 - 2000} = \frac{325}{5}, \text{ or } 65$$

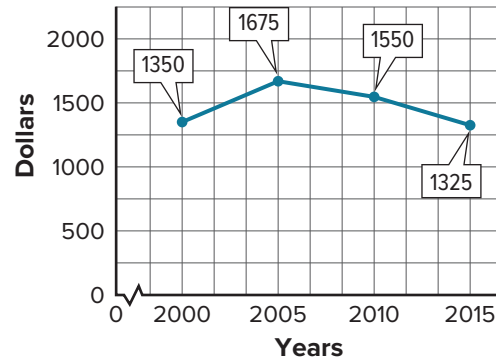
This means that the student council's budget increased by \$325 over the 5-year period, with a rate of change of \$65 per year.

Part B Find the rate of change for 2010–2015 and describe its meaning in the context of the situation.

$$\frac{\text{change in budget}}{\text{change in time}} = \frac{1325 - 1550}{2015 - 2010} = \frac{-225}{5}, \text{ or } -45$$

This means that the student council's budget was reduced by \$225 over the 5-year period, with a rate of change of -\$45 per year.

Jackson High School Student Council Budget



Check

TICKETS The graph shows the average ticket prices for the Miami Dolphins football team.

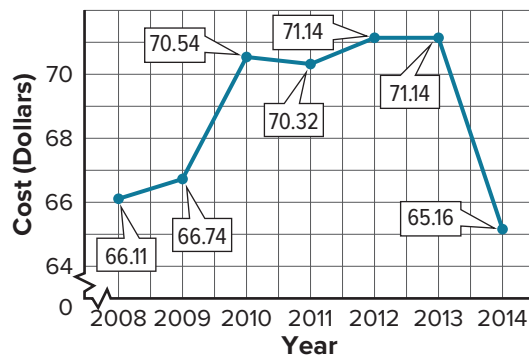
Part A Find the rate of change in ticket prices between 2009–2010.

$$\frac{\text{?}}{\text{?}} \frac{\text{dollars}}{\text{year}}$$

Part B The ticket prices have the greatest rate of change between _____?

Part C Between _____? and _____?, the rate of change is negative.

Miami Dolphins Average Ticket Prices



Go Online You can complete an Extra Example online.

Example 3 Constant Rate of Change

Determine whether the function is linear. If it is, state the rate of change.

Find the changes in the x -values and the changes in the y -values.

Notice that the rate of change for each pair of points shown is $-\frac{2}{3}$.

The rates of change are constant, so the function is linear. The rate of change is $-\frac{2}{3}$.

x	y
11	-5
8	-3
5	-1
2	1
-1	3

Example 4 Rate of Change

Determine whether the function is linear. If it is, state the rate of change.

Find the changes in the x -values and the changes in the y -values.

The rates of change are not constant. Between some pairs of points the rate of change is $\frac{3}{7}$, and between the other pairs it is $\frac{2}{7}$. Therefore, this is not a linear function.

x	y
22	-4
29	-1
36	1
43	4
50	6

Study Tip

Linear Versus Not Linear Remember that the word *linear* means that the graph of the function is a straight line. For the graph of a function to be a line, it has to be increasing or decreasing at a constant rate.

Check

Copy and complete the table so that the function is linear.

x	y
	-2.25
	1
11	
10.5	7.5
10	10.75
9.5	

 **Go Online** You can complete an Extra Example online.

Go Online

You can watch a video to see how to find the slope of a nonvertical line.

Think About It!

If the point $(1, 3)$ is on a line, what other point could be on the line to make the slope positive? negative? zero? undefined?

Think About It!

Can a line that passes through two specific points, such as the origin and $(2, 4)$, have more than one slope? Explain your reasoning.

Think About It!

How would lines with slopes of $m = \frac{1}{8}$ and $m = 80$ compare on the same coordinate plane?

Explore Investigating Slope

Online Activity Use graphing technology to complete an Explore.

INQUIRY How does slope help to describe a line?

Learn Slope of a Line

The **slope** of a line is the rate of change in the y -coordinates (rise) for the corresponding change in the x -coordinates (run) for points on the line.

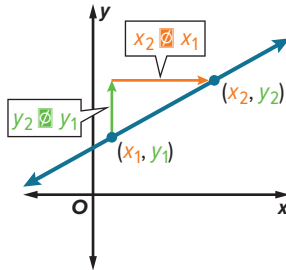
Key Concept • Slope

Words The slope of a nonvertical line is the ratio of the rise to the run.

Symbols The slope m of a nonvertical line through any two points (x_1, y_1) and (x_2, y_2) can be found as follows.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

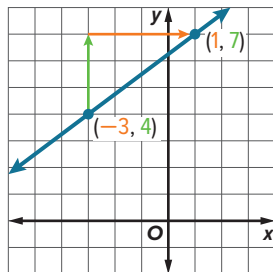
Example



The slope of a line can show how a quantity changes over time. When finding the slope of a line that represents a real-world situation, it is often referred to as the *rate of change*.

Example 5 Positive Slope

Find the slope of a line that passes through $(-3, 4)$ and $(1, 7)$.



$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{7 - 4}{1 - (-3)} \\ &= \frac{3}{4} \end{aligned}$$

Check

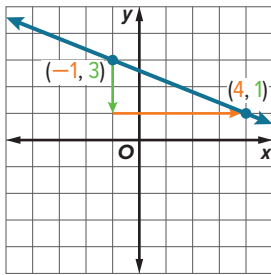
Determine the slope of a line passing through the given points. If the slope is undefined, write *undefined*. Write your answer as a decimal if necessary.

$(-1, 8)$ and $(7, 10)$

Go Online You can complete an Extra Example online.

Example 6 Negative Slope

Find the slope of a line that passes through $(-1, 3)$ and $(4, 1)$.



$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{1 - 3}{4 - (-1)} \\ &= -\frac{2}{5} \end{aligned}$$

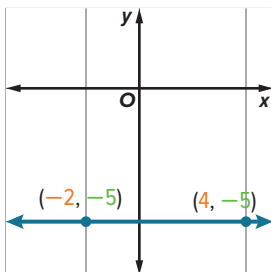
Check

Determine the slope of a line passing through the given points. If the slope is undefined, write *undefined*. Write your answer as a decimal if necessary.

- a. $(5, -4)$ and $(0, 1)$

Example 7 Slopes of Horizontal Lines

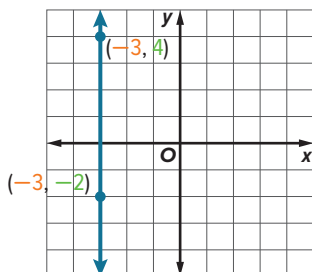
Find the slope of a line that passes through $(-2, -5)$ and $(4, -5)$.



$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-5 - (-5)}{4 - (-2)} \\ &= \frac{0}{6} \text{ or } 0 \end{aligned}$$

Example 8 Slopes of Vertical Lines

Find the slope of a line that passes through $(-3, 4)$ and $(-3, -2)$.



$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-2 - 4}{-3 - (-3)} \\ &= -\frac{6}{0} \text{ or } \text{undefined} \end{aligned}$$

Study Tip

Positive and Negative Slope To know whether a line has a positive or negative slope, read the graph of the line just like you would read a sentence, from left to right. If the line “goes uphill,” then the slope is positive. If the line “goes downhill,” then the slope is negative.

Talk About It!

Why is the slope for vertical lines always undefined? Justify your argument.

Go Online You can complete an Extra Example online.

Study Tip

Converting Slope

When solving for an unknown coordinate, like the previous example, converting a slope from a decimal or mixed number to an improper fraction might make the problem easier to solve. For example, a slope of $1.\overline{333}$ can be rewritten as $\frac{4}{3}$.

Example 9 Find Coordinates Given the Slope

Find the value of r so that the line passing through $(-4, 5)$ and $(4, r)$ has a slope of $\frac{3}{4}$.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Use the Slope Formula.

$$\frac{3}{4} = \frac{r - 5}{4 - (-4)}$$

$(-4, 5) = (x_1, y_1)$ and $(4, r) = (x_2, y_2)$

$$\frac{3}{4} = \frac{r - 5}{8}$$

Subtract.

$$8\left(\frac{3}{4}\right) = \frac{8(r - 5)}{8}$$

Multiply each side by 8.

$$6 = r - 5$$

Simplify.

$$6 + 5 = r - 5 + 5$$

Add 5 to each side.

$$11 = r$$

Simplify.

Check

Find the value of r so that the line passing through $(-3, r)$ and $(7, -6)$ has a slope of $2\frac{2}{5}$.

$$r = \underline{\quad? \quad}$$

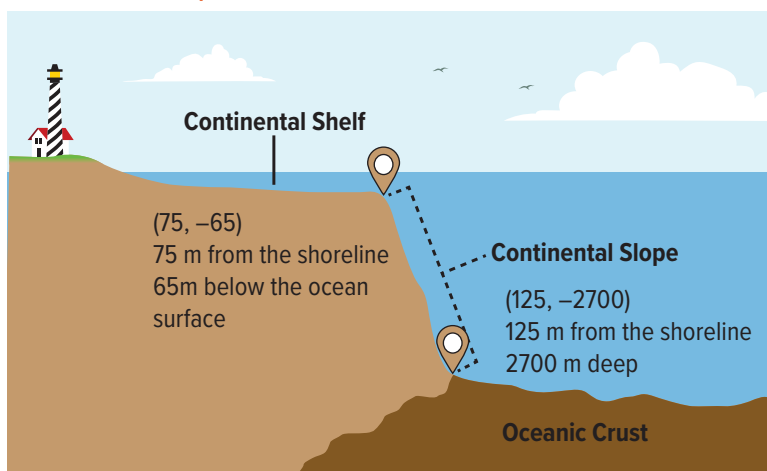
Example 10 Use Slope

Think About It!

If a crab is walking along the ocean floor 112 meters away from the shoreline to 114 meters away from the shoreline to 114 meters away from the shoreline, how far does it descend?

OCEANS

What is the slope of the continental slope at Cape Hatteras?



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Use the Slope Formula

$$= \frac{-2700 - (-65)}{125 - 75}$$

$(75, -65) = (x_1, y_1)$ and
 $(125, -2700) = (x_2, y_2)$

$$= \frac{-2635}{50} \text{ or } -52.7$$

Simplify.

The continental slope at Cape Hatteras has a slope of -52.7 .

Go Online You can complete an Extra Example online.

Practice

 **Go Online** You can complete your homework online.

Example 1

Find the rate of change of the function by using two points from the table.

1.

x	y
5	2
10	3
15	4
20	5

2.

x	y
1	15
2	9
3	3
4	-3

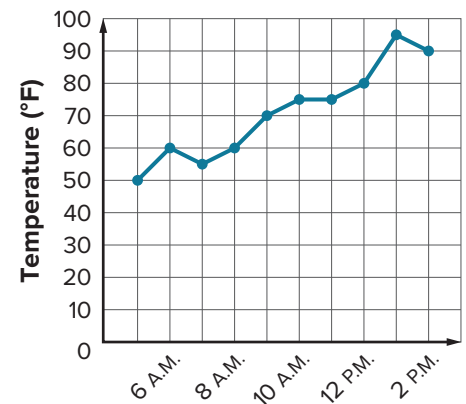
3. **POPULATION DENSITY** The table shows the population density for the state of Texas in various years. Find the average annual rate of change in the population density from 2000 to 2009.
4. **BAND** In 2012, there were approximately 275 students in the Delaware High School band. In 2018, that number increased to 305. Find the annual rate of change in the number of students in the band.

Population Density	
Year	People Per Square Mile
1930	22.1
1960	36.4
1980	54.3
2000	79.6
2009	96.7

Source: Bureau of the Census, U.S. Dept. of Commerce

Example 2

5. **TEMPERATURE** The graph shows the temperature in a city during different hours of one day.
- Find the rate of change in temperature between 6 A.M. and 7 A.M. and describe its meaning in the context of the situation.
 - Find the rate of change in temperature from 1 P.M. and 2 P.M. and describe its meaning in the context of the situation.
6. **COAL EXPORTS** The graph shows the annual coal exports from U.S. mines in millions of short tons.
- Find the rate of change in coal exports between 2000 and 2002 and describe its meaning in the context of the situation.
 - Find the rate of change in coal exports between 2005 and 2006 and describe its meaning in the context of the situation.



Source: Energy Information Association

Examples 3 and 4

Determine whether the function is linear. If it is, state the rate of change.

7.

x	4	2	0	-2	-4
y	-1	1	3	5	7

8.

x	-7	-5	-3	-1	0
y	11	14	17	20	23

9.

x	-0.2	0	0.2	0.4	0.6
y	0.7	0.4	0.1	0.3	0.6

10.

x	$\frac{1}{2}$	$\frac{3}{2}$	$\frac{5}{2}$	$\frac{7}{2}$	$\frac{9}{2}$
y	$\frac{1}{2}$	1	$\frac{3}{2}$	2	$\frac{5}{2}$

Examples 5 through 8

Find the slope of the line that passes through each pair of points.

11. (4, 3), (-1, 6) 12. (8, -2), (1, 1) 13. (2, 2), (-2, -2)
14. (6, -10), (6, 14) 15. (5, -4), (9, -4) 16. (11, 7), (-6, 2)
17. (-3, 5), (3, 6) 18. (-3, 2), (7, 2) 19. (8, 10), (-4, -6)
20. (-12, 15), (18, -13) 21. (-8, 6), (-8, 4) 22. (-8, -15), (-2, 5)
23. (2, 5), (3, 6) 24. (6, 1), (-6, 1) 25. (4, 6), (4, 8)
26. (-5, -8), (-8, 1) 27. (2, 5), (-3, -5) 28. (9, 8), (7, -8)
29. (5, 2), (5, -2) 30. (10, 0), (-2, 4) 31. (17, 18), (18, 17)
32. (-6, -4), (4, 1) 33. (-3, 10), (-3, 7) 34. (2, -1), (-8, -2)
35. (5, -9), (3, -2) 36. (12, 6), (3, -5) 37. (-4, 5), (-8, -5)

Example 9

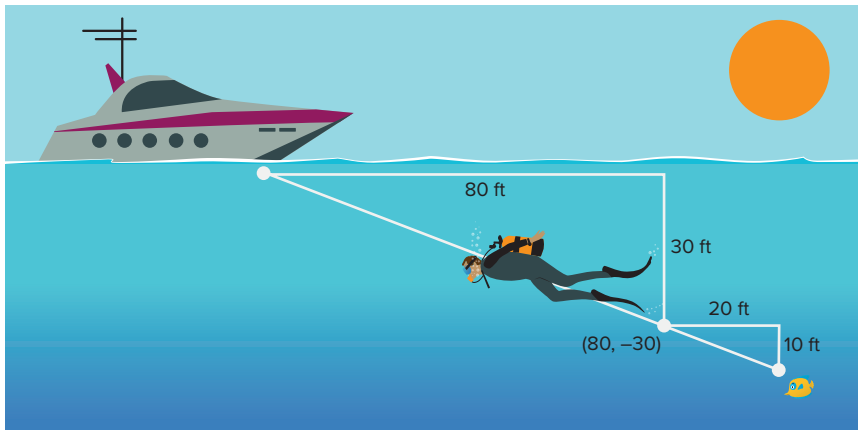
Find the value of r so the line that passes through each pair of points has the given slope.

38. (12, 10), (-2, r), $m = -4$ 39. (r , -5), (3, 13), $m = 8$
40. (3, 5), (-3, r), $m = \frac{3}{4}$ 41. (-2, 8), (r , 4), $m = -\frac{1}{2}$
42. (r , 3), (5, 9), $m = 2$ 43. (5, 9), (r , -3), $m = -4$
44. (r , 2), (6, 3), $m = \frac{1}{2}$ 45. (r , 4), (7, 1), $m = \frac{3}{4}$

Example 10



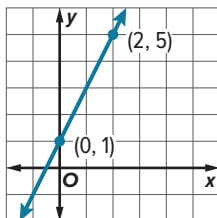
- 46. ROAD SIGNS** Roadway signs such as the one shown are used to warn drivers of an upcoming steep down grade. What is the grade, or slope, of the hill described on the sign?
- 47. HOME MAINTENANCE** Grading the soil around the foundation of a house can reduce interior home damage from water runoff. For every 6 inches in height, the soil should extend 10 feet from the foundation. What is the slope of the soil grade?
- 48. USE A SOURCE** Research the Americans with Disabilities Act (ADA) regulation for the slope of a wheelchair ramp. What is the slope of an ADA regulation ramp? Use the slope to determine the length and height of an ADA regulation ramp.
- 49. DIVERS** A boat is located at sea level. A scuba diver is 80 feet along the surface of the water from the boat and 30 feet below the water surface. A fish is 20 feet along the horizontal plane from the scuba diver and 10 feet below the scuba diver. What is the slope between the scuba diver and fish?



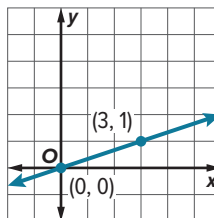
Mixed Exercises

STRUCTURE Find the slope of the line that passes through each pair of points.

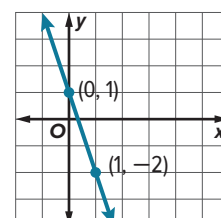
50.



51.



52.



53. $(6, -7), (4, -8)$

54. $(0, 5), (5, 5)$

55. $(-2, 6), (-5, 9)$

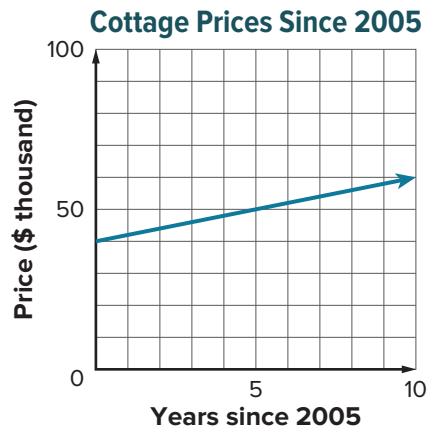
56. $(5, 8), (-4, 6)$

57. $(9, 4), (5, -3)$

58. $(1, 4), (3, -1)$

59. **REASONING** Find the value of r that gives the line passing through $(3, 2)$ and $(r, -4)$ a slope that is undefined.
60. **REASONING** Find the value of r that gives the line that passing through $(-5, 2)$ and $(3, r)$ a slope of 0.
61. **CREATE** Draw a line on a coordinate plane so that you can determine at least two points on the graph. Describe how you would determine the slope of the graph and justify the slope you found.

62. **ARGUMENTS** The graph shows median prices for small cottages on a lake since 2005. A real estate agent says that since 2005, the rate of change for house prices is \$10,000 each year. Do you agree? Use the graph to justify your answer.



Higher-Order Thinking Skills

63. **CREATE** Use what you know about rate of change to describe the function represented by the table.

Time (wk)	Height of Plant (in.)
4	9.0
6	13.5
8	18.0

64. **WRITE** Explain how the rate of change and slope are related and how to find the slope of a line.

65. **FIND THE ERROR** Fern is finding the slope of the line that passes through $(-2, 8)$ and $(4, 6)$. Determine in which step she made an error. Explain your reasoning.

66. **PERSEVERE** Find the value of d so that the line that passes through (a, b) and (c, d) has a slope of $\frac{1}{2}$.

67. **ANALYZE** Why is the slope undefined for vertical lines? Explain.

68. **WRITE** Tarak wants to find the value of a so that the line that passes through $(10, a)$ and $(-2, 8)$ has a slope of $\frac{1}{4}$. Explain how Tarak can find the value of a .

$$\begin{array}{l}
 m = \frac{6 - 8}{-2 - 4} \quad \text{Step 1} \\
 = \frac{-2}{-6} \quad \text{Step 2} \\
 = \frac{1}{3} \quad \text{Step 3}
 \end{array}$$

Essential Question

What can a function tell you about the relationship that it represents?

It can tell you about the rate of change, whether the relationship is positive or negative, the locations of the x - and y -intercepts, and what points fall on the graph.

Module Summary

Lessons 4-1 through 4-3

Graphing Linear Functions, Rate of Change, and Slope

- The graph of an equation represents all of its solutions.
- The x -value of the y -intercept is 0. The y -value of the x -intercept is 0.
- The rate of change is how a quantity is changing with respect to a change in another quantity. If x is the independent variable and y is the dependent variable, then rate of change = $\frac{\text{change in } y}{\text{change in } x}$.
- The slope m of a nonvertical line through any two points can be found using $m = \frac{y_2 - y_1}{x_2 - x_1}$.
- A line with positive slope slopes upward from left to right. A line with negative slope slopes downward from left to right. A horizontal line has a slope of 0. The slope of a vertical line is undefined.

Lesson 4-4

Transformations of Linear Functions

- When a constant k is added to a linear function $f(x)$, the result is a vertical translation.
- When a linear function $f(x)$ is multiplied by a constant a , the result $a \cdot f(x)$ is a vertical dilation.
- When a linear function $f(x)$ is multiplied by -1 before or after the function has been evaluated, the result is a reflection across the x - or y -axis.

Lesson 4-5

Arithmetic Sequences

- An arithmetic sequence is a numerical pattern that increases or decreases at a constant rate called the common difference.
- The n th term of an arithmetic sequence with the first term a_1 and common difference d is given by $a_n = a_1 + (n - 1)d$, where n is a positive integer.

Lessons 4-6, 4-7

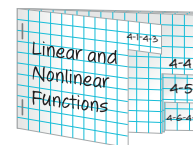
Special Functions

- A piecewise-linear function has a graph that is composed of a number of linear pieces.
- A step function is a type of piecewise-linear function with a graph that is a series of horizontal line segments.
- An absolute value function is V-shaped.

Study Organizer

Foldables

Use your Foldable to review this module. Working with a partner can be helpful. Ask for clarification of concepts as needed.



Test Practice

1. **GRAPH** Jalyn made a table of how much money she will earn from babysitting. (Lesson 4-1)

Hours Babysitting	Money Earned
1	5
2	10
3	15
4	20

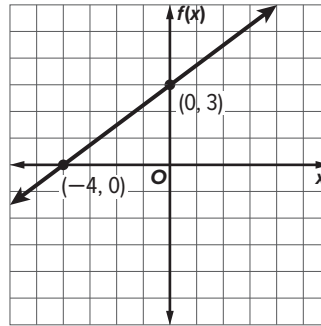
Use the table to graph the function.

2. **OPEN RESPONSE** Copy and complete the table to find the missing values in the table that show the points on the graph of $f(x) = 2x - 4$. (Lesson 4-1)

x	-2	0	2	4	6
$f(x)$	-8	-4			

3. **OPEN RESPONSE** Mr. Hernandez is draining his pool to have it cleaned. At 8:00 A.M., it had 2000 gallons of water and at 11:00 A.M. it had 500 gallons left to drain. What is the rate of change in the amount of water in the pool? (Lesson 4-2)

4. **MULTIPLE CHOICE** Find the slope of the graphed line. (Lesson 4-2)



- A. $-\frac{4}{3}$
 B. $-\frac{3}{4}$
 C. $\frac{3}{4}$
 D. $\frac{4}{3}$
5. **MULTIPLE CHOICE** Determine the slope of the line that passes through the points (4, 10) and (2, 10). (Lesson 4-2)
- A. -1
 B. 0
 C. 1
 D. undefined
6. **GRAPH** Graph the equation of a line with a slope of -3 and a y -intercept of 2. (Lesson 4-3)

7. **MULTIPLE CHOICE** What is the slope of the line that passes through (3, 4) and (-7, 4)? (Lesson 4-3)
- A. 0
 B. undefined
 C. -2
 D. -10

8. MULTIPLE CHOICE A teacher buys 100 pencils to keep in her classroom at the beginning of the school year. She allows the students to borrow pencils, but they are not always returned. On average, she loses about 8 pencils a month. Write an equation in slope-intercept form that represents the number of pencils she has left, y , after a number of x months. (Lesson 4-3)

- A. $y = -8x - 100$
- B. $y = -8x + 100$
- C. $y = 8x + 100$
- D. $y = 8x - 100$

9. OPEN RESPONSE Name the transformation that changes the slope, or the steepness of, a graph. (Lesson 4-4)

10. OPEN RESPONSE Describe the dilation of $g(x) = \frac{1}{2}(x)$ as it relates to the graph of the parent function, $f(x) = x$. (Lesson 4-4)

11. MULTIPLE CHOICE Arjun begins the calendar year with \$40 in his bank account. Each week he receives an allowance of \$20, half of which he deposits into his bank account. The situation describes an arithmetic sequence. Which function represents the amount in Arjun's account after n weeks? (Lesson 4-5)

- A. $f(n) = 20n + 40$
- B. $f(n) = 40n + 20$
- C. $f(n) = 40 + 10n$
- D. $f(n) = 10 + 40n$

12. OPEN RESPONSE What number can be used to complete the equation below that describes the n th term of the arithmetic sequence $-2, -1.5, -1, 0, 0.5, \dots$? (Lesson 4-5)

$$a_n = 0.5n - \underline{\quad? \quad}$$

13. OPEN RESPONSE Write and graph a function to represent the sequence 1, 10, 19, 28, ... (Lesson 4-5)

14. OPEN RESPONSE Christa has a box of chocolate candies. The number of chocolates in each row forms an arithmetic sequence as shown in the table. (Lesson 4-5)

Row	1	2	3	4
Number of Chocolates	3	6	9	12

Write an arithmetic function that can be used to find the number of chocolates in each row.

- 15. OPEN RESPONSE** Daniel earns \$9 per hour at his job for the first 40 hours he works each week. However, his pay rate increases to \$13.50 per hour thereafter. This situation can be represented with the function

$$f(x) = \begin{cases} 9x, & \text{if } x \leq 40 \\ 360 + 13.5(x - 40), & \text{if } x > 40 \end{cases}$$

Use this function to copy and complete the table with the correct values. (Lesson 4-6)

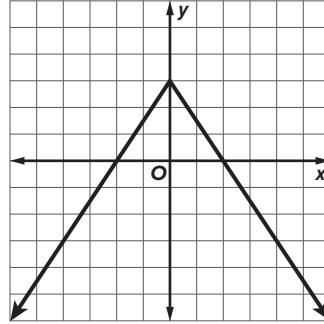
Hours Worked, x	Money Earned, $f(x)$
30	
35	315
40	
45	427.5
50	

- 16. GRAPH** Graph the function $f(x) = 2\lceil x \rceil$. (Lesson 4-6)

- 17. MULTIPLE CHOICE** Which of the following describes the effect a dilation has upon the graph of the absolute value parent function? (Lesson 4-7)

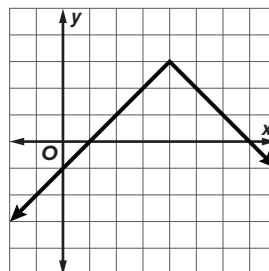
- A. Flipped across axis
- B. Stretch or compression
- C. Rotated about the origin
- D. Shifted horizontally or vertically

- 18. MULTI-SELECT** Describe the transformation(s) of the function graphed below in relation to the absolute value parent function. Select all that apply. (Lesson 4-7)



- A. Reflected across x -axis
 - B. Vertical stretch
 - C. Vertical compression
 - D. Reflected across y -axis
 - E. Translated right 3
 - F. Translated up 3
- 19. OPEN RESPONSE** Describe the graph of $g(x) = |x| + 5$ in relation to the graph of the absolute value parent function. (Lesson 4-7)
- 20. OPEN RESPONSE** Across which axis is the graph of $h(x) = -5|x|$ reflected? (Lesson 4-7)

- 21. OPEN RESPONSE** Use the graph of the function to write its equation. (Lesson 4-7)





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