CHAPTER 2

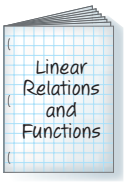
Study Guide and Review

Download Vocabulary Review from algebra2.com

FOLDABLES Study Organizer

GET READY to Study

Be sure the following Key Concepts are noted in your Foldable.



Key Concepts

Relations and Functions (Lesson 2-1)

- A relation is a set of ordered pairs. The domain is the set of all x-coordinates, and the range is the set of all y-coordinates.
- A function is a relation where each member of the domain is paired with exactly one member of the range.

Linear Equations and Slope (Lessons 2-2 to 2-4)

- A linear equation is an equation whose graph is a line.
- Slope is the ratio of the change in y-coordinates to the corresponding change in x-coordinates.
- Lines with the same slope are parallel. Lines with slopes that are opposite reciprocals are perpendicular.
- Standard Form: $Ax + By = C$, where A, B, and C are integers whose greatest common factor is 1, $A \geq 0$, and A and B are not both zero
- Slope-Intercept Form: $y = mx + b$
- Point-Slope Form: $y - y_1 = m(x - x_1)$

Using Scatter Plots (Lesson 2-5)

- A prediction equation can be used to predict the value of one of the variables given the value of the other variable.

Graphing Inequalities (Lesson 2-7)

- You can graph an inequality by following these steps.

  Step 1 Determine whether the boundary is solid or dashed. Graph the boundary.

  Step 2 Choose a point not on the boundary and test it in the inequality.

  Step 3 If a true inequality results, shade the region containing your test point. If a false inequality results, shade the other region.

Key Vocabulary

absolute value function (p. 96)
boundary (p. 102)
constant function (p. 96)
continuous function (p. 65)
coordinate plane (p. 58)
dependent variable (p. 61)
discrete function (p. 65)
domain (p. 58)
family of graphs (p. 73)
function (p. 58)
function notation (p. 61)
greatest integer function (p. 95)
identity function (p. 96)
independent variable (p. 61)
linear equation (p. 66)
linear function (p. 66)
line of fit (p. 86)
mapping (p. 58)
negative correlation (p. 86)
no correlation (p. 86)
one-to-one function (p. 58)
ordered pair (p. 58)
parent graph (p. 73)
piecewise function (p. 97)
point-slope form (p. 80)
positive correlation (p. 86)
prediction equation (p. 86)
quadrant (p. 58)
range (p. 58)
rate of change (p. 71)
relation (p. 58)
scatter plot (p. 86)
slope (p. 71)
slope-intercept form (p. 79)
standard form (p. 67)
step function (p. 95)
vertical line test (p. 59)
x-intercept (p. 68)

Vocabulary Check

Choose the correct term to complete each sentence.

1. The (constant, identity) function is a linear function described by $f(x) = x$.
2. The graph of the (absolute value, greatest integer) function forms a V-shape.
3. The (slope-intercept, standard) form of the equation of a line is $y = mx + b$.
4. Two lines in the same plane having the same slope are (parallel, perpendicular).
5. The (line of fit, vertical line test) can be used to determine if a relation is a function.
6. The (domain, range) of a relation is the set of all first coordinates from the ordered pairs which determine the relation.

Vocabulary Review at algebra2.com

Lesson-by-Lesson Review

2–1 Relations and Functions (pp. 58–64)

Graph each relation or equation and find the domain and range. Then determine whether the relation or equation is a function. Is the relation *discrete* or *continuous*?

7. {(6, 3), (2, 1), (−2, 3)}

8. {(−5, 2), (2, 4), (1, 1), (−5, −2)}

9. $y = 0.5x$ **10.** $y = 2x + 1$

Find each value if $f(x) = 5x - 9$.

11. $f(6)$ **12.** $f(-2)$

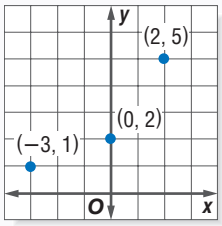
13. $f(y)$ **14.** $f(-2v)$

15. TAXI RIDE A taxi company charges $2.80 for the first mile and $1.60 for each additional mile. The amount a passenger will be charged can be expressed as $f(x) = 1.20 + 1.60x$, when $x \geq 1$. Graph this equation and find the domain and range. Then determine whether the equation is a function. Is the equation *discrete* or *continuous*?

Example 1 **Graph the relation {(−3, 1), (0, 2), (2, 5)} and find the domain and range. Then determine whether the relation is a function. Is the relation *discrete* or *continuous*?**

The domain is {−3, 0, 2}, and the range is {1, 2, 5}.

Since each x-value is paired with exactly one y-value, the relation is a function. The relation is discrete because the points are not connected.



2–2 Linear Equations (pp. 66–70)

State whether each equation or function is linear. Write *yes* or *no*. If no, explain your reasoning.

16. $2x + y = 11$ **17.** $h(x) = \sqrt{2x + 1}$

Write each equation in standard form. Identify *A*, *B*, and *C*.

18. $\frac{2}{3}x - \frac{3}{4}y = 6$ **19.** $0.5x = -0.2y - 0.4$

Find the *x*-intercept and the *y*-intercept of the graph of each equation. Then graph the equation.

20. $-\frac{1}{5}y = x + 4$ **21.** $6x = -12y + 48$

22. CUBES Julián thinks that the equation for the volume of a cube, $V = s^3$, is a linear equation. Is he correct? Explain.

Example 2 **Write $2x - 6 = y + 8$ in standard form. Identify *A*, *B*, and *C*.**

$2x - 6 = y + 8$	Original equation
$2x - y - 6 = 8$	Subtract y from each side.
$2x - y = 14$	Add 6 to each side.

The standard form is $2x - y = 14$. So, $A = 2$, $B = -1$, and $C = 14$.

2–3 Slope (pp. 71–77)

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

23. (−6, −3), (6, 7) **24.** (5.5, −5.5), (11, −7)

Graph the line passing through the given point with the given slope.

25. (0, 1), $m = 2$ **26.** (−5, 2), $m = -\frac{1}{4}$

Graph the line that satisfies each set of conditions.

27. passes through (−1, −2), perpendicular to a line whose slope is $\frac{1}{2}$

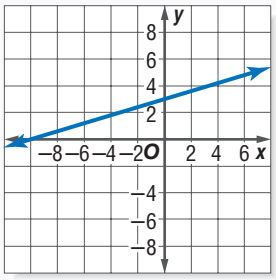
28. passes through (−1, 2), parallel to the graph of $x - 3y = 14$

29. RAMPS Jack measures his bicycle ramp and finds that it is 5 feet long and 3 feet high. What is the slope of his ramp?

Example 3 **Graph the line passing through (3, 4) with slope $m = \frac{1}{3}$.**

Graph the ordered pair (3, 4). Then, according to the slope, go up 1 unit and right 3 units. Plot the new point at (6, 5). You can also go right 3 units and then up 1 unit to plot the new point.

Draw the line containing the points.



2–4 Writing Linear Equations (pp. 79–84)

Write an equation in slope-intercept form for the line that satisfies each set of conditions.

30. slope $\frac{3}{4}$, passes through (−6, 9)

31. passes through (−1, 2), parallel to the graph of $x - 3y = 14$

32. passes through (3, −8) and (−3, 2)

33. passes through (3, 2), perpendicular to the graph of $4x - 3y = 12$

34. LANDSCAPING Mr. Ryan is planning to plant rows of roses in a garden he is designing for a client. Before planting, he sketches out his plans on a coordinate grid. A row of white roses will be planted along the line with equation $y = 2x + 1$. A row of red roses will be parallel to the white roses and pass through the point (3, 5). What equation would represent the line for the row of red roses?

Example 4 **Write an equation in slope-intercept form for the line through (4, 5) that is parallel to the line through (−1, −3) and (2, −1).**

First, find the slope of the given line.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{-1 - (-3)}{2 - (-1)}$$
$$= \frac{2}{3}$$

The parallel line will also have a slope of $\frac{2}{3}$.

$$y - y_1 = m(x - x_1)$$
$$y - 5 = \frac{2}{3}(x - 4)$$
$$y = \frac{2}{3}x + \frac{7}{3}$$

2–5 Statistics: Using Scatter Plots (pp. 86–91)

HEALTH INSURANCE For Exercises 35 and 36 use the table that shows the number of people covered by private or government health insurance in the United States.

Year	People (millions)
1988	211
1992	218
1996	225
2000	240
2004	245

Source: U.S. Census

35. Draw a scatter plot and describe the correlation.

36. Use two ordered pairs to write a prediction equation. Then use your prediction equation to predict the number of people with health insurance in 2010.

GOLD PRODUCTION For Exercises 37 and 38, use the table that shows the number of ounces of gold produced in the United States for several years.

Year	Troy ounces (millions)
1998	11.8
1999	11.0
2000	11.3
2001	10.8
2002	9.6
2003	8.9

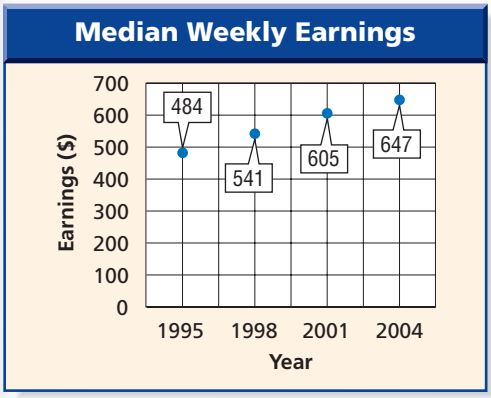
Source: *World Almanac*

37. Draw a scatter plot and describe the correlation.

38. Use two ordered pairs to write a prediction equation. Then use your prediction equation to predict the number of ounces of gold that will be produced in 2010.

Example 5 WEEKLY PAY The table below shows the median weekly earnings for American workers for the period 1985–1999. Predict the median weekly earnings for 2010.

Year	1995	1998	2001	2004	2010
Earnings ($)	484	541	605	647	?



Source: U.S. Bureau of Labor Statistics

Use (1995, 484) and (2004, 647) to find a prediction equation.

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

$= \frac{647 - 484}{2004 - 1995}$ $(x_1, y_1) = (1995, 484)$, $(x_2, y_2) = (2004, 647)$,

$= \frac{163}{9}$ or about 18.1 Simplify.

$y - y_1 = m(x - x_1)$ Point-slope form

$y - 484 = 18.1(x - 1995)$ Substitute.

$y - 484 = 18.1x - 36{,}109.5$ Multiply.

$y = 18.1x - 35{,}625.5$ Add 484 to each side.

To predict earnings for 2010, substitute 2010 for x.

$y = 18.1(2010) - 35{,}625.5$ $x = 2010$

$= 755.5$ Simplify.

The model predicts median weekly earnings of $755.50 in 2010.

2-6 Special Functions (pp. 95–101)

Graph each function. Identify the domain and range.

39. $f(x) = [\![x]\!] - 2$

40. $h(x) = [\![2x - 1]\!]$

41. $g(x) = |x| + 4$

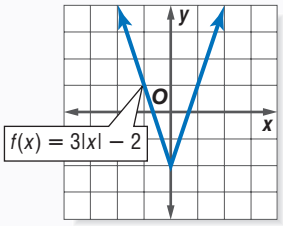
42. $h(x) = |x - 1| - 7$

43. $f(x) = \begin{cases} 2 \text{ if } x < -1 \\ -x - 1 \text{ if } x \geq -1 \end{cases}$

44. $g(x) = \begin{cases} -2x - 3 \text{ if } x < 1 \\ x - 4 \text{ if } x > 1 \end{cases}$

45. WIRELESS INTERNET A wireless Internet provider charges $40 a month plus an additional 30 cents a minute or any fraction thereof. Draw a graph that represents this situation.

Example 6 **Graph the function $f(x) = 3|x| - 2$. Identify the domain and range.**



The domain is all real numbers. The range is all real numbers greater than or equal to −2.

2-7 Graphing Inequalities (pp. 102–105)

Graph each inequality.

46. $y \leq 3x - 5$

47. $x > y - 1$

48. $y + 0.5x < 4$

49. $2x + y \geq 3$

50. $y \geq |x| + 2$

51. $y > |x - 3|$

52. BASEBALL The Cincinnati Reds must score more runs than their opponent to win a game. Write an inequality to represent this situation. Graph the inequality.

Example 7 **Graph $x + 4y \leq 4$.**

Since the inequality symbol is $\leq$, the graph of the boundary should be solid. Graph the equation.

Test (0, 0).

$x + 4y \leq 4$ Original inequality

$0 + 4(0) \leq 4$ $(x, y) = (0, 0)$

$0 \leq 4$ Shade the region that contains (0, 0).