Newspapers and print magazines communicate information in words, symbols, and pictures. Many feature colorful graphs and charts to make data easier to understand.

Television is a primary source of news information for many people. Reporters research the facts of a story and explain the facts to the viewing audience. Pictures, lists, and colorful graphics help the viewers make sense of the story.

- **Environmental journalists** (page 61) research what is being done to harm and save our planet. They must be able to interpret data, understand graphs, and notice trends in numbers to present the facts without inserting opinions.

- **Transcriptionists or prompter operators** (page 81) prepare the copy that television newscasters read as they report the news. They must be able to work quickly and accurately.
Data Activity: Where Can You Find the News?

Use the table for Questions 1–3.

1. Which type of news media gives the most coverage to the daily happenings in the U.S. Congress? newspapers

2. A TV news magazine show is about how many more times as likely as a newspaper to give coverage to problems in a rock star’s marriage? About 5 times

3. A print news magazine devotes an average of 4 pages per magazine to its coverage of foreign affairs and the military. About how many pages would you expect to find in the section entitled Consumer News?

   Between 7 and 8 pages

CHAPTER INVESTIGATION

The news media use many different ways to present data to the public. Newspapers and magazines use charts, tables, and graphs. Television uses animated diagrams and graphs to make data appealing. Some types of presentations are more effective than others. Some graphs and charts may even be biased or misleading.
The skills on these two pages are ones you have already learned. Use the examples to refresh your memory and complete the exercises. For additional practice on these and more prerequisite skills, see pages 654–661.

**GRAPHING INEQUALITIES**

Graphing an inequality on a number line can give you an easily understandable visual record of all the solutions for the inequality.

**Example** Graph the inequality \(3x \geq -9\) on a number line.

Use the properties of inequalities. Graph the solution.

\[
\begin{align*}
3x &\geq -9 \\
\frac{3x}{3} &\geq \frac{-9}{3} \\
x &\geq -3
\end{align*}
\]

Use a closed dot if that number is included in the solution set. Use an open dot if it is not included.

Graph each inequality on a number line.

1. \(2a \geq 6\)  
2. \(2(m + 3) < 8\)  
3. \(k \geq -1\)

4. \(4b - 3 \leq 13\)  
5. \(\frac{1}{2}x > -4\)  
6. \(3z + 5 \leq 14\)

7. \(3(b - 3) \leq -3\)  
8. \(8c - 3 < 5c\)  
9. \(\frac{m}{4} - 7 \geq -8\)

10. \(5(w - 2) > -15\)  
11. \(2y + 7 < -13\)  
12. \(9d + 2 \geq -4\)

**POINTS ON A COORDINATE PLANE**

You will need to know how to plot points on the coordinate plane in order to graph linear equations and inequalities.

Plot each point on a coordinate plane. Label each point with its letter.

13. \(A(-3, 2)\)  
14. \(B(1, 8)\)  
15. \(C(8, -1)\)

16. \(D(2, -6)\)  
17. \(E(3, 4)\)  
18. \(F(-7, 5)\)

19. \(G(-5, -5)\)  
20. \(H(6, 2)\)  
21. \(I(0, 8)\)

22. \(J(-7, 0)\)  
23. \(K(7, -4)\)  
24. \(L(-4, -3)\)
### Measures of Central Tendency

**Example** Find the mean, median, mode, and range of this data:

\[
\begin{align*}
8 & \quad 10 & \quad 9 & \quad 9 & \quad 8 & \quad 7 & \quad 5 & \quad 12 & \quad 8 & \quad 6 & \quad 6
\end{align*}
\]

The *mean* is the sum of the data divided by the number of data.

\[
(8 + 10 + 9 + 9 + 8 + 7 + 5 + 12 + 8 + 6 + 6) \div 11 = 8
\]

The *median* is the middle value when the data is arranged in numerical order.

\[
5 \quad 6 \quad 6 \quad 7 \quad 8 \quad 8 \quad 8 \quad 9 \quad 9 \quad 10 \quad 12
\]

If the number of data items is even, the median is the average of the two middle numbers.

The *mode* is the number that occurs most often in the set of data.

\[
5 \quad 6 \quad 6 \quad 7 \quad 8 \quad 8 \quad 8 \quad 9 \quad 9 \quad 10 \quad 12
\]

The *range* is the difference between the greatest and least values in the set of data.

\[
5 \quad 6 \quad 6 \quad 7 \quad 8 \quad 8 \quad 8 \quad 9 \quad 9 \quad 10 \quad 12
\]

\[
12 - 5 = 7
\]

**Find the mean, median, mode, and range of each set of data.**

**25.**

\[
\begin{align*}
2 & \quad 3 & \quad 8 & \quad 7 & \quad 8 & \quad 1 \\
2 & \quad 5 & \quad 10 & \quad 8 & \quad 12
\end{align*}
\]

**26.**

\[
\begin{align*}
5 & \quad 8 & \quad 11 & \quad 13 & \quad 5 \\
9 & \quad 2 & \quad 4 & \quad 6
\end{align*}
\]

**27.**

\[
\begin{align*}
22 & \quad 31 & \quad 16 & \quad 19 & \quad 15 & \quad 24 \\
27 & \quad 27 & \quad 14 & \quad 31 & \quad 32 & \quad 30
\end{align*}
\]

**28.**

\[
\begin{align*}
42 & \quad 40 & \quad 38 & \quad 46 & \quad 51 & \quad 28 & \quad 37 & \quad 44 \\
30 & \quad 29 & \quad 45 & \quad 36 & \quad 27 & \quad 43 & \quad 34
\end{align*}
\]

### Language of Mathematics

Write each phrase as an algebraic expression. Use \( n \) for “a number.”

**29.** seven less than five times a number

**30.** the product of two and the sum of a number and eight

**31.** the quotient of three times a number and five

**32.** the sum of thirteen and eight decreased by a number

**33.** fourteen decreased by five times a number

**34.** five times the difference of a number and ten

**35.** three increased by the quotient of a number and two
Patterns and Iterations

Goals
- Identify the next terms in a sequence and the rule in an iterative process.

Applications
Media, Finance, Business

1. Use blocks or tiles to make the next two figures in this pattern.

2. Make a chart like this to show the number of pieces used in each figure.

3. How many pieces will it take to make the 7th figure? How do you know your answer is correct?

<table>
<thead>
<tr>
<th>Figure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pieces</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example 1**

Identify the pattern for the sequence 1, 2, 4, 7, _____, _____, _____, ... Find the next three terms.

**Solution**

In this pattern, the number being added is 1 more than the number that was added to the previous term.

The next three terms are 11, 16, and 22.

In some patterns, a term can be calculated by applying a rule to the term’s position number.

Mathematicians have always been interested in number patterns. Many such patterns exist naturally, both in mathematics and in nature. A **pattern**, or **sequence**, is an arrangement of numbers in a particular order. The numbers are called **terms**, and the pattern is formed by applying a rule. If a pattern exists, a prediction can be made about the terms in the pattern. For example, the numbers 2, 7, 12, 17, 22, ... are arranged in a pattern. Each number is 5 more than the preceding number. The rule is “add 5.”
Example 2

In the sequence 1, 4, 9, 16, . . . , identify the rule relating each term to its position number. Then find the 10th term and the 15th term.

Solution

Each term in the sequence 1, 4, 9, 16, . . . , is found by taking the square of its position number. The 10th term is $10^2$, or 100. Likewise, the 15th term is $15^2 = 225$.

In mathematics, the term iteration is used to describe a process that is repeated over and over. You have already seen how iterations can be used to create number patterns. For example, the sequence 1, 2, 4, 8, . . . , is generated by using the iterative process of multiplying by 2. An iteration diagram can also be used to model the sequence.

Example 3

The sequence 1, 3, 9, 27, . . . , can be modeled using an iteration diagram. Draw the diagram and calculate the output for 7 iterations.

Solution

Initial value (input): 1  Number of iterations: 7
Rule: Multiply input by 3  Output: 3, 9, 27, 81, 243, 729, 2187

Many occupations require the use of iterative processes. Most assets a business owns, such as a car or a piece of business equipment, become less valuable over the time they are used. This is called depreciation. For example, if a new car was purchased for $13,000 and sold three years later for $5000, the value of the car has depreciated $8000 in value.

There are different methods to calculate depreciation. Many such methods are iterative, such as the one called the declining-balance method.

Example 4

NEWSPAPER A printing machine has an expected life of five years, a beginning book value (cost when bought) of $50,000, and a depreciation rate of 30% per year. Find the ending book value after five years.
Solution

Calculate the output for 5 iterations.

<table>
<thead>
<tr>
<th>Year</th>
<th>Beginning book value</th>
<th>Depreciation rate</th>
<th>Annual depreciation</th>
<th>Ending book value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$50,000.00</td>
<td>0.3</td>
<td>$15,000.00</td>
<td>$35,000.00</td>
</tr>
<tr>
<td>2</td>
<td>35,000.00</td>
<td>0.3</td>
<td>10,500.00</td>
<td>24,500.00</td>
</tr>
<tr>
<td>3</td>
<td>24,500.00</td>
<td>0.3</td>
<td>7350.00</td>
<td>17,150.00</td>
</tr>
<tr>
<td>4</td>
<td>17,150.00</td>
<td>0.3</td>
<td>5145.00</td>
<td>12,005.00</td>
</tr>
<tr>
<td>5</td>
<td>12,005.00</td>
<td>0.3</td>
<td>3601.50</td>
<td>8403.50</td>
</tr>
</tbody>
</table>

After five years the ending book value is $8403.50.

Try These Exercises

Identify the pattern for each sequence. Find the next three terms in each sequence.
1. $-15, -11, -7, -3, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$
2. $1, 7, 13, 19, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$
3. $5, 2, -1, -4, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$
4. $-1, 3, -9, 27, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$
5. $2, 6, 18, 54, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$
6. Draw the iteration diagram for this sequence:
   
   $16, 4, 8, 2, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$
   
   Identify each part of the diagram. Then calculate the output for the first 7 iterations.

Practice Exercises • For Extra Practice, see page 665.

Determine the next three terms in each sequence.
7. $2, 3, 5, 8, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$
8. $1, 2, 5, 10, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$
9. $1, 3, 7, 13, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$
10. $20, 8, -4, -16, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$
11. $1, 8, 27, 64, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$
12. $-1, \frac{1}{2}, -\frac{1}{4}, -\frac{1}{8}, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$

13. ERROR ALERT Ryan determines that the next term in the sequence 1.7, 6.9, 12.1, 17.3, \ldots is 23.5. Explain what Ryan did wrong.
14. Draw the iteration diagram for the sequence 1, 2, 4, 8, 16, \ldots Calculate the output for the first 7 iterations.
15. Determine the output for the given iteration. Round each answer to the nearest cent.
Draw the next three figures in the pattern.

16. 

17. 

TELEVISION Use the declining-balance method to find the book value at the end of the expected life for each of these assets.

18. sound system for $18,000, expected life of five years, depreciation rate of 30% per year

19. video equipment for $12,000, expected life of three years, depreciation rate of 50% per year

20. NEWSPAPER A local newspaper hopes to increase its circulation at the rate of 15% per year for the next five years. If its current circulation is 15,640, what will its circulation be at the end of five years? Round your answer to the nearest whole number.

EXTENDED PRACTICE EXERCISES

21. FINANCE John deposits $500 in his savings account which earns interest at a 7.5% rate. At the end of each year, he also adds $100 to his account. Determine the iteration diagram and the output for 5 iterations. Round each answer to the nearest cent.

22. WRITING MATH Examine the following sequence.

1, 1, 2, 3, 5, 8, 13, 21, . . .

Identify the rule being applied to the pattern, and find the next three terms.

MIXED REVIEW

Graph each set of numbers on a number line. (Lesson 1-1)

23. \(-6, -2.75, 0, \sqrt{5}, \frac{11}{2}\)

24. whole numbers less than 3

25. real numbers greater than or equal to -4

26. real numbers less than -1

27. real numbers greater than 2

28. real numbers less than or equal to -3

Graph the intersection of each pair of sets. (Lesson 1-3)

29. \(A = \{x | x \geq -3\} \quad B = \{x | x < 5\}\)

30. \(A = \{x | x > -1\} \quad B = \{x | x \geq 4\}\)

31. \(A = \{x | x > 0\} \quad B = \{x | x \leq 5\}\)

32. \(A = \{x | x < 2\} \quad B = \{x | x > 1\}\)

33. \(A = \{x | x > -5\} \quad B = \{x | x \leq 2\}\)

34. \(A = \{x | x \leq 0\} \quad B = \{x | x \geq -4\}\)

---

mathmatters3.com/self_check_quiz
The Coordinate Plane, Relations, and Functions

Goals
■ Identify relations and their domains and ranges.
■ Identify and evaluate functions.

Applications
Engineering, Biology, Television

Determine the final text size by completing the table.

<table>
<thead>
<tr>
<th>Input</th>
<th>Copy Machine</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>length of text</td>
<td>reduces copy</td>
<td>length of text</td>
</tr>
<tr>
<td>9 in.</td>
<td>to ( \frac{1}{4} ) the original size</td>
<td></td>
</tr>
<tr>
<td>5 ( \frac{1}{2} ) in.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.4 cm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Build Understanding

You know that real numbers can be graphed on a number line. You can graph pairs of numbers on a grid system called a coordinate plane. A coordinate plane consists of two perpendicular number lines, dividing the plane into four regions called quadrants. The horizontal number line is the \( x \)-axis, and the vertical number line is the \( y \)-axis. The point where the axes cross is the origin. Points on the axes are not part of the quadrants.

There are infinitely many points in the plane. Each point is unique and is assigned an ordered pair of real numbers, consisting of one \( x \)-coordinate and one \( y \)-coordinate. For example, the point \((2, -5)\) has an \( x \)-coordinate of 2, and a \( y \)-coordinate of \(-5\). The \( x \)-coordinate, or abscissa, determines the horizontal location of the point, while the \( y \)-coordinate, or ordinate, determines the vertical location. The order of the numbers is important. \((2, -5)\) and \((-5, 2)\) refer to two different points.

A set of ordered pairs is defined as a relation. You can represent a relation by a table of values or a graph.

The domain is the set of all the \( x \)-coordinates of ordered pairs in the relation. The range is the set of all the \( y \)-coordinates of ordered pairs in the relation. A mapping is the relationship between the elements of the domain and the range.

The mapping at the right shows the relationship between the \( x \)-coordinates (domain) and the \( y \)-coordinates (range) for the set of ordered pairs \([0, 1), (2, -1), (3, 2)\).

A special kind of relation that is important in mathematics is called a function. A function is a set of ordered pairs in which each element of the domain is paired with exactly one element in the range.
Example 1

Determine whether each relation is a function. State the domain and range of each.

a. \{(0, 3), (1, 4), (3, 0)\}

b. \[
\begin{array}{c|cccc}
  x & -4 & -2 & 0 & 2 \\
  y & 2 & 0 & 2 & 4 \\
\end{array}
\]

c. \{(0, 3), (1, 4), (-3, 0)\}

Solution

a. No; the element 3 in the domain is paired with two elements in the range, -3 and 3. Domain: \{1, 3, 5\}, Range: \{-3, 0, 3, 4\}

b. Yes; each element of the domain is paired with exactly one element of the range. However, you will note that one element of the range can be paired with more than one element of the domain.

Domain: \{-4, -2, 0, 2\}, Range \{0, 2, 4\}

c. Yes. Domain: \{-3, 0, 1\}, Range: \{0, 3, 4\}

Below is another method to determine if a relation is a function.

**Vertical Line Test:** When a vertical line is drawn through the graph of a relation, the relation is not a function if the vertical line intersects the graph in more than one point.

Example 2

Determine whether \{(2, 2), (4, -4), (2, -2), (4, 4)\} is a function by using the Vertical Line Test.

Solution

The relation is not a function. A vertical line passes through more than one point.

Examples of functions in everyday life are the relationship between the numbers of hamburgers sold and the price of each, or the weight of a package and the cost of postage. In mathematics, functions are usually given as rules that show the relationship of elements of the domain (input values) to elements of the range (output values). The variable whose values make up the domain is the independent variable, \(x\). The variable that depends on \(x\) is the dependent variable.

**Function notation** can represent the rule that associates the input value with the output value. The most commonly used function notation is called the “\(f\) of \(x\)” notation. If \(f\) is the function that assigns to each real number \(x\) the value \(x + 1\), then \(f(x) = x + 1\).

<table>
<thead>
<tr>
<th>Rule represented by</th>
<th>Example</th>
<th>Is read</th>
</tr>
</thead>
<tbody>
<tr>
<td>equation in two variables</td>
<td>(y = x + 1)</td>
<td>“(y) is a function of (x) equal to (x + 1)” or “(y) equals (x + 1)”</td>
</tr>
<tr>
<td>(f) of (x) notation</td>
<td>(f(x) = x + 1)</td>
<td>“(f) of (x) equals (x + 1)”</td>
</tr>
</tbody>
</table>
Example 3

Evaluate each function.

a. \( f(x) = 3x + 2; f(6) \)  

Solution

\[
 f(6) = 3(6) + 2 \\
= 18 + 2 \\
= 20 
\]

b. \( g(x) = x^2 - 1; g(-1) \)

Solution

\[
 g(-1) = (-1)^2 - 1 \\
= 1 - 1 \\
= 0 
\]

Because functions define the mathematical relationship between two variables, they are often used to model real-world problems.

Example 4

ENGINEERING The air conditioner in a car should produce air that is 26 degrees below the temperature outside the car. The formula for this function is \( T(x) = x - 26 \), where \( x \) is the outside air temperature. What is the temperature inside the car when the outside temperature is 92°F?

Solution

\[
 T(92) = 92 - 26 = 66 \\
\]

The temperature is 66°F inside the car.

Try These Exercises

Graph each point on a coordinate plane.

1. \( A(-1, 0) \)  
2. \( B(2, -1) \)  
3. \( C(0, -4) \)  
4. \( D(-3, -2) \)

Given \( f(x) = x - 5 \), evaluate each of the following.

5. \( f(3) \)  
6. \( f(0) \)  
7. \( f(-2) \)  
8. \( f(11) \)

Determine if each relation is a function. Give the domain and range.

9.  

<table>
<thead>
<tr>
<th>( x )</th>
<th>-2</th>
<th>-3</th>
<th>1</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>1</td>
<td>0</td>
<td>-1</td>
<td>1</td>
<td>-3</td>
</tr>
</tbody>
</table>

10.

Practice Exercises • For Extra Practice, see page 666.

Graph each point on a coordinate plane. Name the quadrant in which each point is located.

11. \( A(3, 5) \)  
12. \( B(-2, -3) \)  
13. \( C(-4, 3) \)  
14. \( D(1, -5) \)

Given \( f(x) = 4x - 1 \), evaluate each of the following.

15. \( f(-4) \)  
16. \( f(0) \)  
17. \( f(2) \)
Write each relation as a set of ordered pairs. Give the domain and range.

18. \[
\begin{array}{c|c|c|c|c|c}
\hline
x & -1 & 0 & 1 & 2 \\
\hline
y & 0 & 1 & 2 & 3 \\
\hline
\end{array}
\]

19. \[
\begin{array}{c|c|c}
\hline
x & 1 & 2 & 3 \\
\hline
y & 2 & 3 & 4 \\
\hline
\end{array}
\]

20. \[
\begin{array}{c|c|c|c|c|c}
\hline
x & 0 & 1 & 2 & 3 \\
\hline
y & -1 & 1 & 3 & ? \\
\hline
\end{array}
\]

**BIOLOGY** Biologists have determined that the number of chirps made by a cricket in one minute is a function of the temperature \(t\) measured in degrees Fahrenheit. This relationship is modeled by the function \[c(t) = \frac{1}{4}t + 37.\] Calculate the number of chirps per minute for the given temperatures.

21. \(48^\circ F\)

22. \(92^\circ F\)

Given \(f(x) = 5x + 2, g(x) = -2x + 1,\) and \(h(x) = 3x^2,\) find each value.

23. \(f(3)\)

24. \(g(5)\)

25. \(h(4)\)

26. \(f(1) + g(1)\)

**Extended Practice Exercises**

Given \(f(x) = ax + b, g(x) = cx^2,\) find each value if \(a \neq 0\) and \(c \neq 0.\)

27. \(f\left(\frac{1}{a}\right)\)

28. \(f\left(-\frac{b}{a}\right)\)

29. \(g(c)\)

30. \(g\left(-\frac{1}{c}\right)\)

Use the Vertical Line Test to determine whether each graph represents a function.

31. ![Graph 1](image1)

32. ![Graph 2](image2)

33. ![Graph 3](image3)

34. **WRITING MATH** Explain why the Vertical Line Test works.

35. **TELEVISION** A video technician charges $80 for the first hour. Each additional half-hour or part of a half-hour costs $30. What is the total charge for a 3\(\frac{1}{4}\)-hour session?

**Mixed Review Exercises**

Let \(U = \{0, 3, 5, 6, 8, 10, 13, 14, 18, 20\}, A = \{0, 3, 6, 10, 14, 20\}, B = \{3, 5, 10, 13, 18\},\) and \(C = \{0, 3, 6, 8, 14, 20\}.\) Find each set. (Lesson 1-3)

36. \(A' \cup B'\)

37. \(B' \cap C\)

38. \((A \cup C) \cap B'\)

39. \((B \cap C') \cup A\)

40. \((B' \cap C') \cup A\)

41. \((A \cup B') \cap C\)

42. \((A \cup B) \cap C'\)

43. \((B' \cup C) \cap (A \cup B')\)

44. \((A' \cap C) \cup (C' \cap B)\)

45. **DATA FILE** Use the data on page 644 on tall buildings of the world. What is the mean height in feet of the buildings? What is the median height of the buildings listed? (Prerequisite Skill)
Review and Practice Your Skills

**Practice Lesson 2-1**

Find the next three terms in each sequence.

1. 5, −10, 20, −40, _____, _____, _____, . . .
2. 2187, 729, 243, 81, _____, _____, _____, . . .
3. 3, 5, 9, 15, _____, _____, _____, . . .
4. 1, 8, 5, 12, _____, _____, _____, . . .
5. 5, 2, −1, −4, _____, _____, _____, . . .
6. \( \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \quad \), _____, _____, _____, . . .
7. \( \frac{1}{7}, \frac{2}{7}, \frac{4}{7}, \frac{8}{7}, \quad \), _____, _____, _____, . . .
8. 1, 4, 9, 16, _____, _____, _____, . . .
9. 2, 1, 0.5, 0.25, _____, _____, _____, . . .
10. 38, 65, 92, 119, _____, _____, _____, . . .

Draw the iteration diagram for each sequence. Calculate the output for the first 7 iterations.

11. 15, −10, −5, 0, _____, _____, _____, . . .
12. \( \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \quad \), _____, _____, _____, . . .
13. 1024, 256, 64, 16, _____, _____, _____, . . .
14. 47, 40, 33, 26, _____, _____, _____, . . .
15. 15, −15, 15, −15, _____, _____, _____, . . .
16. −0.5, 2, −8, 32, _____, _____, _____, . . .

17. Glenda’s money market account has a starting balance of $10,000. Annual interest rate is 10%. At the end of each year, Glenda also deposits $500 into her account. Draw an iteration diagram and determine the output after 5 iterations. Round to the nearest cent.

**Practice Lesson 2-2**

Graph each point on a coordinate plane.

18. \( J(3, −5) \)
19. \( K(5, −3) \)
20. \( L(0, 6) \)
21. \( M(−6, 0) \)
22. \( A(−1, −2) \)
23. \( B(−2, 7) \)
24. \( C(−5, 3) \)
25. \( D(0, −8) \)

Given \( f(x) = 11 − 7x \), evaluate each function.

26. \( f(2) \)
27. \( f(−2) \)
28. \( f(0) \)
29. \( f(5) \)

Given \( f(x) = x^2 + 5x + 6 \), evaluate each function.

30. \( f(−2) \)
31. \( f(−3) \)
32. \( f(0) \)
33. \( f(10) \)

Determine if each relation is a function. Give the domain and range.

34. \[ \begin{array}{c|c}
 x & y \\
 \hline
 1 & 5 \\
 −1 & 6 \\
 −3 & 5 \\
 −5 & 6 \\
\end{array} \]
35. \[ \begin{array}{c|c}
 x & y \\
 \hline
 0 & 0 \\
 3 & 6 \\
 3 & 12 \\
 4 & 18 \\
\end{array} \]
Write each as a set of ordered pairs. Given the domain and range. (Lesson 2-2)

36. \[
\begin{array}{c|cccc}
  x & 2 & 4 & 6 & 8 \\
  y & 11 & 8 & 5 & 2 \\
\end{array}
\]

37. \[
\begin{array}{c|cccc}
  x & 0 & -1 & 1 & -2 & 2 \\
  y & 3 & 4 & 4 & 7 & 7 \\
\end{array}
\]

Determine the next three terms or figures in each pattern. (Lesson 2-1)

38. 243, 260, 277, 294, _____, _____, _____

39. 105, 104, 103, 102, 100, 21, 17, 170, _____, _____, _____

40. 32, 48, 72, 108, _____, _____, _____

41. Z, ZY, ZYX, ZYXW, _____, _____, _____

42. *, **, ***, ****, _____, _____, _____

43. 10, \(-10^2\), \(-10^3\), \(-10^4\), _____, _____, _____

Given \(f(x) = 3x^2\) and \(g(x) = -3x + 1\frac{1}{2}\), find each value. (Lesson 2-2)

44. \(f(2)\)

45. \(f(-2)\)

46. \(g(\frac{1}{2})\)

47. \(f(1) + g(1)\)

Name the quadrant in which each point is located. (Lesson 2-2)

48. \(W(9, -1.5)\)

49. \(X(-8, 17)\)

50. \(Z(-6.5, -6.5)\)

---

**Career – Environmental Journalism**

Environmental journalists inform the public about what is being done to harm and to save the planet. They work with a great deal of mathematical information such as, how much pollution a smokestack emits or how much garbage is added to a landfill each year.

Environmental journalists study data gathered by scientists and the government. They must be able to analyze raw data, understand and create graphs, spot trends in numbers, and draw conclusions about what is happening to the environment.

1. The United States has 17 commercial incinerators that burn hazardous waste and release pollutants into the air. The hazardous waste size has increased from 1.3 billion to 2.4 billion to 4.6 billion pounds of waste. Project the growth for the next five years. (Hint: Plot the ordered pairs as \((0, 0)\) for the starting point, the difference of 2.4 billion and 1.3 billion for the increase at end of year 1, and so on.)

2. Create a graph to go with your story. Place years on the \(x\)-axis and billions of pounds of waste (in 0.5 billion increments) on the \(y\)-axis.

3. A television reporter claims that fewer people in your town are recycling. But is the report true? Last year, 30% of the people in your town recycled regularly. This year recycling is down to 27%. Last year, your town had a population of 2500, but this year the population is 3100. Is the reporter’s claim true? Explain your thinking.
Use Algeblocks to represent and simplify expressions.
The green blocks in a set of Algeblocks can be used to represent integers. Blocks on the top half of the mat represent positive integers, and blocks on the bottom half represent negative integers. An equal number of positive and negative blocks add to zero and may be removed from the mat. These pairs are called zero pairs. For example, \(+3 + (-7)\) is simplified to \(-4\).

Use the units pieces on a mat to show how these expressions can be simplified.

a. \(4 + (-1)\)

b. \(-6 + 2\)

c. \(7 - 4\) (rewrite as addition)

d. \(6 - 8\)

BUILD UNDERSTANDING

In Lesson 2-2 you learned about number pairs produced by functions. Such pairs can be plotted on a coordinate plane and used to construct a graphical representation of the function. An equation that can be written in the form \(Ax + By = C\), where \(A\) and \(B\) are not both zero, is called a linear equation. Graphs of such equations are straight lines. A function with ordered pairs that satisfy a linear equation is called a linear function.

Example 1

Graph \(y = 2x + 3\).

Solution

<table>
<thead>
<tr>
<th>(x)</th>
<th>(2x + 3)</th>
<th>(y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>2(-2) + 3</td>
<td>-1</td>
</tr>
<tr>
<td>0</td>
<td>2(0) + 3</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>2(1) + 3</td>
<td>5</td>
</tr>
</tbody>
</table>

Choose at least three values for \(x\), calculate the corresponding \(y\)-values, and make a table to show the ordered pairs. Then plot the points and draw the line containing them. The domain is the set of all real numbers. The range is the set of all real numbers.

A constant function is a linear function with a domain of all real numbers and a range of only one value. The graph of a constant function is a horizontal line.
**Example 2**

Graph each equation. Determine if the relation is a function. Then determine the domain and range.

a. \( x = 2 \)

b. \( y = -1 \)

**Solution**

a. Any value of \( y \) results in an \( x \) value equal to 2.

\( x = 2 \) is not a function.

Domain: \( x = 2 \) Range: set of all real numbers.

b. Any value of \( x \) results in a \( y \) value equal to (-1).

\( y = -1 \) is a linear constant function.

Domain: set of all real numbers Range: \( y = -1 \)

**Example 3**

**TEMPERATURE** The relationship between the scales used to measure temperature in degrees Fahrenheit (\( F \)) and degrees Celsius (\( C \)) can be represented by the linear equation \( F = \frac{9}{5}C + 32 \). Graph this function and determine the Fahrenheit temperature that is equivalent to 35°C.

**Solution**

Select three values for \( C \). Calculate the corresponding \( F \)-values. Then plot the points and draw the line.

Find the point that has an \( x \)-coordinate of 35. The second coordinate of that point, 95, is the equivalent temperature measured in degrees Fahrenheit.

The **absolute value function** is defined as:

\[
g(x) = |x| = \begin{cases} 
  x & \text{if } x \geq 0 \\
  -x & \text{if } x < 0 
\end{cases}
\]

For example, \( g(-3) = |-3| = -(-3) \) or 3, because \(-3 < 0\).

**Example 4**

Given \( h(x) = |x + 2| \), find each value.

a. \( h(-3) \)

b. \( h(0) \)

**Solution**

a. \( h(-3) = |-3 + 2| \)

= \(|-1|\)

= 1, because \(-1 < 0\)

b. \( h(0) = |0 + 2| \)

= |2|

= 2, because \( 2 \geq 0 \)
A graphing calculator is useful for solving real-world problems. Functions and equations can be graphed more quickly than on paper. Follow these rules when using a graphing calculator.

**Step 1** Use the viewing window to select the minimum and maximum values for the \(x\)- and \(y\)-axes. These values will be determined by the problem.

The minimum values (min) for \(x\) and \(y\) refer to the extreme low values on the \(x\)- and \(y\)-axes. Likewise, the maximum values (max) refer to the extreme high values on the \(x\)- and \(y\)-axes. The scale refers to what each tick-mark on the axes represents.

**Step 2** Enter the equation into the calculator and graph.

**Example 5**

**GRAPHING** Use a graphing calculator to graph \(y = x + 3\).

**Solution**

Calculator input: \([Y= X,T,\theta,n] + 3 \text{ Graph}\)

Settings for Viewing Window:

**Try These Exercises**

**MODELING** Use Algeblocks to represent each equation. Simplify where possible. Sketch your answer.

1. \(3 - 2x + x = y - y + 3\)
2. \(3x + x + 1 = -4 - 2\)

Given \(g(x) = |2x - 1|\), find each value.

3. \(g(1)\)
4. \(g(-2)\)

5. **RETAIL** Rich's weekly salary is based on the number of pairs of shoes he sells. He is paid a base salary of $25, plus $5 for every pair of shoes he sells. The relationship between his pay \((p)\) and pairs of shoes \((s)\) sold can be represented by the linear equation \(p = 25 + 5s\). Graph this function, and determine Rich's pay for a week in which he sold 7 pairs of shoes.

6. **WRITING MATH** Why should you use three values for \(x\) when graphing a linear equation or function?
Graph each function.
7. \( y = x + 4 \)  
8. \( f(x) = -5 \)  
9. \( y = -2x + 3 \)

Given \( h(x) = |-2x + 3| \), find each value.
10. \( h(-6) \)  
11. \( h(2) \)

**GRAPHING** Use a graphing calculator to graph each function.
12. \( y + 1 = 2x - 3 \)  
13. \( 2x + 4 = 4y \)  
14. \( y - 2 = 3x \)

Given \( F(x) = 2|2x| - 3|x + 1| \), find each value.
15. \( F(-4) \)  
16. \( F(0) \)

**PHOTOGRAPHY** A photographer charges a sitting fee of \( $15 \), and charges \( $4 \) for each 5-in. by 7-in. photograph the customer orders. The linear function \( c = 15 + 4n \) can be used to calculate the customer’s cost \( (c) \) based on the number of photographs \( (n) \) purchased.

17. Graph the function.
18. Use your graph to determine the total cost of 6 photographs.
19. How many photographs can be purchased if you cannot spend more than \( $50.00 \)?

**CHAPTER INVESTIGATION** Working together, think of a positive change that you would like to make at your school or in your community. What kind of data would encourage others to adopt your proposal? Make a list.

**Extended Practice Exercises**

Graph each function.
21. \( y = |x + 2| \)  
22. \( y = -|x + 2| \)  
23. \( y = |x| + 2 \)

24. Graph \( y = \begin{cases} 
  x & \text{for } x < 0 \\
  2x + 1 & \text{for } x \geq 0
\end{cases} \)

**Mixed Review Exercises**

Add or subtract. (Lesson 1-4)
25. \(-6 + (-3) - 12 - (-5)\)  
26. \((-3) + (-2) + (-6)\)  
27. \(-(-4) - (-8)\)
28. \(5 + (-4) - 16 + (-2)\)  
29. \((-8) + (-(-3)) + 2\)  
30. \(6 - 12 + (-7) - 4\)

Estimate each sum or difference. (Lesson 1-4)
31. \(5382 + 7649\)  
32. \(9764 - 3478\)  
33. \(5894 + 9763\)  
34. \(8043 - 5612\)
35. \(\$78.64 + 85.06\)  
36. \(\$83.98 - 36.52\)  
37. \(\$94.76 + 75.15\)  
38. \(\$52.25 - 18.96\)

See additional answers.
In Lesson 2–3, you used Algeblocks to model equations. Model \(x + 5 = 3\). Then add \(-5\) to both sides and simplify each side. What is the result on both sides? Sketch your answer and complete the equations.

### BUILD UNDERSTANDING

In the activity above, you used the opposite of a number to simplify and solve an equation. In the same way, you can use opposite, or **inverse operations** to get a variable alone on one side of an equation.

**Example 1**

**Use Algeblocks to solve** \(x + 3 = 10\).

**Solution**

Represent the equation. Adding \(-3\) to each mat will result in zeros and leave the \(x\)-piece alone on one mat.

Add the opposite. \(x\) is alone.

When equations involve the inverse operations of addition and subtraction, you can use opposites and the addition property of equality to solve them. This property states that adding the same number to both sides of an equation results in an **equivalent equation**.

### Addition Property of Equality

For all real numbers \(a\), \(b\), and \(c\), if \(a = b\), then \(a + c = b + c\) and \(c + a = c + b\).
**Example 2**

Use mathematical notation to show the steps in solving the equation.

\[ x - 3.7 = -0.1 \]

**Solution**

\[ x - 3.7 = -0.1 \]
\[ x - 3.7 + 3.7 = -0.1 + 3.7 \]
\[ x = 3.6 \]

In a similar manner, reciprocals and the multiplication property of equality are used in solving equations involving multiplication. The multiplication property of equality states that multiplying both sides of an equation by the same number still maintains the equality.

**Multiplication Property of Equality**

For all real numbers \( a, b, \) and \( c, \) if \( a = b, \) then \( ac = bc \) and \( ca = cb. \)

**Example 3**

Solve each equation.

a. \( \left( \frac{2}{5} \right) y = 12 \)

**Solution**

a. \( \left( \frac{2}{5} \right) y = 12 \)
\[ \left( \frac{5}{2} \right) \left( \frac{2}{5} \right) y = \left( \frac{5}{2} \right) 12 \]
\[ 1y = 30 \]
\[ y = 30 \]

b. \( -3q = 45 \)

**Solution**

b. \( -3q = 45 \)
\[ \left( -\frac{1}{3} \right) (-3q) = \left( -\frac{1}{3} \right) 45 \]
\[ 1q = -15 \]
\[ q = -15 \]

You may need to simplify one or both sides of an equation before applying the properties of equality.

**Example 4**

Solve: \( w - 9 + 23 = | -3 - 5 | \)

**Solution**

\[ w - 9 + 23 = | -3 - 5 | \]
\[ w + 14 = 8 \]
\[ w + 14 + (-14) = 8 + (-14) \]
\[ w = -6 \]

The solution is \(-6.\)

---

**Check Understanding**

Find the opposite and reciprocal of each number:

\( 2, -5, \frac{2}{3}, 0.5 \)

**Reading Math**

In Example 3:

a. Multiply both sides of the equation by the reciprocal of \( \frac{2}{5}. \)

b. Multiply both sides of the equation by the reciprocal of \(-3.\)

In part b, dividing by \(-3\) is the same as multiplying by the reciprocal of \(-3.\)
Solving problems often involves translating a verbal problem into an algebraic equation. These equations can then be solved using the properties of equality.

**Example 5**

Translate the sentence into an equation using \( n \) to represent the unknown number. Then solve the equation for \( n \).

When a number is decreased by 31, the result is the square of 3.

**Solution**

When a number is decreased by 31, the result is the square of 3.

The equation is:

\[
\frac{n}{9} - 31 = 3^2
\]

\[
\frac{n}{9} - 31 = 9
\]

\[
\frac{n}{9} + 31 = 9 + 31
\]

\[
\frac{n}{9} = 40
\]

The number is 40.

**Try These Exercises**

Solve each equation.

1. \( q + 18 = 32 \)
2. \( r - 5 = -2 \)
3. \( -4z = 36 \)
4. \( -16 = 21 + h \)
5. \( -7 = \frac{v}{8} \)
6. \( \frac{5}{3}k = 30 \)
7. \( e + \frac{3}{4} = 1 \)
8. \( \frac{2}{5} = m - \frac{1}{2} \)
9. \( w - 1.7 = -4.2 \)

**WRITING MATH**

Translate each sentence into an equation using \( n \) to represent the unknown number. Do not solve.

10. The product of \(-8\) and a number is the same as the square of \(-4\).
11. Increasing a number by 15 yields the same result as taking half of 72.
12. The quotient of a number and 5 is 0.2.
13. The difference between a number and 26 is \(-9\).

**DATA FILE**

Use the data on page 646 on average daily temperatures. On November 16, the temperature in San Diego climbed \(9^\circ\) higher than the average daily temperature in that city for November and then dropped \(12^\circ\). What was the temperature on November 16?

**Practice Exercises**

Solve each equation.

15. \( f + 19 = 41 \)
16. \( 7m = -35 \)
17. \( 21 + a = -4 \)
18. \( -10 = p - 1 \)
19. \( 25n = -10 \)
20. \( 0.9u = 0.63 \)
21. \( 12 = \left( -\frac{4}{3} \right)y \)
22. \( \left( \frac{3}{8} \right)x = 6 \)
23. \( 5.74 = j - 3.6 \)
24. **YOU MAKE THE CALL** Anthony says that \((-4)^2\) and \(-4^2\) are equal. Do you agree with him? Explain.

Translate each sentence into an equation using \(n\) to represent the unknown number. Then solve the equation for \(n\).

25. **FINANCE** When an account balance is increased by $25, the result is $−15.

26. The difference between a number and 26 is the square of $−3$.

27. The quotient of a number and 8 is 0.7.

28. One-third of $−81$ is the same as the product of 3 and some number.

Solve each equation.

29. \((-2)(−3)(−4) = 12c\)  
30. \(|13 − 19| = \left(\frac{−4}{5}\right)y\)

31. \((2.5)(5) = m − 17 + 4\)  
32. \(w + 3^4 = 4^3\)

33. \(a − 7 + 25 = 2^3\)  
34. \(0.01k = (1 + 2 + 3 + 4)^2\)

Find all solutions in each equation.

35. \(|x| + 5 = 11\)  
36. \(-48 = −4|z|\)  
37. \(|w| − 3 = −3\)

38. **NEWS MEDIA** A television news magazine has 48 minutes of airtime to fill. The producer decides to run an 8-minute health segment and a 9-minute science segment. At the last minute, a 12-minute celebrity feature is canceled. The producer decides to add a 20-minute segment. What length segment is needed to complete the broadcast? Write an equation to model the situation and solve.

---

**EXTENDED PRACTICE EXERCISES**

Replace each \(\_?\) so that the equation will have the given solution.

39. \(x + \_? = −4\); The solution is \(-15\).
40. \(\_? x = \frac{1}{2}\); The solution is \(\frac{1}{12}\).

41. \(-24 = x − \_?\); The solution is 16.
42. \(-0.27 = \_? x\); The solution is 0.9.

43. Write an equation that has no solution.

44. Write an equation that has infinitely many solutions.

45. **BUSINESS** The cost of making a camera is 60% of its selling price \((p)\). The rest is profit. If the camera cost $101.25 to make, how much is its selling price? Write an equation and solve.

---

**MIXED REVIEW EXERCISES**

Find each product or each quotient. (Lesson 1-5)

46. \((16)(−3.9)\)  
47. \(−\frac{5}{3} \div \frac{2}{3}\)  
48. \((-7)(−0.5)(−2)\)  
49. \(345 \div (−15)\)

50. \(\left(-\frac{3}{4}\right)\left(\frac{1}{2}\right)\left(-\frac{5}{8}\right)\)  
51. \(-63 \div (−0.7)\)  
52. \((-3)\left(-\frac{7}{8}\right)(−9)\)  
53. \(54.6 \div (−4.2)\)

Evaluate each expression when \(a = 6\) and \(b = −4\). (Lesson 1-4)

54. \(a + (−b)\)  
55. \(4a + 3b\)  
56. \(6b − (−2a)\)

---

mathmatters3.com/self_check_quiz

Lesson 2-4 Solve One-Step Equations
Review and Practice Your Skills

PRACTICE Lesson 2-3

Graph each function.
1. \( y = 4x + 3 \)  
2. \( f(x) = -2x + 5 \)  
3. \( y = 7 \)  
4. \( f(x) = -\frac{1}{2}x + 6 \)  
5. \( y = 8 - x \)  
6. \( y = 3x \)  
7. \( x + y = 10 \)  
8. \( y - 2 = 2x + 6 \)  
9. \( y = x \)

Given \( g(x) = | -3x - 2 | \), find each value.
10. \( g(0) \)  
11. \( g(-5) \)  
12. \( g(3) \)

Given \( F(x) = 3|x| - 2|2x - 5| \), find each value.
13. \( F(0) \)  
14. \( F(-3) \)  
15. \( F(3) \)

A car rental agency charges a flat fee of $30 to rent a car, and $21 for each day the car is rented. The linear function \( c = 30 + 21d \) can be used to calculate the customer's cost \( (c) \) based on the number of days \( (d) \) the car is rented.

16. Graph the function.
17. Determine the cost for a 7-day rental.
18. What is the maximum number of days Lakesha can rent a car if she has only $140 to spend?

PRACTICE Lesson 2-4

Solve each equation.
19. \( 4x = -12 \)  
20. \( x - 5 = -4 \)  
21. \( l + 8 = 11 \)  
22. \( y + 5 = 7.2 \)  
23. \( \frac{1}{3}p = -2 \)  
24. \( -5b = 65 \)  
25. \( \frac{2}{3} = -\frac{7}{12} + m \)  
26. \( 0.8t = 9.6 \)  
27. \( 2u = \frac{1}{2} \)  
28. \( -11 = n - 4 \)  
29. \( 45 + m = 71 \)  
30. \( -1\frac{1}{8}x = 1 \)  
31. \( 62.4 + k = -39.9 \)  
32. \( x - 4 = -4 \)  
33. \( \frac{y}{3} = 27 \)  
34. \( 38 = -43 + x \)  
35. \( -8.4 = 0.12x \)  
36. \( d - (-13) = 25 \)  
37. \( \frac{6}{13}a = 52 \)  
38. \( 2.18 = r + 3.59 \)  
39. \( b - 5 = -41 \)  
40. \( \frac{c}{4} = -7 \)  
41. \( p - \frac{4}{5} = 1\frac{1}{5} \)  
42. \( -6 = y - 6 \)  
43. \( -12n = 3 \)  
44. \( -12 + n = 3 \)  
45. \( -\frac{n}{12} = 3 \)  
46. \( 3n = -12 \)  
47. \( \frac{m}{-3} = \frac{4}{9} \)  
48. \( \frac{7}{3}x = 21 \)  
49. \( -4.7 = n - 2.5 \)  
50. \( 0 = d + 11 \)  
51. \( -x = 16 \)
Determine the next three terms in each sequence. (Lesson 2-1)
52. 1600, 400, 100, 25, ____, ____, ____  
53. 47, 36, 25, 14, ____, ____, ____  
54. a, c, e, g, ____, ____, ____  
55. ___, ___  

Graph each function. (Lesson 2-3)
56. $f(x) = -x + 1$  
57. $y = |x|$  
58. $y = 9$

Translate each sentence into an equation using $n$ to represent the unknown number. Then solve the equation for $n$. (Lesson 2-4)
59. When $n$ is increased by 13, the result is −29.  
60. The product of a number and 8 is the same as the square of −7.  
61. The quotient of a number and −4 is 11.  
62. The difference between $n$ and 17 is 25.

Solve each equation. (Lesson 2-4)
63. $t + 1\frac{3}{8} = 3\frac{3}{4}$  
64. $|x| + 4 = 10$  
65. $|21 - 27| = -\frac{3}{2}y$

**Mid-Chapter Quiz**

Determine the next three terms in each sequence. (Lesson 2-1)
1. 4, 13, 22, 31, . . .  
2. 2, −10, 50, −250, . . .  
3. $-1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \ldots$  
4. Determine the output for the first five iterations: The initial input is 6; the rule is “add −4.”

Use the relation, $\{(−1, 2), (0, 3), (2, 5)\}$ for Exercises 5–7. (Lesson 2-2)
5. What is the domain?  
6. What is the range?  
7. Is it a function?

Find each value. (Lesson 2-3)
8. $f(2)$ if $f(x) = -3x + 1$.  
9. $f(-4)$ if $f(x) = 2$.  
10. $f(-3)$ if $f(x) = |-x|$.

Solve each equation. (Lesson 2-4)
11. $9 = -3 + j$  
12. $-4m = 1$  
13. $\frac{2n}{3} = 7$

Translate the sentence into an equation using $n$ to represent the unknown number. Then solve the equation for $n$. (Lesson 2-4)
14. The difference between a number and 6 is the product of 3 and 8.  
15. The product of $−5$ and $−4$ is the product of 8 and a number.
Algeblocks can be used to solve two-step equations. Complete the equation to show algebraically the steps taken to solve $3x - 2 = 4$.

**Algeblocks**

a. Represent the equation.

**Algebraically**

a. Write the equation.

b. Add the opposite of $-2$ to both sides and simplify.

c. Divide each side into three groups.

d. Read the solution.

$3x - 2 = 4$

$3x - 2 + \square = 4 + \square$

$\square = \square$

$\square = \square$

$x = \square$

**BUILD UNDERSTANDING**

To solve some equations, it may take two or more steps to get the variable alone on one side of the equation. When solving these equations, use the addition property of equality first. Then use the multiplication property of equality.

**Example 1**

**MODELING** Solve $2x - 7 = -1$. Along with using Algeblocks, explain and represent each step algebraically.

**Solution**

Use Algeblocks to represent the equation. Add $+7$ to each side of the equation. Simplify.

Separate into 2 groups.

The solution is $x = 3$. 
Some equations contain variables on both sides. For these equations, simplify the equation by using the addition property of equality to move like terms to the same side of the equation. Terms that have exactly the same variables are called like or similar terms.

**Example 2**

Solve $x + 5 = 2x - 3$. Check the solution.

**Solution**

\[
\begin{align*}
x + 5 &= 2x - 3 \\
x + 5 + (-2x) &= 2x + (-2x) - 3 & \text{Add } -2x \text{ to each side.} \\
-x + 5 &= -3 \\
-x + 5 + (-5) &= -3 + (-5) & \text{Add } -5 \text{ to each side.} \\
-x &= -8 \\
-x(-1) &= -8(-1) & \text{Multiply each side by } -1. \\
x &= 8 \\
\end{align*}
\]

The solution is 8.

Sometimes you will need to simplify each side of an equation before applying the properties of equality.

**Example 3**

Solve $6(2x - 1) = -36 + 6$. Check the solution.

**Solution**

\[
\begin{align*}
6(2x - 1) &= -36 + 6 & \text{Apply the distributive property.} \\
12x - 6 &= -36 + 6 \\
12x - 6 &= -30 \\
12x - 6 + 6 &= -30 + 6 & \text{Add 6 to each side.} \\
12x &= -24 \\
\left(\frac{1}{12}\right)(12x) &= \left(\frac{1}{12}\right)(-24) & \text{Multiply each side by } \frac{1}{12}. \\
x &= -2 \\
\end{align*}
\]

The solution is -2.

**Check** Be sure to follow the order of operations.

\[
\begin{align*}
6(2x - 1) &= -36 + 6 \\
6(2(-2) - 1) &= -30 \\
6(-4 - 1) &= -30 \\
6(-5) &= -30 \\
-30 &= -30 & \checkmark \\
\end{align*}
\]

The equation in Example 3 can also be solved by dividing both sides by 6 first.

\[
\begin{align*}
\frac{6(2x - 1)}{6} &= \frac{-30}{6} \\
2x - 1 &= -5 \\
\end{align*}
\]

Then solve the equation.

\[
\begin{align*}
2x - 1 + 1 &= -5 + 1 \\
2x &= -4 \\
x &= -2 & \checkmark \\
\end{align*}
\]
Example 4

ADVERTISING  A local newspaper sells all classified ads for the same price. Larger boxed ads cost $24.50. Eun Ah bought three classified ads and one boxed ad. If the total cost for the ads was $79.25, what was the price of each classified ad?

Solution

Let \( a \) represent the price of each classified ad.

\[
3a + 24.50 = 79.25
\]

\[
3a + 24.50 + (-24.50) = 79.25 + (-24.50)
\]

\[
3a = 54.75
\]

\[
\left(\frac{1}{3}\right)(3a) = \left(\frac{1}{3}\right)(54.75)
\]

\[
a = 18.25
\]

Check

3 classified ads = \( 3 \times 18.25 \): $54.75
1 larger ad: $24.50
Total: $79.25 ✓

Each classified ad costs $18.25.

Try These Exercises

1. MODELING Use Algebblocks to solve \( 2x - 5 = 7 \). Show each step algebraically.

Solve each equation and check the solution.

2. \( 3a - 5 = 7 \)

3. \( -4x + 1 = 25 \)

4. \( 52 = 4(2j + 5) \)

5. \( 4u - 5 = 2u - 13 \)

6. \( -6b + 9 = 4b - 41 \)

7. \( 2n + 14 = -8 \)

8. YOU MAKE THE CALL Maggie says that multiplying by the reciprocal of a number is the same as dividing by the number. Is Maggie correct?

9. RECREATION A carnival pass costs $15, and buys unlimited access to 10 rides. This pass costs $2.50 less than paying the individual price for each of the 10 rides. What is the individual price of each ride?

10. WRITING MATH Write a multi-step equation that has \(-4\) as a solution.

Practice Exercises • For Extra Practice, see page 667.

Solve each equation and check the solution.

11. \( 4n + 3 = 15 \)

12. \( -2d - 16 = 4 \)

13. \( -28 = 3r - 7 \)

14. \( -14 = 18 - 8e \)

15. \( 2(5z - 3) = 34 \)

16. \( -3(2h - 1) = 3 \)

17. \( -5p - 1 = 3p + 15 \)

18. \( 4 - 7a = -1 - 2a \)

19. \( 6v + 3 - 2v = 1 + 5v \)

20. \( 9 - 4c + 15 = 0 \)

21. \( \left(\frac{1}{2}\right)(12f + 30) = 9 \)

22. \( 8(1.25 - q) = 6 \)
Translate each sentence into an equation. Then solve.
23. Four more than 3 times a number is 31. Find the number.
24. When 12 is decreased by twice a number, the result is –14. Find the number.

Solve each equation and check the solution.
25. $-3(d - 5) = 2(4d - 9)$
26. $\frac{1}{3}(15z - 21) = \frac{2}{5}(10z - 35)$
27. $4(5 - 3m) - 9 = 3m - 4$
28. $-2(4k + 1) + k = 8 - 5k$
29. $9(a + 4) - 2a = 19 - 3(a + 6)$
30. $15x - 4(4 + 3x) = -5(2x - 5) + 11$

Translate each sentence into an equation. Then solve.
31. Fifteen more than twice a number is the same as 7 less than four times the number. Find the number.
32. When the sum of twice a number and 3 is multiplied by 5, the result is the same as decreasing the product of 6 and the number by 1. Find the number.
33. **FINANCE** The stereo system Doug wants to buy can be purchased by paying a $50.00 down payment, and paying the rest in equal monthly installments over the next 6 months. If the total cost of the stereo system is $228.50, what will be the amount of each monthly payment?
34. **CHAPTER INVESTIGATION** Think about how you will use the media to convince the public to support your message. Write a public relations plan and a budget. Estimate the cost of any advertisements or commercials you will need to run in local newspapers or on television.

**Extended Practice Exercises**

35. Solve $2(3x + 2) + x = 3x + 4 + 4x$. Explain your solution.
36. Solve $5 + 4(2x - 1) = 3(x + 1) + 5x$. Explain your solution.
37. **WRITING MATH** Summarize, in writing, the steps used to solve equations.

**Mixed Review Exercises**

Evaluate each expression when $a = 2$ and $b = -3$. (Lesson 1-7)
38. $ab^2$ 39. $a^3b^2$ 40. $a^3 - b^3$
41. $a^2 + b^2$ 42. $(a^2 - b)^2$ 43. $-4ab^3$
44. $(a^2)(b^2)$ 45. $(a^3 - 5)^3$ 46. $-(b^2)(a^3)$
47. $-4a^3b$ 48. $(b + 8)(a^2)$ 49. $(a^3 + 2)^2$

Write each number in scientific notation. (Lesson 1-8)
50. 8,640,000,000,000 51. 0.0000000045 52. 0.0000017
53. 0.000000000039 54. 128,000,000,000,000 55. 0.00000000026
56. **DATA FILE** Use the data on foreign trade on page 648. Write the dollar amount of United States imports to Mexico in scientific notation. (Prerequisite Skill)
Consider the graph of the equation $x + y = 5$. The points that lie on this line have coordinates whose sum is 5. For example, $(0, 5)$, $(1, 4)$, and $(-2, 7)$ are points that lie on the line $x + y = 5$.

a. Are there any points not on the line that have coordinates whose sum is 5?

b. Select any three points below the line and find the sum of the coordinates. How do these sums compare with 5?

c. Select any three points above the line and find the sum of the coordinates. How do these sums compare with 5?

BUILD UNDERSTANDING

A mathematical sentence that contains one of the symbols $<$, $>$, $\leq$, or $\geq$ is an inequality. Inequalities are used to indicate the order of a comparison between two quantities.

A linear inequality in one variable is an inequality only in $x$ or $y$. The techniques used to solve an inequality are similar to those used to solve equations. The addition property of inequality states that adding the same number to both sides of an inequality maintains the order of the inequality.

<table>
<thead>
<tr>
<th>Addition Property of Inequality</th>
<th>For all real numbers $a$, $b$, and $c$:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If $a &lt; b$, then $a + c &lt; b + c$.</td>
</tr>
<tr>
<td></td>
<td>If $a &gt; b$, then $a + c &gt; b + c$.</td>
</tr>
</tbody>
</table>

The multiplication property of inequality states that multiplying both sides of an inequality by the same positive number still maintains the order of the inequality. However, if the number you are multiplying by is a negative number, you must reverse the order of the inequality.

<table>
<thead>
<tr>
<th>Multiplication Property of Inequality</th>
<th>For all real numbers $a$, $b$, and $c$:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$c &gt; 0$: If $a &lt; b$ then $ac &lt; bc$.</td>
</tr>
<tr>
<td></td>
<td>If $a &gt; b$ then $ac &gt; bc$.</td>
</tr>
<tr>
<td></td>
<td>$c &lt; 0$: If $a &lt; b$ then $ac &gt; bc$.</td>
</tr>
<tr>
<td></td>
<td>If $a &gt; b$ then $ac &lt; bc$.</td>
</tr>
</tbody>
</table>
The transitive property of inequality relates two inequalities to produce a third.

<table>
<thead>
<tr>
<th>Transitive Property of Inequality</th>
<th>For all real numbers (a, b,) and (c:)</th>
</tr>
</thead>
<tbody>
<tr>
<td>If (a &lt; b) and (b &lt; c,) then (a &lt; c.)</td>
<td></td>
</tr>
<tr>
<td>If (a &gt; b) and (b &gt; c,) then (a &gt; c.)</td>
<td></td>
</tr>
</tbody>
</table>

For example, if \(x + 3 < y\) and \(y < 7,\) then \(x + 3 < 7.\) This inequality can then be solved for \(x.\)

**Example 1**

Solve each inequality and graph the solutions on a number line.

a. \(3x + 10 < 4\)

Solution

\[
3x + 10 < 4 \\
3x + 10 + (-10) < 4 + (-10) \\
3x < -6 \\
\left(\frac{1}{3}\right)3x < \left(\frac{1}{3}\right)(-6) \\
x < -2
\]

The open circle indicates that \(-2\) is not a solution.

b. \(23 \geq 8 - 5y\)

Solution

\[
23 \geq 8 - 5y \\
23 + (-8) \geq 8 + (-8) - 5y \\
15 \geq -5y \\
\left(-\frac{1}{5}\right)15 \leq \left(-\frac{1}{5}\right)(-5y) \\
-3 \leq y \\
y \geq -3
\]

The closed circle indicates that \(-3\) is a solution.

A solution of a linear inequality in two variables, such as \(2x + y < 4,\) is an ordered pair that makes the inequality true. The graph of all such solutions is a region called a half-plane.

The edge of the half-plane is called the boundary. If the inequality is a strict inequality (< or >), then the region is an open half-plane, and the boundary is not part of the solution set. If the inequality is inclusive (\(\leq\) or \(\geq\)), then the region is a closed half-plane, and the boundary is part of the solution set.

To graph an inequality in two variables, first graph the related equation. This line will serve as the boundary. If the solution will be a closed half-plane, draw the boundary as a solid line. Otherwise, draw it with a dashed line. Then shade the half-plane that contains the solutions of the inequality.
Example 2

Graph \( y \leq 4x \).

Solution

The related equation is \( y = 4x \). Make a table of values that can be used to graph the boundary.

Note that the boundary is part of the solution set, and is drawn as a solid line. To decide which half-plane to shade, use a test-point not on the boundary. If it is a solution, then all points of that half-plane will also be solutions; so, shade that side. If the point is not a solution, shade the half-plane that does not contain the test point.

Test Point: \((-1, 1)\)

\[
\begin{align*}
1 & \leq 4(-1) \\
1 & \leq -4 \quad \text{(false)}
\end{align*}
\]

Because 1 is not less than or equal to \(-4\), shade the half-plane that does not contain \((-1, 1)\).

Example 3

Graph \( y > \frac{3}{2}x - 4 \).

Solution

The related equation is \( y = \frac{3}{2}x - 4 \).

Make a table of values that can be used to graph the boundary. Note that the boundary is not included in the solution set, and is drawn as a dashed line.

\[
y = \frac{3}{2}x - 4
\]

Test Point: \((0, 0)\)

\[
\begin{align*}
0 & > \frac{3}{2}(0) - 4 \\
0 & > -4
\end{align*}
\]

Because 0 is greater than \(-4\), shade the half-plane that contains \((0, 0)\).

Try These Exercises

Solve each inequality and graph the solution on a number line.

1. \(4m + 5 > 25\)  
2. \(-2k + 9 \geq 1\)  
3. \(\frac{3}{4}c - 4 > -16\)

Graph each inequality on the coordinate plane.

4. \(y \leq 3x - 1\)  
5. \(y \geq -x + 2\)  
6. \(2x - y < 3\)  
7. \(x + 2y < 10\)  
8. \(4x + 3y \geq -6\)  
9. \(2x - 5y \geq 15\)
Solve each inequality and graph the solution on a number line.

10. \(5b + 4 \leq -11\)  
11. \(\frac{1}{2}p - 10 > -7\)  
12. \(9 - 4r > 5\)

13. \(13 < 3a - 8\)  
14. \(26 \leq -9n - 1\)  
15. \(-31 > 14 - 15z\)

16. \(\frac{3}{2}h + 12 \geq 6\)  
17. \(3(4e + 3) < -9\)  
18. \(8k - 7 > 6k - 9\)

Graph each inequality on the coordinate plane.

19. \(y > 2x - 5\)  
20. \(y \leq -3x + 4\)  
21. \(x + y \geq -3\)

22. \(x - y > 2\)  
23. \(2x - 3y < 6\)  
24. \(6 > 2x - \left(\frac{2}{3}\right)y\)

25. **NEWS MEDIA** A reporter estimates that \(\frac{2}{3}\) of the hours \((h)\) spent on a story increased by 15 h is less than 27 h. What values are possible for \(h\)?

26. **SALES** A jacket sells for $55. Decreasing the price of the jacket by a discount amount \((d)\) yields a result greater than one-half the sum of the discount and $10. What are the possible values for the discount?

Solve each inequality and graph the solution on a number line.

27. \(0.5c - 7.4 \geq 0.35 + 1.75c\)  
28. \(6 - (5m + 7) < 3(2m + 1) - 10m\)

29. \(4(3d + 1) - 5d \leq 8 - 2(5d + 2)\)  
30. \(-10 \leq \left(\frac{2}{5}\right)(10 - 5q)\)

Write the inequality represented by each graph.

31.  
32.  
33.

**Extended Practice Exercises**

34. Graph the solution to the inequality \(|x| > 2\) on a number line.

35. **WRITING MATH** Write a paragraph in which you discuss two different ways to interpret and graph the inequality \(y < 5\). How are these two interpretations and their graphs related?

36. Name three points that are solutions of both the inequality \(x + y < 1\) and the equation \(-3x + 2y = 10\).

**Mixed Review Exercises**

Identify the pattern for each sequence. Determine the next three terms in each sequence. (Lesson 2-1)

37. 1, 4, 16, 64, 256, . . . .  
38. 100, 50, 25, 12.5, 6.25, . . . .

39. 1, 4, 7, 10, 13, . . . .  
40. 200, 193, 186, 179, 172, . . . .

41. 1, –3, 9, –27, 81, . . . .  
42. 50,000, –10,000, 2000, –400, 80, . . . .
Review and Practice Your Skills

**Practice Lesson 2-5**

Solve each multi-step equation.

1. \(4r - 1 = 35\)
2. \(5g + 1 = -29\)
3. \(-4q - 5 = 7\)
4. \(2(x - 3) = 14\)
5. \(6x - 13 = -13\)
6. \(\frac{1}{2}x + 5 = 16\)
7. \(0.4x - 3.8 = 4.2\)
8. \(-7(m - 3) = 2(4m + 3)\)
9. \(0.2(1.8 + z) = 0.3z\)
10. \(10b - 6b - 3 = 9\)
11. \(\frac{z}{3} + 70 = 98\)
12. \(12 - 3m = -15\)
13. \(7 - x = 23\)
14. \(-4x + 23 = 75\)
15. \(15(2 + x) - 3x = 114\)
16. \(14 = 8r - 58\)
17. \(\frac{2}{5}x - 7 = 11\)
18. \(7(x - 2) = -14\)
19. \(12 - 3(4 - 7x) = 9(3x + 2) + x\)
20. \(\frac{1}{3}(18y - 6) = -\frac{5}{6}(12 - 6y)\)
21. \(-m + 3(m + 1) = 11\)
22. \(-8 - 2w = 11\)
23. \(112 = 12 + 8y\)
24. \(\frac{4}{7}x = -(21 + 14)\)

Translate each sentence into an equation. Then solve.

25. Six more than 5 times a number is \(-29\). Find the number.
26. When 47 is decreased by twice a number, the result is \(-75\). Find the number.
27. The sum of one-third of a number and \(\frac{1}{2}\) is \(3\frac{1}{2}\). Find the number.
28. 7 less than twice a number is 14. Find the number.
29. Three times the sum of a number and 2 is \(-27\). Find the number.

**Practice Lesson 2-6**

Solve each inequality and graph the solutions on a number line.

30. \(3 + x < 2\)
31. \(-g - 9 > 3\)
32. \(2x - 0.3 \leq 0.5\)
33. \(n + 5 < 2\)
34. \(-4x + 6 \geq 17\)
35. \(5d - 8 < -8\)
36. \(\frac{r}{4} \leq -2\)
37. \(c + \frac{2}{3} > 1\frac{1}{3}\)
38. \(2 - (3 - s) \leq 4\)
39. \(5 > \frac{1}{3}k + 14\)
40. \(-6(k + 2) > 48\)
41. \(72 \geq -3h + 4 - 5h\)
42. \(5(7 + r) \geq 12r\)
43. \(2x - 5(x + 3) \leq -20\)
44. \(\frac{5}{8}e - 3 - \frac{3}{8}e > -5\)
45. \(m - 19 > -15\)
46. \(\frac{1}{3}x - 2 \geq 11\)
47. \(-3x - 2 \geq 4.5\)

Graph each inequality on the coordinate plane.

48. \(y \leq x - 2\)
49. \(y > \frac{4}{5}x - 4\)
50. \(y < -2x\)
51. \(y \geq 5 - 3x\)
52. \(5x + 10y < -30\)
53. \(x - y > 4\)
54. \(y \geq -3\)
55. \(x < 8\)
56. \(y \geq -3x + 2\)
57. \(y < x\)
58. \(-2y \leq x\)
59. \(4x + 3y \leq 12\)
60. \(-5x + 4y > 20\)
61. \(0.2x - 0.8y \leq 3.2\)
62. \(\frac{1}{4}x - \frac{1}{2}y > 2\frac{1}{2}\)
PRACTICE  Lesson 2-1–Lesson 2-6

Find the next three terms in each sequence. (Lesson 2-1)
63. 1.2, 1.5, 1.8, 2.1, _____, _____, _____
64. 1.2, 2.4, 4.8, 9.6, _____, _____, _____
65. 1.2, −1.2, −3.6, −6.0, _____, _____, _____
66. 1.2, −6, 30, −150, _____, _____, _____
67. 1.2, 1.21, 1.212, 1.2121, _____, _____, _____
68. 1.2, 1.44, 1.728, 2.0736, _____, _____, _____

Write each as a set of ordered pairs. Graph on a coordinate plane. List the domain and range. Determine if each is a function. (Lessons 2-2 and 2-3)
69.

70.

Solve each equation. (Lesson 2-4)
71. \(x - 3 = 0\)
72. \(9 = (-4) + f\)
73. \(c + \frac{3}{5} = -1\frac{4}{5}\)
74. \(-3.2d = 48\)
75. \(\frac{w}{7} = -14\)
76. \(\frac{2}{3}x = 24\)

Solve each equation. (Lesson 2-5)
77. \(-8 - x = 14\)
78. \(-4x + 5 = 33\)
79. \(\frac{t}{-3} - 9 = -1\)

MathWorks  Career – Transcriptionist

TV newscasters can’t possibly remember everything they need to say in a newscast. Instead, they read from a device known as a teleprompter. A teleprompter is a television screen that scrolls slowly through the script for the show. Transcriptionists make sure the copy is typed accurately and on time for the program.

1. You hire a transcription assistant at the rate of $4/page of typed copy. You also pay her a base salary of $25 per day. Her total earnings is represented by \(e = 4p + 25\) when \(e\) is the total earnings and \(p\) is the number of pages. If you can afford to pay her up to $150 for one day, how many pages of copy can you ask her to type?

2. Samantha has six hours to get four tasks done. She spends 45 min talking to the producer, 1 h 45 min talking to a repair technician, and 2 h 15 min proofreading the copy of a speech. She still has to type 1,800 words of copy for the evening newscast. How many words per minute must she type?

3. Victor knows that he can type 30 words/min. He has 60 pages of copy to type, and there are about 100 words/page. How long will it take him to finish the job?
Consumers are constantly bombarded with facts and figures from advertisers who use statistics to entice people to buy their products. Newspaper and television advertisements are full of these statistics. For example, a television commercial makes the following claim:

“In a national taste-test, 7 out of 10 teenagers preferred our brand of cola to our competitor’s.”

a. How is this advertiser trying to influence consumers?

b. Is it possible that this statistic is not truly representative of the nation’s preference? Explain.

**Example 1**

**SPORTS** In preparing a sports report for the newspaper, Juan recorded the batting averages of 2 baseball players systematically sampled from each of the ten teams in the league. Construct a frequency table for this data.

<table>
<thead>
<tr>
<th>Batting Average</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>.240—.249</td>
<td>H</td>
<td>5</td>
</tr>
<tr>
<td>.250—.259</td>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>.260—.269</td>
<td>H IH</td>
<td>6</td>
</tr>
<tr>
<td>.270—.279</td>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>.280—.289</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>.290—.299</td>
<td>II</td>
<td>2</td>
</tr>
<tr>
<td>.300—.309</td>
<td>III</td>
<td>3</td>
</tr>
</tbody>
</table>

The lowest batting average is .241, and the highest is .304. Group the data into intervals. Then mark a tally for each data item in the appropriate interval, and record the total for each interval.
Once data has been organized, it can then be analyzed statistically. Three measures of central tendency that can be calculated are the mean, median, and mode.

The mean, or arithmetic average, is the sum of the data divided by the number of data. The mean is the most representative measure of central tendency for data sets that do not contain extreme values.

The median is the middle value of the data when arranged in numerical order. If the number of data items is even, the median is the average of the two middle numbers. The median is the most representative measure of central tendency for data sets that contain extreme values.

The mode is the number (or numbers) that occurs most often in the set of data. A set of data may contain one mode, more than one mode, or no mode. The mode is used to describe the most characteristic value of a set of data.

**Example 2**

**TEST TAKING** The SAT mathematics scores for 8 high school students are listed below.

539 541 576 505 548 576 565 558

a. Find the mean of the data.
b. Find the median of the data.
c. Find the mode of the data.
d. Which measure of central tendency is the best indicator of the typical SAT mathematics score for these students?

**Solution**

a. To find the mean, add the data and divide by the number of data.

\[
\frac{539 + 541 + 576 + 505 + 548 + 576 + 565 + 558}{8} = \frac{4408}{8} = 551
\]

The mean is 551.

b. To find the median, first rewrite the data in numerical order.

505 539 541 548 558 565 576 576

Because there is an even number of data, the median is the average of the two middle numbers.

\[
\frac{548 + 558}{2} = \frac{1106}{2} = 553
\]

The median is 553.

c. The mode is the number that occurs most often. So the mode is 576.

d. The best indicator of the typical SAT mathematics score for the students is the median, 553, which is not affected by the extreme value (505).
Example 3

CALCULATOR A photographer sold photos to a magazine for the following: $150, $225, $175, $350, $635, $120, and $550. Find the mean and median of the amounts.

Solution

Use the list feature to create and store a new list (L1). After entering the data, choose MATH from the LIST menu to find the mean and median of the new list.

The mean of the data is $315 and the median is $225.

Try These Exercises

EDUCATION A random sample of 20 student records was used to determine the average number of absences per student during the school year. The number of absences on each record is listed below.

| 3 | 2 | 1 | 4 | 3 | 1 | 2 | 1 | 0 | 2 |
| 2 | 3 | 5 | 1 | 4 | 8 | 9 | 0 | 4 | 1 |

1. Construct a frequency table for these data.
2. Find the mean, median, and mode of the data.
3. Which measure of central tendency is the best indicator of the average number of absences per student for this school year?

NEWS MEDIA The manager of the school newspaper researched and recorded the number of issues of each edition of the newspaper that were sold.

| 362 | 398 | 409 | 377 | 421 | 351 | 399 | 358 | 406 | 388 |
| 379 | 412 | 423 | 361 | 414 | 420 | 409 | 387 | 361 | 425 |
| 366 | 401 | 392 | 387 | 390 | 371 | 405 | 417 | 399 | 358 |

4. Construct a frequency table for these data. Group the data into intervals of 10.
5. Determine the interval that contains the median of the data.

Practice Exercises • For Extra Practice, see page 668.

MARKETING Thirty families were randomly sampled and surveyed as to the number of magazines to which they subscribe. The results are listed below.

| 3 | 1 | 0 | 0 | 2 | 3 |
| 1 | 4 | 5 | 1 | 0 | 2 |
| 2 | 0 | 1 | 1 | 1 | 4 |
| 3 | 2 | 1 | 3 | 4 | 4 |
| 1 | 0 | 2 | 3 | 2 | 1 |

6. Construct a frequency table for these data.
7. Find the mean, median, and mode of the data.
JOURNALISM  Amanda systematically sampled every tenth student on the cafeteria lunch line to record the amount of money spent on lunch that day. The results of her survey are listed below.

$2.95  $3.10  $2.85  $2.95  $3.35  $3.15  $3.15  $2.80
$2.60  $2.85  $3.15  $2.70  $3.25  $3.00  $2.95  $3.20
$2.85  $2.95  $2.90  $3.00  $2.95  $2.65  $3.05  $2.75

8. Construct a frequency table for these data. Group the data into intervals.

9. Which interval contains the median of the data?

SPORTS  The heights, in inches, of the members of the Hills High School Boys’ Basketball Team are listed below.

75  74  66  76  71  74
78  77  67  76  77  74

10. Use a calculator to find the mean and median of the data.

11. Find the mode of the data.

12. Which measure of central tendency is the best indicator of the typical height of a member of the basketball team?

WEATHER  For a television documentary on desert environments, a meteorologist recorded the highest temperature for each day of June in Death Valley, California. The data are displayed in the frequency table.

13. Find the interval that contains the median.

14. To the nearest percent, on what percent of the days was the recorded temperature at least 100°F?

EXTENDED PRACTICE EXERCISES

15. Refer to Exercises 13–14. Do you think the mean of the daily high temperatures for Death Valley is greater than or less than 100°F? Explain.

16. WRITING MATH  Suppose you were interested in determining the average temperature during June (as opposed to the average daily high temperature). What sampling method would you use, and how would you collect the data?

MIXED REVIEW EXERCISES

Evaluate each function.

17. \( f(x) = 2x - 1; f(3) \)

18. \( f(x) = \frac{1}{2}x + 3; f(4) \)

19. \( f(x) = 3x + 5; f(7) \)

20. \( f(x) = \frac{x}{3} + 4; f(-9) \)

21. \( f(x) = 2x + 6; f(-3) \)

22. \( f(x) = x + 4; f(2) \)

23. \( f(x) = 3x - 2; f(6) \)

24. \( f(x) = -3x + 2; f(-4) \)

25. \( f(x) = 5x + 8; f(-2) \)

26. Clarks Plumbing and Heating purchased a new computer for $6000. The depreciation rate for this computer is 30%. Use the declining-balance method to find the ending book value after the fourth year. (Lesson 2-2)
Work in small groups.

From a newspaper or magazine, find a table of information. Study the data presented in the table. Discuss whether a different type of display might have been more effective. If so, sketch your idea.

Graphs and plots are often used to present a picture of the data. These types of displays provide visual representations of the distribution of the data. They also display characteristics about the data that are sometimes difficult to identify from charts and tables.

One type of visual data display is the **stem-and-leaf plot**. To construct a stem-and-leaf plot, first divide each piece of data into two parts: a stem and a leaf. The last digit of each number is referred to as its **leaf**; the remaining digits comprise the **stem**. The data is then organized by grouping together data items that have common stems.

**Example 1**

**HEALTH** For an article she was preparing for a women's health magazine, Sharon recorded the cholesterol levels of the twenty women on the magazine staff.

<table>
<thead>
<tr>
<th>Cholesterol Levels of Female Staff Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stems</td>
</tr>
<tr>
<td>14</td>
</tr>
<tr>
<td>15</td>
</tr>
<tr>
<td>16</td>
</tr>
<tr>
<td>17</td>
</tr>
<tr>
<td>18</td>
</tr>
<tr>
<td>19</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>21</td>
</tr>
<tr>
<td>22</td>
</tr>
<tr>
<td>23</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>25</td>
</tr>
</tbody>
</table>

Construct a stem-and-leaf plot to display the data. Interpret the data using your plot.

**Solution**

For these data, the digits in the hundreds and tens places form the stem, and the units digit is the leaf. Sort the data according to stems, and arrange the leaves in numerical order.

Be sure to provide a title and a key for your plot.
Because 146 is much less than the other data, and 259 is much greater, these data items are considered to be outliers. There is a large data cluster for cholesterol levels between 177 and 216, and a smaller cluster for levels in the lower 230s. Gaps exist between these two clusters, and between the outliers and the rest of the data. The mode is 208. The median cholesterol level is 204.5 (the average of the tenth and eleventh data pieces in the plot).

A histogram is a type of bar graph used to display data. The height of the bars of the graph are used to measure frequency. Histograms are frequently used to display data that have been grouped into equal intervals.

**Example 2**

The Town Gazette surveyed 40 families, and asked them to record the number of hours per week their television was in use. The results are shown in this frequency table. Construct a histogram to display these data.

**Solution**

Let the horizontal axis represent the number of hours, and the vertical axis represent the frequency. Draw each bar so that its height corresponds to the frequency of the interval it represents.

A spreadsheet program can quickly create a variety of charts and graphs from a set of data.

**Example 3**

**SPREADSHEET** A class earned the following scores on a science quiz: 89, 88, 72, 66, 89, 90, 94, 78, 95, 82, 84. Make a frequency table and a histogram of the data.

**Solution**

Create the frequency table on a spreadsheet. Use the intervals 61–70, 71–80, 81–90, and 91–100.

Highlight the cells and select **Chart** from the **Insert** menu. From the list of types of charts and graphs, choose **column**. Format the width of the bars so there are no gaps. Add titles and your histogram is complete.
TRY THESE EXERCISES

On an aptitude test measuring reasoning ability on a scale of 0 to 100, a class of 30 students received the following scores.

38  75  28  34  56  32  61  28  71  27
62  50  66  40  38  71  60  52  33  59
74  69  86  57  65  16  60  56  55  38

1. Construct a stem-and-leaf plot to display the data.
2. Identify any outliers, clusters, and gaps in the data.
3. Find the mode of the data.
4. Find the median of the data.
5. Find the mean of the data.

6. NEWS MEDIA A newspaper report on the price of gasoline contained this frequency table showing the amount of money spent weekly at the gas pump by 25 people surveyed. Construct a histogram to represent these data.

<table>
<thead>
<tr>
<th>Amount of Money</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 14.99</td>
<td>1</td>
</tr>
<tr>
<td>15.00 – 19.99</td>
<td>2</td>
</tr>
<tr>
<td>20.00 – 24.99</td>
<td>10</td>
</tr>
<tr>
<td>25.00 – 29.99</td>
<td>8</td>
</tr>
<tr>
<td>30.00 – 34.99</td>
<td>4</td>
</tr>
</tbody>
</table>

PRACTICE EXERCISES • For Extra Practice, see page 669.

REPORTING For an article he was writing for the school newspaper, Norman surveyed 30 students about the average amount of time (in minutes) each student spent on homework on a weeknight. He recorded the following data.

30  43  58  50  41  98  75  30  72  45
38  75  81  45  17  43  55  52  78  47
31  45  46  55  77  53  58  46  43  35

7. Construct a stem-and-leaf plot to display the data.
8. Identify any outliers, clusters, and gaps in the data.
9. Find the mode of the data.
10. Find the median of the data.
11. Find the mean of the data to the nearest tenth.
12. WRITING MATH What conclusions could Norman draw from the data? Write the lead paragraph of his newspaper article.
13. **ENTERTAINMENT** An entertainment magazine surveyed a sample of its readers about the average number of movies they see in a year. The data are recorded in this frequency table. Construct a histogram to display the data.

<table>
<thead>
<tr>
<th>Number of movies</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–4</td>
<td>6</td>
</tr>
<tr>
<td>5–9</td>
<td>15</td>
</tr>
<tr>
<td>10–14</td>
<td>30</td>
</tr>
<tr>
<td>15–19</td>
<td>25</td>
</tr>
<tr>
<td>20–24</td>
<td>32</td>
</tr>
<tr>
<td>25–29</td>
<td>12</td>
</tr>
</tbody>
</table>

14. **DATA FILE** Use the data on page 652 on the All-American Girls Professional Baseball League Batting Champions. Make a stem-and-leaf plot of the at-bats for the champion each year.

Refer to the histogram for Exercises 15–18.

15. How many students earn less than $60.00 per week?

16. What percent of the students earn between $60.00 and $99.99 per week?

17. Which interval contains the median amount of earnings?

18. Is it possible to identify the mode of the data? Explain.

---

**EXTENDED PRACTICE EXERCISES**

19. **WRITING MATH** Write a paragraph comparing stem-and-leaf plots and histograms. Include in your comparison a discussion of the kinds of data for which each type of display is best suited, and describe the statistical conclusions that can be deduced from analyzing each type of display.

20. **CHAPTER INVESTIGATION** Develop a survey question to ask your classmates that could provide you with data to support your proposal. Collect the data, construct a frequency table, and draw the related histogram. Write a paragraph analyzing your results.

---

**MIXED REVIEW EXERCISES**

**Graph each function.** (Lesson 2-3)

21. \( y = 3x - 2 \)  
22. \( y = \frac{1}{2}x + 3 \)  
23. \( y = 2x + 1 \)  
24. \( y = x - 4 \)  
25. \( y = -2x + 1 \)  
26. \( y = x - 3 \)

**Solve each equation.** (Lesson 2-4)

27. \( m - 13 = 28 \)  
28. \( 6n = -42 \)  
29. \( 8 + g = -2 \)  
30. \( 25 = p + 47 \)  
31. \( 0.9x = 7.2 \)  
32. \( -7h = 28 \)  
33. \( \frac{a}{4} = 1.2 \)  
34. \( \left( \frac{2}{3} \right)c = 12 \)  
35. \( 0.4w = -6 \)
Review and Practice Your Skills

**Practice Lesson 2-7**

Find the mean, median, and mode of each set of data.

1. 98, 77, 89, 93, 75, 77, 88, 78
2. 4237, 4516, 4444, 4379, 4516, 4869
4. 4.1, 2.6, 4.1, 4.8, 5.9, 2.7, 6.9, 4.1
5. Althea measures the following volumes of water in milliliters in beakers in a chemistry lab:

<table>
<thead>
<tr>
<th>Number of students</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>90</td>
</tr>
<tr>
<td>7</td>
<td>80</td>
</tr>
<tr>
<td>10</td>
<td>70</td>
</tr>
</tbody>
</table>

6. The number of students and their heights are:

<table>
<thead>
<tr>
<th>Number of students</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>150 cm</td>
</tr>
<tr>
<td>5</td>
<td>155 cm</td>
</tr>
<tr>
<td>2</td>
<td>160 cm</td>
</tr>
</tbody>
</table>

7. Construct a frequency table for these data. Group the data into intervals of 10.

8. Find the mean, median, and mode of the data.

9. Which interval contains the median? Which interval contains the mean?

10. Which measure of central tendency best describes the most commonly measured volume of water?

**Practice Lesson 2-8**

For the data given above for Exercises 7–9 (Althea’s chemistry lab):

11. Construct a stem-and-leaf plot to display the data.

12. Identify any outliers, clusters, and gaps in the data.

13. Use your frequency table from Exercise 7 to construct a histogram.

The school newspaper surveyed 50 seniors about the average amount of time (in hours) per week that each student spent talking on the phone with friends.

<table>
<thead>
<tr>
<th>Time (h)</th>
<th>1–3</th>
<th>4–6</th>
<th>7–9</th>
<th>10–12</th>
<th>13–15</th>
<th>16–18</th>
<th>19–21</th>
<th>22–24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>12</td>
<td>5</td>
<td>11</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

14. Construct a histogram to display the data.

15. How many students talk on the phone less than 13 h/wk?

16. What percent of the students talk on the phone between 7 and 15 h/wk?

17. Which interval contains the median of the data?

18. Is it possible to identify the mean of the data? Explain.

19. If each student increases his or her phone time by 3 h/wk, which measures of central tendency would it affect? How?
Find the next three terms in each sequence. (Lesson 2-1)
20. 4000, 800, 160, 32, ____, ____ , ____  
21. −45, −17, 11, 39, ____, ____ , ____  
22. 4, 8, 7, 14, 13, 26, ____, ____ , ____  
23. A, E, I, M, ____, ____ , ____  

Graph each point on a coordinate plane. Name the quadrant in which each point is located. (Lesson 2-2)
24. $M(0, 5)$  
25. $N(-6, 3)$  
26. $P(-4, -1)$  
27. $Q(-7, 0)$  
28. $R(1.5, -1.5)$  
29. $S\left(\frac{1}{2}, 4\right)$  
30. $T\left(0, -\frac{8}{3}\right)$  
31. $U(-8, 5)$  

Graph each function. (Lesson 2-3)
32. $y = 3x$  
33. $f(x) = \frac{1}{2}x + 3$  
34. $x + y = -8$  
35. $f(x) = -2x + 3$  
36. $y = |3x|$  
37. $y = 4(x - 2)$  

Solve each equation. (Lesson 2-4 and Lesson 2-5)
38. $x + 17 = 31$  
39. $23 - a = 0$  
40. $b - (-16) = -23$  
41. $-4c = 18$  
42. $13d = -78$  
43. $\frac{x}{5} = -30$  
44. $23 - m = -17$  
45. $9e - 1 = 23$  
46. $2(x - 5) = -24$  
47. $\frac{y - 3}{2} = -11$  
48. $17 = -41 + p + 16$  
49. $3(x - 4) = -6 + 4x$  
50. $2.8x - 11.7 = 24.42$  
51. $9\frac{1}{3} - 2\frac{2}{3}n = 27$  
52. $\frac{x}{3} - 14 = -72$  

Solve each inequality and graph the solutions on a number line. (Lesson 2-6)
53. $x - \left(-1\frac{1}{4}\right) > 7$  
54. $-3h + 38 \leq 56$  
55. $\frac{10}{3}g - 2 \geq 18$  

Graph each linear inequality on a coordinate plane. (Lesson 2-6)
56. $y < -x + 7$  
57. $x - y \leq -7$  
58. $24 > 6x + 4y$  

Find the mean, median, and mode of each set of data. (Lesson 2-7)
59. 15, 25, 30, 22, 45, 35, 38, 22, 37, 20, 31  
60. $\frac{1}{2}', 3', 4', 3', 4', 2', 8', 8', 2', 1', 1', 4', 3', 1'$  

The table gives salaries and number of workers at a manufacturer of auto parts. (Lesson 2-8)

<table>
<thead>
<tr>
<th>Job</th>
<th>President</th>
<th>Group Manager</th>
<th>Line Manager</th>
<th>Machinist</th>
<th>Clerk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Salary Range</td>
<td>1</td>
<td>$81–95,000</td>
<td>2</td>
<td>$66–80,000</td>
<td>5</td>
</tr>
</tbody>
</table>

61. In a labor dispute, which measures of central tendency might the president use to show that the worker’s wages were already high enough? Why?
62. What percent of the workers earn $51,000 per year or more?
When examining or reading statistics, think critically. Although informative and useful, statistics can be misleading. Graphs can mislead when scales or dimensions are changed. Measures of central tendency can be misleading if they do not accurately represent the data. Advertising claims can be misleading if they are vague, omit information, or hint at something that may not be true.

**Problem**

A sales representative for a new soft drink is trying to convince a chain of food stores to order a much larger quantity. The salesperson uses the graph at the right in the sales pitch.

1. What can you say about sales of the drink?
2. What is deceptive about the graph?
3. How would you change the graph so that it is not misleading?

**Solve the Problem**

1. Read the vertical scale. Sales are increasing. Sales in March are 1.5 times as great as the sales in January.
2. Dimensions other than height have been changed. Sales for February and March appear to be greater than they actually are.
3. Diameters should be the same, so only the heights are compared.

**Try These Exercises**

1. **SPORTS** “Just look at the graph,” the player’s agent said. “Phil’s hits have doubled since last year. We are looking for a large raise and a long contract.”

   Look at the graph. Is the agent’s claim misleading? Why?

2. **ADVERTISING** Tell why you think each of the following advertisements is misleading.
   
   a. Eighty percent of all dentists surveyed agree: Zilch toothpaste tastes best.
   
   b. In the past 5 years, 25,000 cola drinkers have switched to Koala Kola.
   
   c. Thousands of teenagers wake in the morning to a glass of Zest. It has 20% real fruit juice and 100% bounce.
These data show sales of the Earn A Million-A-Day At Home video. Read the table, and then examine the graphs below.

<table>
<thead>
<tr>
<th>Week</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>252</td>
<td>246</td>
<td>265</td>
<td>276</td>
<td>280</td>
</tr>
</tbody>
</table>

3. **WRITING MATH** The graphs show the same data. Why do they have different appearances?

4. Suppose you were a sales representative for the video and wanted to convince stores to stock more copies. Which graph would you use? Why?

5. **BUSINESS** Employee annual wages at a plant rose steadily, but very gradually, from one year to the next during one 5-year period. Make two graphs to show these changes, one from the perspective of the factory owner who wants to show that workers’ wages are rising rapidly, and one from the perspective of an employee representative who wants to show that wages are rising minimally.

6. **WRITING MATH** Create your own advertisement that contains misleading statistics, or find one in a newspaper or magazine. See if a classmate can tell what is misleading about the ad.

---

**Mixed Review Exercises**

Solve each equation. (Lesson 2-5)

7. $4b - 3 = 17$
8. $2(m + 5) = -9$
9. $-4d + 6 = 2d - 8$
10. $(\frac{1}{2})(8x - 6) = -7$
11. $-12 + 3a + 14 = 4$
12. $(0.75)(8w - 12) = 9$
13. $-5k - 3 = -38$
14. $3(2m - 4) = 2m - 22$
15. $3(3x + 6.5) = -3$

Evaluate $g(x) = |3x - 4|$ for the given values of $x$. (Lesson 2-3)

16. $g(2)$
17. $g(-4)$
18. $g(3)$
19. $g(-2)$
20. $g(-1)$
21. $g(7)$
22. $g(0.5)$
23. $g(1.3)$
Chapter 2 Review

VOCABULARY

Choose the word from the list at the right that completes each statement.

1. A type of bar graph used to display data is called a(n) ___.
2. A(n) ___ is a relation in which each element of one set is paired with exactly one element of another set.
3. The middle value in a set of data that are arranged in numerical order is called the ___.
4. To calculate the ___, divide the sum of the data by the number of data items.
5. An arrangement of terms in a particular order is called a(n) ___.
6. Perpendicular lines divide a coordinate plane into ___.
7. Values that are much less or much greater than the other data are called ___.
8. A representative part of a population is called a(n) ___.
9. The set of all input values in a relation is called the ___.
10. The point where the x-axis crosses the y-axis is called the ___.

LESSON 2-1 Patterns and Iterations, p. 52

An arrangement of numbers in a pattern is a sequence.

An iteration is a process that is repeated over and over again.

Find the next three terms in each sequence. Identify the rule.

11. 64, 16, 4, . . .
12. 1, \frac{3}{2}, \frac{9}{4}, . . .
13. 1, −2, 4, −8, . . .

14. The price of a new car is $20,000. If it has a depreciation rate of 18% per year, what is its value in 3 yr?

LESSON 2-2 The Coordinate Plane, Relations and Functions, p. 56

A set of ordered pairs is defined as a relation. The domain of a relation is the set of all x-coordinates. The range of a relation is the set of all y-coordinates.

A function is a set of ordered pairs in which each element of the domain is paired with exactly one element in the range.

Determine whether each relation is a function. Give the domain and range.

15. \{(2, 3), (−1, 4), (0, 2), (1, 2)\}
16. \{(2, −1), (1, 0), (0, 1)\}

Given \(f(x) = 5x − 9\), find each value.

17. \(f(1)\)
18. \(f(0)\)
19. \(f(−1)\)
20. \(f(−2)\)
LESSON 2-3  ■  Linear Functions, p. 62

- An equation that can be written in the form $Ax + By = C$ where $A$ and $B$ are not both zero is called a linear equation. A linear equation whose graph is not a vertical line represents a linear function. Graphs of such equations are straight lines.

An absolute value function is $g(x) = |x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$

Graph each function.
21. $y = 2x - 3$  
22. $y = -x + 2$  
23. $y = 2x - 7$

Evaluate $f(x) = |1 - 3x|$ for the given values of $x$.
24. $f(4)$  
25. $f(-2)$  
26. $f(3)$

LESSON 2-4  ■  Solve One-Step Equations, p. 66

- You can add (subtract) the same number to (from) each side of an equation and/or multiply (divide) each side by the same number. Remember to perform the same operations on each side.

Solve each equation.
27. $a + 17 = 43$  
28. $-15 = t - 55$  
29. $1.7p = -1.87$
30. $\left(\frac{3}{5}\right)w = 33$  
31. $\frac{2}{5} = \frac{3}{4} + t$  
32. $\frac{d}{17} = -5$

LESSON 2-5  ■  Solve Multi-Step Equations, p. 72

- Some equations contain variables on both sides. To solve these equations, use the addition property of equality to move terms with the variable to one side of the equal sign and the constants to the other side. Then, solve the equation using the multiplication property of equality.

Solve each equation and check the solution.
33. $11 + 9y = 119$  
34. $341 = 71 + 2w$  
35. $7 = 4 - \frac{n}{3}$
36. $10h = 8h + 6$  
37. $6.2s + 7 = 3s - 1$  
38. $2.4k + 1 = 7(2k - 4)$
39. $3 + \frac{5}{8}x = 2(x - 4)$  
40. $4(5 - a) - 2.1(6a) = -4.9$  
41. $5(2g - 3) + 2(g + 4) = 17$

LESSON 2-6  ■  Solve Linear Inequalities, p. 76

- The graph of an inequality is the graph of the set of all ordered pairs that make the inequality true.

Solve each inequality and graph the solution set on a number line.
42. $-3x + 4 \geq 13$  
43. $5x + 1 > -4$  
44. $-6x + 2 < 12 - x$

Graph each inequality on the coordinate plane.
45. $y > 2x + 1$  
46. $y \leq -x + 3$  
47. $y - x > 2$
LESSON 2-7 Data and Measures of Central Tendency, p. 82

- The **mean** of a set of data is the sum of the items divided by the number of items.
- The **median** is the middle value (or the mean of the two middle values) of a set of data arranged in numerical order.
- A **mode** is a number that occurs most often in a set of data.

The results of the last math test are:

81 78 90 85 62 59 86 94 93 92 85 82 90 80 86 85

48. Construct a frequency table of interval width 10.
49. Find the mean, median, and mode.

LESSON 2-8 Display Data, p. 86

- Individual items can be displayed in **stem-and-leaf plots**. In these, the digit farthest to the right in a number is the leaf. The other digits make up the stem.
- The frequency of data can be displayed in a type of bar graph called a **histogram**.

50. Construct a stem-and-leaf plot to display the data in Exercises 48–49.
51. Identify any outliers, clusters, and gaps in the data.

LESSON 2-9 Problem Solving Skills: Misleading Graphs, p. 92

- Statistics can be helpful when trying to make a decision. However, they can be misleading.

52. A television advertisement says, “Over 100 dentists can't be wrong. XYZ toothpaste is the one you should use for a healthier smile.” Tell why this advertisement might be misleading.

The two graphs below show the results of a taste test of Bill's cookies.

53. Do the graphs represent the same information? Explain.
54. Is one of the graphs misleading? Explain.

**Chapter Investigation**

**EXTENSION** Create an advertisement for your school or community newspaper to promote your proposal. Include your survey question, the histogram of the data you collected, and a paragraph that will convince people to support your proposal.
Chapter 2 Assessment

1. Find the next three terms in the pattern 1, 2, 5, 10, . . . .
2. Determine whether {−1, −2, (1, 2), (2, 2)} is a function. Give the domain and range.
3. Given \( f(x) = -3x + 5 \), find \( f(-1) \).
4. Graph \( y = 2x - 3 \).
5. Evaluate \( g(x) = -|2x - 1| + |-x| \) for \( g(-1) \).

Solve each equation.
6. \( 7x - 5 = -4 \)  
7. \( \frac{2}{5}x + 1 = 3 \)

Translate each sentence into an equation. Then solve.
8. When three times a number is increased by 2, the result is 17. Find the number.
9. When three-sevenths of a number is decreased by 1, the result is 5. Find the number.

Solve and graph each inequality.
10. \( 8x + 5 > 12 \)  
11. \( -3x + 8 \geq 11 \)

Graph each inequality in the coordinate plane.
12. \( y \leq 3x - 4 \)  
13. \( y > -x + 3 \)
14. Solve \( ax = -a + ba + c \) for \( a \)

Teenagers polled about the number of evening meals they ate at home in one week reported the following number of meals.

<table>
<thead>
<tr>
<th>Meals</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

15. Construct a frequency table for the data.
16. Find the mean of the data.
17. Find the median of the data.
18. Find the mode of the data.

Another group of teenagers polled about the number of evening meals they ate at home in one four-week period reported the following number of meals.

<table>
<thead>
<tr>
<th>Meals</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>28</td>
<td>3</td>
</tr>
<tr>
<td>28</td>
<td>3</td>
</tr>
<tr>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>28</td>
<td>4</td>
</tr>
</tbody>
</table>

19. Construct a stem-and-leaf plot to display the data.
20. Identify the outliers, clusters, and gaps in the data.
7. Which would be the first step to solve \(6 = 4t - 2\)? (Lesson 2-5)
   - A. Add 2 to each side.
   - B. Add \(-4t\) to each side.
   - C. Multiply each side by \(\frac{1}{4}\).
   - D. Multiply each side by 4.

8. Which graph represents the solution of \(3x - 5 < 1\)? (Lesson 2-6)
   - A.
   - B.
   - C.
   - D.

9. Salaries of the 12 employees at the XYZ Company are $28,600, $32,000, $29,400, $31,200, $28,600, $38,500, $20,100, $85,000, $36,000, $35,200, $26,500, and $19,850. What is the mean salary? (Lesson 2-7)
   - $28,500
   - $29,050
   - $29,500
   - $33,425

10. The stem-and-leaf plot records Molly’s test scores. Which of the following is true? (Lesson 2-8)

    | Stems | Leaves |
    |-------|--------|
    | 7     | 5 6 8  |
    | 8     | 0 2 5 9 |
    | 9     | 0 0 3 7 |

    - A. 75 is an outlier.
    - B. The median equals the mean.
    - C. There is no mode.
    - D. The mode is less than the median.

**Test-Taking Tip**

*Question 10*

Always read every answer choice, particularly in questions that ask, “Which of the following is true?”
Part 2 Short Response/Grid In

Record your answers on the answer sheet provided by your teacher or on a sheet of paper.

11. Chapa had $432.28 in her checking account. She wrote two checks for $25.50 and $43.23. Then she deposited $50. How much is in her account now? (Lesson 1-4)

12. The Cabinet Shop made a desktop by gluing a sheet of oak veneer to a sheet of 3/4-in. plywood. The total thickness of the desktop is 1 3/16 in. What is the thickness of the oak veneer? (Lesson 1-4)

13. What is the area of the rectangle? (Lesson 1-5)

14. The United States purchased Alaska for $7,200,000. Write this dollar amount in scientific notation. (Lesson 1-8)

15. What is the next term in the sequence? (Lesson 2-1)

16. A house costs $200,000. If it increases in value 4% each year, what is its value in 3 yr? (Lesson 2-1)

17. The function \( f(a) = (220 - a) \times 0.8 \div 4 \) gives the target 15-sec heart rate for an athlete during a workout. In the function, \( a \) represents the athlete's age. Find the target 15-sec heart rate for a 20-yr-old athlete during a workout. (Lesson 2-2)

18. If \(-2m + 3 = m - 12\), what is the value of 10m? (Lesson 2-5)

Part 3 Extended Response

Record your answers on a sheet of paper. Show your work.

19. A company plans to open a new fitness center. It conducts a survey of the number of hours people exercise weekly. The results for twelve people chosen at random are 7, 2, 4, 8, 3, 0, 3, 1, 0, 5, 3, and 4 h. What is the mode of the data? (Lesson 2-7)

20. For their science fiction book reports, students must choose one book from a list of eight books. The numbers of pages in the books are 272, 188, 164, 380, 442, 216, 360, and 262. What is the median number of pages? (Lesson 2-7)

21. The table gives prices two different bowling alleys charge. You plan to rent shoes and play some games.

<table>
<thead>
<tr>
<th>Bowling Alley</th>
<th>Shoe rental</th>
<th>Cost per game</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bob's Bowling Alley</td>
<td>$2.50</td>
<td>$4.00</td>
</tr>
<tr>
<td>Midtown Bowling Alley</td>
<td>$3.50</td>
<td>$3.75</td>
</tr>
</tbody>
</table>

a. Write an equation to find the number of games \( g \) for which the total cost to bowl at each alley would be equal. Solve the equation showing each step. (Lesson 2-5)

b. For how many games will Bob's Bowling Alley be cheaper? Write an equation to show the number of games where Midtown Bowling Alley will be cheaper. (Lesson 2-6)

22. Construct a stem-and-leaf plot to display the following data. Then interpret the data. (Lesson 2-8)

<table>
<thead>
<tr>
<th>Score</th>
<th>Score</th>
<th>Score</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>87</td>
<td>111</td>
<td>92</td>
</tr>
<tr>
<td>122</td>
<td>85</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>