Chapter 1

Chapter Opener

Math in the Real World (p. 3)

To find the vertical distance, add the distance from the water's surface to the top of the iceberg, 45 feet, to the distance from the bottom of the iceberg to the water's surface, 357 feet.

$45 + 357 = 402$

The vertical distance between these two points is 402 feet.

Prerequisite Skills Quiz (p. 4)

1. In the multiplication equation $12 \cdot 5 = 60$, 12 and 5 are called *factors* and 60 is called the *product*.

2. When you divide one number by another, the result is called the quotient.

3.
$$\begin{array}{r} 7.2 \\ + 13.7 \\ \hline 20.9 \end{array}$$
4.
$$\begin{array}{r} 2.41 \\ + 34.60 \\ \hline 37.01 \end{array}$$
5.
$$\begin{array}{r} 10.5 \\ - 7.3 \\ \hline 3.2 \end{array}$$
6.
$$\begin{array}{r} 27.1 \\ - 18.6 \\ \hline 8.5 \end{array}$$

7.
$$\begin{array}{r} 3.2 \\ \times\ 1.4 \\ \hline 1\ 28 \\ 3\ 2\ \\ \hline 4.48 \end{array}$$
8.
$$\begin{array}{r} 0.5 \\ \times\ 27 \\ \hline 3\ 5 \\ 10\ \\ \hline 13.5 \end{array}$$

9. $8.2\overline{)27.8\,8}$

$$\begin{array}{r} 3.4 \\ 82\overline{)278.8} \\ 246\ \\ \hline 32\ 8 \\ 32\ 8 \\ \hline 0 \end{array}$$

$27.88 \div 8.2 = 3.4$

10. $1.7\overline{)11.9}$

$$\begin{array}{r} 7 \\ 17\overline{)119} \\ 119 \\ \hline 0 \end{array}$$

$11.9 \div 1.7 = 7$

Lesson 1.1

1.1 Checkpoint (p. 6)

1. When $y = 12$; $y + 8 = 12 + 8 = 20$
2. When $x = 6$; $9 - x = 9 - 6 = 3$
3. When $x = 6$ and $y = 12$; $y - x = 12 - 6 = 6$
4. When $x = 6$ and $y = 12$; $xy = 6 \cdot 12 = 72$

1.1 Guided Practice (p. 7)

1. In the expression $21 + d$, d is the variable.
2. In both $2 + x$ and $2 + 3$, the expressions are sums with 2 as an addend. But, $2 + x$ is a variable expression and $2 + 3$ is a numerical expression.
3. When $x = 4$; $10 - x = 10 - 4 = 6$
4. When $x = 4$; $x + 7 = 4 + 7 = 11$
5. When $x = 4$; $2x = 2(4) = 8$
6. When $x = 4$; $\dfrac{32}{x} = \dfrac{32}{4} = 8$
7. When $n = 6$; $\dfrac{n}{2} = \dfrac{6}{2} = 3$
8. When $m = 5$ and $n = 6$; $m + n = 5 + 6 = 11$
9. When $m = 5$ and $n = 6$; $n - m = 6 - 5 = 1$

10. When $m = 5$ and $n = 6$; $mn = 5 \cdot 6 = 30$
11. (1) Number of sunrises seen in d days $= 16d$
    (2) $d = 196$
    (3) When $d = 196$; $16(196) = 3136$
        Walz and Bursch saw 3136 sunrises.

1.1 Practice and Problem Solving (pp. 7–9)

12. When $x = 6$; $x + 3 = 6 + 3 = 9$
13. When $x = 6$; $15 - x = 15 - 6 = 9$
14. When $x = 6$; $2x = 2(6) = 12$
15. When $x = 6$; $\dfrac{x}{3} = \dfrac{6}{3} = 2$
16. When $x = 6$; $20x = 20(6) = 120$
17. When $x = 6$; $\dfrac{24}{x} = \dfrac{24}{6} = 4$
18. When $x = 6$; $30 - x = 30 - 6 = 24$
19. When $x = 6$; $15 + x = 15 + 6 = 21$
20. When $a = 4$ and $b = 2$; $a + b = 4 + 2 = 6$
21. When $a = 4$ and $c = 16$; $c - a = 16 - 4 = 12$
22. When $a = 4$ and $b = 2$; $ab = 4 \cdot 2 = 8$
23. When $a = 4$ and $b = 2$; $\dfrac{a}{b} = \dfrac{4}{2} = 2$
24. When $b = 2$ and $c = 16$; $bc = 2 \cdot 16 = 32$
25. When $a = 4$ and $c = 16$; $\dfrac{c}{a} = \dfrac{16}{4} = 4$
26. When $a = 4$ and $b = 2$; $a - b = 4 - 2 = 2$
27. When $b = 2$ and $c = 16$; $\dfrac{c}{b} = \dfrac{16}{2} = 8$
28. When $b = 2$ and $c = 16$; $b + c = 2 + 16 = 18$
29. When $b = 2$ and $c = 16$; $c - b = 16 - 2 = 14$
30. When $a = 4$ and $c = 16$; $ac = 4 \cdot 16 = 64$
31. When $a = 4$ and $c = 16$; $a + c = 4 + 16 = 20$
32. $72x$ 33. $x - 1$ 34. $x + 13$ 35. $x + 9.4$
36. $\dfrac{x}{3}$ 37. $\dfrac{x}{41}$
38. "The difference of a number and 31" means $p - 31$, not $31 - p$.
39. When $d = 18$; $50 - d = 50 - 18 = 32$

    There is $32 left after you have spent $18.
40. a. Student's final score $= t + i$
    b. When $t = 30$ and $i = 40$; $t + i = 30 + 40 = 70$
       Student A earned 70 points.

       When $t = 40$ and $i = 20$; $t + i = 40 + 20 = 60$
       Student B earned 60 points.

       When $t = 30$ and $i = 50$; $t + i = 30 + 50 = 80$
       Student C earned 80 points.
    c. If $t = 35$ and $t + i$ is greater than 80, then i must be at least 46. So, you must earn at least 46 points for interpretation.

41. When $a = 2.5$ and $b = 15$; $a + b = 2.5 + 15 = 17.5$

42. When $b = 15$ and $c = 3.5$; $b - c = 15 - 3.5 = 11.5$

43. When $b = 15$ and $c = 3.5$; $bc = 15 \cdot 3.5 = 52.5$

$$\begin{array}{r} 15 \\ \times\ 3.5 \\ \hline 7\,5 \\ 45 \\ \hline 52.5 \end{array}$$

44. When $a = 2.5$ and $c = 3.5$; $a + c = 2.5 + 3.5 = 6$

45. When $a = 2.5$ and $b = 15$; $\dfrac{b}{a} = \dfrac{15}{2.5} = 6$

$$\begin{array}{r} 6. \\ 2.5\overline{)15.0} \\ 15\,0 \\ \hline 0 \end{array}$$

46. When $a = 2.5$ and $c = 3.5$; $c - a = 3.5 - 2.5 = 1$

47. When $a = 2.5$ and $c = 3.5$; $\dfrac{c}{a} = \dfrac{3.5}{2.5} = 1.4$

$$2.5\overline{)3.5} \qquad \begin{array}{r} 1.4 \\ 25\overline{)35.0} \\ 25 \\ \hline 10\,0 \\ 10\,0 \\ \hline 0 \end{array}$$

48. When $a = 2.5$ and $c = 3.5$; $ac = 2.5 \cdot 3.5 = 8.75$

$$\begin{array}{r} 2.5 \\ \times\ 3.5 \\ \hline 1\,25 \\ 7\,5 \\ \hline 8.75 \end{array}$$

49. Let $x =$ the number of feet.

Expression: $12x$

50. Let $y =$ the number of ounces.

Expression: $\dfrac{y}{16}$

51. a.

DVDs	Cost (dollars)	Amount left (dollars)
1	4	196
2	8	192
3	12	188
4	16	184

b. Let $r =$ the number of rentals.

Expression: $4r$

c. Expression: $200 - 4r$

d. 50 rentals. *Sample answer:* Find the greatest value of r so that $200 - 4r$ is not less than zero.

$200 - 4(50) = 200 - 200 = 0$

So, you can rent 50 DVDs before the $200 is spent.

52. a. Let $p =$ the number of points scored after a touchdown.

Let $f =$ the number of field goals.

Expression: $p + 3f$

b. When $p = 943$ and $f = 335$;
$p + 3f = 943 + 3(335) = 943 + 1005 = 1948$

So, George Blanda had 1948 points.

When $p = 562$ and $f = 383$;
$p + 3f = 562 + 3(383) = 562 + 1149 = 1711$

So, Nick Lowery had 1711 points.

When $p = 638$ and $f = 366$;
$p + 3f = 638 + 3(366) = 638 + 1098 = 1736$

So, Norm Johnson had 1736 points.

c. Nick Lowery, Norm Johnson, George Blanda

53. The expressions would have the same value if $a = 2$ because $2 + a = 2 + 2 = 4$ and $2a = 2(2) = 4$.

54. The cost with tax is $1.05 times the cost of the item; $1.05n$.

Cost of item (dollars)	1.00	2.00	3.00	4.00	. . .	n
Cost with tax (dollars)	1.05	2.10	3.15	4.20	. . .	$1.05n$

55. The cost with coupon is $.50 less than the cost of the item; $n - 0.50$.

Cost of item (dollars)	1.00	1.50	2.00	2.50	. . .	n
Cost with coupon (dollars)	0.50	1.00	1.50	2.00	. . .	$n - 0.50$

56. Let $p =$ the pairs of shoes produced each hour.

Let $h =$ the hours each day.

Expression: $4ph$

When $p = 200$ and $h = 24$;

$4ph = 4(200)(24) = 800(24) = 19,200$

So, 19,200 single aglets are used each day.

1.1 Mixed Review (p. 9)

57. $\begin{array}{r} 3.2 \\ +\ 4.7 \\ \hline 7.9 \end{array}$ **58.** $\begin{array}{r} 5.1 \\ +\ 6.8 \\ \hline 11.9 \end{array}$ **59.** $\begin{array}{r} 7.3 \\ -\ 2.1 \\ \hline 5.2 \end{array}$ **60.** $\begin{array}{r} 9.9 \\ -\ 5.4 \\ \hline 4.5 \end{array}$

61. $\begin{array}{r} 13.2 \\ \times\ \ 8 \\ \hline 105.6 \end{array}$

62. $\begin{array}{r} 2.5 \\ 5\overline{)12.5} \\ 10 \\ \hline 2\,5 \\ 2\,5 \\ \hline 0 \end{array}$

Chapter 1 *continued*

63.

$$3.2\overline{)24.3\,2}$$

$$32\overline{)243.2}$$
$$\underline{224}$$
$$19\ 2$$
$$\underline{19\ 2}$$
$$0$$

with quotient 7.6 (left) and 7.6 (right)

64.
$$\begin{array}{r} 6.5 \\ \times\ \ 4.3 \\ \hline 1\ 95 \\ 26\ 0\ \ \\ \hline 27.95 \end{array}$$

65. 7.8, 7.98, 8.79, 8.9, 9.78, 9.87

1.1 Standardized Test Practice (p. 9)

66. B; Because there are 60 seconds in one minute, the number of minutes is equal to $\dfrac{s}{60}$.

67. G; When $x = 12.8$ and $y = 4$; $x - y = 12.8 - 4 = 8.8$

Lesson 1.2

1.2 Checkpoint (pp. 10–11)

1. $10 \cdot 10 \cdot 10 = 10^3$
2. $(4.3)(4.3) = (4.3)^2$

3. $x \cdot x \cdot x \cdot x = x^4$

4. $0^2 = 0 \cdot 0 = 0$
$0^3 = 0 \cdot 0 \cdot 0 = 0$
$0^4 = 0 \cdot 0 \cdot 0 \cdot 0 = 0$
Zero raised to any nonzero while number exponent is zero.
Let $n =$ any nonzero whole number.
Rule: $0^n = 0$

5. When $m = 3$; $m^2 = 3^2 = 3 \cdot 3 = 9$

6. When $m = 3$; $m^3 = 3^3 = 3 \cdot 3 \cdot 3 = 27$

7. When $m = 4$; $m^4 = 3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$

8. When $m = 5$; $m^5 = 3^5 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 243$

9. When $s = 9$; $A = s^2 = 9^2 = 81$
The area is 81 square meters.

10. When $s = 11$; $A = s^2 = 11^2 = 121$
The area is 121 square inches.

11. When $s = 1.5$; $A = s^2 = (1.5)^2 = 2.25$
The area is 2.25 square centimeters.

1.2 Guided Practice (p. 12)

1. In the expression 13^5, the base is 13 and the exponent is 5.

2. The base and the exponent are switched in the expressions 3^4 and 4^3. 3^4 means $3 \cdot 3 \cdot 3 \cdot 3$ and 4^3 means $4 \cdot 4 \cdot 4$.
$3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$
$4^3 = 4 \cdot 4 \cdot 4 = 64$

3. 12 squared; $12^2 = 12 \cdot 12 = 144$

4. 0.3 cubed; $(0.3)^3 = (0.3)(0.3)(0.3) = 0.027$

5. 1.2 cubed; $(1.2)^3 = (1.2)(1.2)(1.2) = 1.728$

6. 5 to the fourth power; $5^4 = 5 \cdot 5 \cdot 5 \cdot 5 = 625$

7. When $k = 6$; $k^2 = 6^2 = 6 \cdot 6 = 36$

8. When $k = 6$; $k^3 = 6^3 = 6 \cdot 6 \cdot 6 = 216$

9. When $k = 6$; $k^4 = 6^4 = 6 \cdot 6 \cdot 6 \cdot 6 = 1296$

10. When $k = 6$; $k^5 = 6^5 = 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 = 7776$

11. When $s = 14$; $V = s^3 = 14^3 = 2744$
The volume is 2744 cubic inches.

12. 2^3 means the base 2 used as a factor 3 times. So, $2^3 = 2 \cdot 2 \cdot 2$.

1.2 Practice and Problem Solving (pp. 12–13)

13. $32 \cdot 32 = 32^2$
14. $11 \cdot 11 \cdot 11 = 11^3$

15. $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 = 6^5$
16. $2 \cdot 2 \cdot 2 \cdot 2 = 2^4$

17. $(5.6)(5.6)(5.6) = (5.6)^3$
18. $(1.7)(1.7) = (1.7)^2$

19. $z \cdot z \cdot z = z^3$
20. $n \cdot n \cdot n \cdot n = n^4$

21. 8 cubed; $8^3 = 8 \cdot 8 \cdot 8 = 512$

22. 2 to the fifth power; $2^5 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$

23. 10 to the sixth power;
$10^6 = 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 1{,}000{,}000$

24. 12 cubed; $12^3 = 12 \cdot 12 \cdot 12 = 1728$

25. 9 cubed; $9^3 = 9 \cdot 9 \cdot 9 = 729$

26. 4 to the fourth power; $4^4 = 4 \cdot 4 \cdot 4 \cdot 4 = 256$

27. 0.2 squared; $(0.2)^2 = (0.2)(0.2) = 0.04$

28. 0.6 to the fourth power;
$(0.6)^4 = (0.6)(0.6)(0.6)(0.6) = 0.1296$

29. a.

Stage	E-mails sent, as a power	Value of power
1	4^1	4
2	4^2	16
3	4^3	64
4	4^4	256

b. Stage 9: $4^9 = 262{,}144$
So, 262,144 e-mails were sent at stage 9.

c. At stage 10, more than 1,000,000 e-mails will be sent.
Calculator: $4^{10} = 1{,}048{,}576$

30. When $n = 7$; $n^2 = 7^2 = 7 \cdot 7 = 49$
When $n = 0.4$; $n^2 = (0.4)^2 = (0.4)(0.4) = 0.16$

31. When $n = 7$; $n^3 = 7^3 = 7 \cdot 7 \cdot 7 = 343$
When $n = 0.4$; $n^3 = (0.4)^3 = (0.4)(0.4)(0.4) = 0.064$

32. When $n = 7$; $n^4 = 7^4 = 7 \cdot 7 \cdot 7 \cdot 7 = 2401$
When $n = 0.4$;
$n^4 = (0.4)^4 = (0.4)(0.4)(0.4)(0.4) = 0.0256$

33. When $n = 7$; $n^5 = 7^5 = 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 = 16{,}807$
When $n = 0.4$;
$n^5 = (0.4)^5 = (0.4)(0.4)(0.4)(0.4)(0.4) = 0.01024$

34. *Sample answer:* The formula for the area of a square is $A = s^2$ and area is measured in square units. The formula for the volume of a cube is $V = s^3$ and volume is measured in cubic units.

35. *Sample answer:* 1 raised to any power is 1 because 1 multiplied by itself any number of times will always equal 1.

36. a. When $s = 15$; $V = s^3 = 15^3 = 3375$

So, the volume of the water is 3375 cubic inches.

b. 3375 cubic inches $\cdot \dfrac{0.036 \text{ pound}}{\text{cubic inch}} \approx 121.5$ pounds

The approximate weight of the water is 121.5 pounds.

37. a.

n	Sum of first n odd numbers
1	1
2	$1 + 3 = 4$
3	$1 + 3 + 5 = 9$
4	$1 + 3 + 5 + 7 = 16$
5	$1 + 3 + 5 + 7 + 9 = 25$

The sum of the first n odd numbers equals n squared.

b. n^2

c. When $n = 100$, $n^2 = 100^2 = 10,000$

38. When $x^2 = 64$; $x = 8$ because $8^2 = 64$

When $y^3 = 64$; $y = 4$ because $4^3 = 64$

When $z^6 = 64$; $z = 2$ because $2^6 = 64$

1.2 Mixed Review (p. 13)

39.
$$\begin{array}{r} 2.5 \\ \times\ \ 7.1 \\ \hline 25 \\ 17\,5\ \ \\ \hline 17.75 \end{array}$$

40.
$$\begin{array}{r} 2.3 \\ \times\ \ 8.4 \\ \hline 92 \\ 18\,4\ \ \\ \hline 19.32 \end{array}$$

41. $2.4\,\overline{)1.2}$

$$\begin{array}{r} 0.5 \\ 24\overline{)12.0} \\ 0\ \ \\ \hline 12\,0 \\ 12\,0 \\ \hline 0 \end{array}$$

$1.2 \div 2.4 = 0.5$

42. $1.2\,5\,\overline{)5.2}$

$$\begin{array}{r} 4.16 \\ 125\overline{)520.00} \\ 500\ \ \ \\ \hline 20\,0 \\ 12\,5 \\ \hline 7\,50 \\ 7\,50 \\ \hline 0 \end{array}$$

$5.2 \div 1.25 = 4.16$

43.
$$\begin{array}{r} 16 \\ 28 \\ 32 \\ +\ 39 \\ \hline 115 \end{array}$$

They won 115 gold medals.

44. When $x = 15$; $x + 4 = 15 + 4 = 19$

45. When $x = 15$; $200 - x = 200 - 15 = 185$

46. When $x = 15$; $x - 11 = 15 - 11 = 4$

47. When $x = 15$; $3x = 3(15) = 45$

1.2 Standardized Test Practice (p. 13)

48. B; $3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$

49. The number in the bottom row is equal to the number in the top row cubed.

1	2	3	4	. . .	n
1	8	27	64	. . .	n^3

Student Reference: A Problem Solving Plan

Checkpoint (p. 15)

1. (1) *Read and Understand*

Know: There are 3 swim sessions each lasting 35 minutes. There are 10 minutes between each session and the final session ends at 11:05 A.M.

Find Out: When does the first session begin?

(2) *Make a Plan*

Work backward by starting with the time the final session ends and subtract the correct amount of time.

(3) *Solve the Problem*

If session 3 ends at 11:05 A.M. and lasts 35 minutes, then it begins at 10:30 A.M.

Because there is a 10 minute break between sessions, session 2 ends at 10:20 A.M. Session 2 is also 35 minutes long, so it begins at 9:45 A.M.

Because there is a 10 minute break between sessions, session 1 ends at 9:35 A.M. Session 1 is 35 minutes long, so it begins at 9:00 A.M.

Answer: The first session begins at 9:00 A.M.

(4) *Look Back*

There is a difference of 2 hours 5 minutes between the beginning and end of the lessons. Adding up the amount of time for 3 lessons and 2 breaks will also give the same amount of time. So, the answer is reasonable.

2. (1) *Read and Understand*

Know: The center section of the theater has 10 rows. Row 10 has 41 seats, row 9 has 38 seats, and row 8 has 35 seats.

Find Out: How many seats are in row 1?

(2) *Make a Plan*

Find a pattern.

Each row has 3 less seats than the previous row because row 10 has 41 seats, row 9 has $41 - 3 = 38$ seats, and row 8 has $38 - 3 = 35$ seats.

—CONTINUED—

Chapter 1 *continued*

2. —CONTINUED—

(3) *Solve the Problem*

Subtract 3 seats from each consecutive row to find the seats in row 1.

So, row 7 has $35 - 3 = 32$ seats.
Row 6 has $32 - 3 = 29$ seats.
Row 5 has $29 - 3 = 26$ seats.
Row 4 has $26 - 3 = 23$ seats.
Row 3 has $23 - 3 = 20$ seats.
Row 2 has $20 - 3 = 17$ seats.
Row 1 has $17 - 3 = 14$ seats.

There are 14 seats in row 1.

(4) *Look Back*

It makes sense because there is a difference of $41 - 14 = 27$ seats and $10 - 1 = 9$ rows. Because each row decreases by 3 seats and $27 \div 9 = 3$, the answer is reasonable.

3. (1) *Read and Understand*

Know: You rented 4 movies: action, science fiction, comedy, and animated.

Find Out: In how many different orders can you watch the movies?

(2) *Make a Plan*

List all of the orders in which you can watch the movies and count them.

(3) *Solve the Problem*

Let A = action,
  S = science fiction,
  C = comedy,
  N = animated.

List all possible orders: ASCN, ASNC, ACSN, ACNS, ANSC, ANCS, SACN, SANC, SCAN, SCNA, SNAC, SNCA, CASN, CANS, CSAN, CSNA, CNAS, CNSA, NASC, NACS, NCAS, NCSA, NSAC, NSCA

You can watch the movies in 24 different orders.

(4) *Look Back*

Because all different orders were listed, the answer is reasonable.

Lesson 1.3

1.3 Checkpoint (p. 17)

1. $28 - 63 \div 7 = 28 - 9 = 19$

2. $52 + 12.5 \cdot 4 = 52 + 50 = 102$

3. $9 \cdot 6 + 27 \div 3 = 54 + 9 = 63$

4. $10(1.5 + 0.6) = 10(2.1) = 21$

5. $\dfrac{70 - 9.2}{3 + 5} = (70 - 9.2) \div (3 + 5) = 60.8 \div 8 = 7.6$

6. $72 \div [(11 - 7) \cdot 2] = 72 \div [4 \cdot 2] = 72 \div 8 = 9$

7. When $x = 4$; $1.2(x + 3) = 1.2(4 + 3) = 1.2(7) = 8.4$

8. When $x = 4$; $1.2x + 3 = 1.2(4) + 3 = 4.8 + 3 = 7.8$

9. When $x = 4$ and $y = 2$;
$3x - 2y = 3(4) - 2(2) = 12 - 4 = 8$

10. When $x = 4$ and $y = 2$;
$$0.5[y - (x - 2)] = 0.5[2 - (4 - 2)]$$
$$= 0.5[2 - 2]$$
$$= 0.5 \cdot 0$$
$$= 0$$

11. When $x = 4$ and $y = 2$; $x^2 - y = (4)^2 - 2 = 16 - 2 = 14$

12. When $x = 4$ and $y = 2$; $2(x - y)^2 = 2(4 - 2)^2$
$$= 2(2)^2$$
$$= 2 \cdot 4$$
$$= 8$$

1.3 Guided Practice (p. 18)

1. *Sample answer:* Parentheses, brackets, and fraction bar

2. $12(x - 3)^2$

$= 12(5 - 3)^2$	Substitute 5 for x.
$= 12(2)^2$	Subtract within parentheses.
$= 12(4)$	Evaluate power.
$= 48$	Multiply.

3. $15 - 3 \cdot 4 = 15 - 12 = 3$

4. $48 \div 6 + 2 = 8 + 2 = 10$

5. $3 \cdot 8 + 5 \cdot 4 = 24 + 20 = 44$

6. $\dfrac{18 + 12}{7 - 2} = (18 + 12) \div (7 - 2) = 30 \div 5 = 6$

7. $17 - (3^2 - 2) = 17 - (9 - 2) = 17 - 7 = 10$

8. $4[15 - (2 + 5)] = 4[15 - 7] = 4 \cdot 8 = 32$

9. Expression:
$$2(2697) + 3(29) + 4(2) + 5(1) = 5394 + 87 + 8 + 5$$
$$= 5494$$

There were 5494 people registered at the convention.

1.3 Practice and Problem Solving (pp. 19–20)

10. $47.7 - 12 \cdot 3 = 47.7 - 36 = 11.7$

11. $11 \cdot 7 - 9 \cdot 5 = 77 - 45 = 32$

12. $14 \div 7 + 36 \div 4 = 2 + 9 = 11$

13. $5.8(3) + 3(1.1) = 17.4 + 3.3 = 20.7$

14. $\dfrac{36 - 12}{2 + 6} = (36 - 12) \div (2 + 6) = 24 \div 8 = 3$

15. $\dfrac{9.8 + 2.2}{7 - 5} = (9.8 + 2.2) \div (7 - 5) = 12 \div 2 = 6$

16. $5(21 - 3^2) = 5(21 - 9) = 5(12) = 60$

17. $7[2.5 + 3(12 - 7)] = 7[2.5 + 3(5)]$
$$= 7[2.5 + 15]$$
$$= 7 \cdot 17.5$$
$$= 122.5$$

18. $84 \div [(18 - 16) \cdot 3] = 84 \div [2 \cdot 3] = 84 \div 6 = 14$

19. When $x = 3$ and $y = 4$;
$0.25y + x = 0.25(4) + 3 = 1 + 3 = 4$

Chapter 1 *continued*

20. When $x = 3$ and $y = 4$;

$0.25(y + x) = 0.25(4 + 3) = 0.25(7) = 1.75$

21. When $x = 3$ and $z = 5$; $4(z - x) = 4(5 - 3) = 4 \cdot 2 = 8$

22. When $x = 3$ and $y = 4$;

$\dfrac{6.5y}{x - 1} = \dfrac{6.5(4)}{3 - 1} = [6.5(4)] \div (3 - 1) = 26 \div 2 = 13$

23. When $x = 3$ and $y = 4$;

$x + \dfrac{24.4}{y} = 3 + \dfrac{24.4}{4} = 3 + (24.4 \div 4) = 3 + 6.1 = 9.1$

24. When $x = 3$ and $z = 5$;

$7z - x^2 = 7(5) - 3^2 = 7(5) - 9 = 35 - 9 = 26$

25. When $x = 3$, $y = 4$, and $z = 5$;

$$\begin{aligned}
x + 2[z - (y - 1)] &= 3 + 2[5 - (4 - 1)] \\
&= 3 + 2[5 - 3] \\
&= 3 + 2 \cdot 2 \\
&= 3 + 4 \\
&= 7
\end{aligned}$$

26. When $x = 3$ and $y = 4$;

$$\begin{aligned}
(x + y)^2 - 3.6 &= (3 + 4)^2 - 3.6 \\
&= 7^2 - 3.6 \\
&= 49 - 3.6 \\
&= 45.4
\end{aligned}$$

27. When $y = 4$ and $z = 5$;

$y + (z - 1)^2 = 4 + (5 - 1)^2 = 4 + 4^2 = 4 + 16 = 20$

28. a.
$$\begin{array}{c}
\text{Height} \\
y \text{ years} \\
\text{from now}
\end{array} = \begin{array}{c}
\text{Height} \\
\text{now}
\end{array} + \begin{array}{c}
\text{Growth} \\
\text{per year}
\end{array} \cdot \begin{array}{c}
\text{Number} \\
\text{of years} \\
\text{from now}
\end{array}$$

$= 1.5 + 0.03y$

b. When $y = 50$;

$1.5 + 0.03y = 1.5 + 0.03(50) = 1.5 + 1.5 = 3$

The boojum will be 3 meters tall in 50 years.

29.
$$\text{Length} = \begin{array}{c}\text{Number} \\ \text{of tables}\end{array} \cdot \begin{array}{c}\text{Length} \\ \text{of each} \\ \text{table}\end{array} + \begin{array}{c}\text{Number} \\ \text{of spaces}\end{array} \cdot \begin{array}{c}\text{Length} \\ \text{of each} \\ \text{space}\end{array}$$

$\text{Length} = 5(72) + 4(48) = 360 + 192 = 552$

The total length of the space must be 552 inches.

30.
$$\begin{array}{c}\text{Total} \\ \text{points}\end{array} = \begin{array}{c}\text{Points} \\ \text{per free} \\ \text{throw}\end{array} \cdot \begin{array}{c}\text{Number} \\ \text{of free} \\ \text{throws}\end{array} + \begin{array}{c}\text{Points per} \\ \text{two-point} \\ \text{field goal}\end{array} \cdot \begin{array}{c}\text{Number of} \\ \text{two-point} \\ \text{field goals}\end{array}$$

$$+ \begin{array}{c}\text{Points per} \\ \text{three-point} \\ \text{field goal}\end{array} \cdot \begin{array}{c}\text{Number of} \\ \text{three-point} \\ \text{field goals}\end{array}$$

$\text{Total Points} = 1(4) + 2(7) + 3(2) = 4 + 14 + 6 = 24$

The player scored a total of 24 points.

31.
$$\text{Cost} = \begin{array}{c}\text{Number of} \\ \text{videotapes}\end{array} \cdot \begin{array}{c}\text{Cost per} \\ \text{videotape}\end{array} + \begin{array}{c}\text{Number} \\ \text{of DVDs}\end{array} \cdot \begin{array}{c}\text{Cost per} \\ \text{DVD}\end{array}$$

$\text{Cost} = 4(14.99) + 3(19.99) = 59.96 + 59.97 = 119.93$

The total cost is $119.93

32. When $x = 4$ and $y = 3$;

$5x^2 + 2y = 5(4)^2 + 2(3) = 5(16) + 2(3) = 80 + 6 = 86$

33. When $x = 4$ and $y = 3$;

$$\begin{aligned}
7(x^2 - 5y) &= 7[4^2 - 5(3)] \\
&= 7[16 - 5(3)] \\
&= 7[16 - 15] \\
&= 7 \cdot 1 \\
&= 7
\end{aligned}$$

34. When $x = 4$ and $y = 3$;

$$\begin{aligned}
\dfrac{x^2 + 9}{y + 2} &= \dfrac{4^2 + 9}{3 + 2} \\
&= (4^2 + 9) \div (3 + 2) \\
&= (16 + 9) \div (3 + 2) \\
&= 25 \div 5 \\
&= 5
\end{aligned}$$

35. When $x = 4$ and $y = 3$;

$$\begin{aligned}
\dfrac{6.5y + 2}{x + 2} &= \dfrac{6.5(3) + 2}{4 + 2} \\
&= [6.5(3) + 2] \div (4 + 2) \\
&= (19.5 + 2) \div (4 + 2) \\
&= 21.5 \div 6 \\
&= 3.58\overline{3}
\end{aligned}$$

36. a. Let $m =$ the number of extra minutes.

$$\text{Your share} = \dfrac{\begin{array}{c}\text{Monthly} \\ \text{fee}\end{array} + \begin{array}{c}\text{Cost per} \\ \text{extra minute}\end{array} \cdot \begin{array}{c}\text{Number of} \\ \text{extra minutes}\end{array}}{\text{Number of people}}$$

$$= \dfrac{39 + 0.30m}{2}$$

b. When $m = 125$;

$$\begin{aligned}
\dfrac{39 + 0.30m}{2} &= \dfrac{39 + 0.30(125)}{2} \\
&= [39 + 0.30(125)] \div 2 \\
&= [39 + 37.5] \div 2 \\
&= 76.5 \div 2 \\
&= 38.25
\end{aligned}$$

Your share of the bill is $38.25.

37. a.
$$\begin{aligned}
\text{Total pixels} &= \begin{array}{c}\text{Number of} \\ \text{pixels in row}\end{array} \cdot \begin{array}{c}\text{Number of} \\ \text{pixels in column}\end{array} \\
&= 1280 \cdot 1024 \\
&= 1,310,720
\end{aligned}$$

There are 1,310,720 pixels.

b.
$$\begin{aligned}
\begin{array}{c}\text{Number of} \\ \text{megapixels}\end{array} &= \dfrac{\text{Number of pixels}}{1,000,000} = \dfrac{1,310,720}{1,000,000} = 1.3
\end{aligned}$$

There are about 1.3 megapixels in the image.

c. No; when $m = 1.3$, $\ell = 10$, and $w = 8$;

$$\dfrac{m}{lw} = \dfrac{1.3}{10 \cdot 8} = 1.3 \div (10 \cdot 8) = 1.3 \div 80 = 0.01625$$

Because $0.01625 < 0.017$, the print will not be clear.

Chapter 1 *continued*

38. Cost per person =

$$\frac{\text{Cost per} \atop \text{member} \cdot \text{Number of} \atop \text{members} + \text{Cost per} \atop \text{nonmember} \cdot \text{Number of} \atop \text{nonmembers}}{\text{Number of people in group}}$$

$$= \frac{6(20) + 10(5)}{25}$$

$$= [6(20) + 10(5)] \div 25$$

$$= [120 + 50] \div 25$$

$$= 170 \div 25$$

$$= 6.8$$

Each person paid $6.80.

39. a. Yes, the patterns are the same; turn either pattern a quarter turn to get the other pattern.

b. When $r = 2$;

$$\frac{r^4 + 2r^3 + 3r^2 + 2r}{8}$$

$$= \frac{(2)^4 + 2(2)^3 + 3(2)^2 + 2(2)}{8}$$

$$= \left[(2)^4 + 2(2)^3 + 3(2)^2 + 2(2)\right] \div 8$$

$$= [16 + 2(8) + 3(4) + 2(2)] \div 8$$

$$= [16 + 16 + 12 + 4] \div 8$$

$$= 48 \div 8$$

$$= 6$$

There are 6 possible patterns with two colors.

c.

1.3 Mixed Review (p. 20)

40. $1.99 > 1.98$ **41.** $0.56 < 0.65$ **42.** $0.32 > 0.23$

43. Expression: $2^8 = 256$

An 8-bit monitor can display 256 colors.

1.3 Standardized Test Practice (p. 20)

44. a.

$$\text{Calories} = \text{Grams of} \atop \text{carbohydrate} \cdot \text{Calories per} \atop \text{gram of} \atop \text{carbohydrate}$$

$$+ \text{Grams} \atop \text{of} \atop \text{protein} \cdot \text{Calories} \atop \text{per} \atop \text{gram of} \atop \text{protein} + \text{Grams} \atop \text{of fat} \cdot \text{Calories} \atop \text{per} \atop \text{gram} \atop \text{of fat}$$

$$= 11(4) + 8(4) + 8(9) = 44 + 32 + 72 = 148$$

There are 148 calories in a cup of whole milk.

b. There are 8 g of protein in one cup of whole milk and 20 g of protein in $\frac{20}{8} = 2.5$ cups of whole milk. To find the number of calories, multiply the calories in one cup of milk by the number of cups.

$148 \cdot 2.5 = 370$

The milk would provide 370 calories.

1.3 Technology Activity (p. 21)

1. $50 + 21 \div 3 = 57$ **2.** $15 \times (24 + 8) = 480$

3. $(8 + 10) \div 2 = 9$ **4.** $(5 + 2)^2 - 3^2 = 40$

5. $(24 - 16) \div 2 = 4$ **6.** $(12 - 7)^2 - 1 = 24$

7. $38 \div (2 + 17) = 2$ **8.** $(8 + 3)^2 + 2 = 123$

9. $100 + 87 \div 328 + 296 = 396.2652439$

Instead of adding the hits and at bats first, the calculator will first do the division $87 \div 328$, then do the additions, because division precedes adding in the order of operations.

10. $(109 + 82) \div (349 + 295) \approx 0.297$

Derek Jeter' batting average for the entire 2002 season was .297.

Lesson 1.4

1.4 Checkpoint (pp. 22–24)

1.
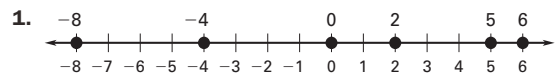
The integers from least to greatest are: $-8, -4, 0, 2, 5, 6$.

2. The distance between 3 and 0 is 3. So, $|3| = 3$.

The opposite of 3 is -3.

3. The distance between -1 and 0 is 1. So, $|-1| = 1$.

The opposite of -1 is 1.

4. The distance between 10 and 0 is 10. So, $|10| = 10$.

The opposite of 10 is -10.

5. The distance between -11 and 0 is 11. So, $|-11| = 11$.

The opposite of -11 is 11.

6. When $x = -4$; $-x = -(-4) = 4$

7. When $x = -4$; $12 - |x| = 12 - |-4| = 12 - 4 = 8$

8. When $x = -4$; $|x| + 9 = |-4| + 9 = 4 + 9 = 13$

9. When $x = -4$; $|x| - 1 = |-4| - 1 = 4 - 1 = 3$

1.4 Guided Practice (p. 24)

1. The number 22.5 is not an integer because it contains a decimal part.

2. The absolute value of a number is never negative because it measures distance from zero on a number line and distance is never a negative value.

3. The integers in order from least to greatest are: $-9, -5, -3, 0, 6,$ and 12.

4. The absolute value of 1 is 1.

5. The absolute value of -9 is 9.

6. The absolute value of 15 is 15.

7. The absolute value of -12 is 12.

8. The opposite of 14 is -14.

9. The opposite of -33 is 33.

10. The opposite of -24 is 24.

11. The opposite of 81 is -81.

12. When $x = -3$; $|x| + 8 = |-3| + 8 = 3 + 8 = 11$

Chapter 1 *continued*

13. When $x = -3$; $|x| + |-1| = |-3| + |-1| = 3 + 1 = 4$

14. When $x = -3$; $20 - |x| = 20 - |-3| = 20 - 3 = 17$

15. When $x = -3$;

$|50| - |x| = |50| - |-3| = 50 - 3 = 47$

16. The distance between -17 and 0 is 17. So, $|-17| = 17$.

17. Use absolute value to find distance.

Kilauea: $|1222| = 1222$

Loihi: $|-980| = 980$

Because $1222 > 980$, the top of Kilauea is farther from sea level.

1.4 Practice and Problem Solving (pp. 25–26)

18. $-8 < 3$

19. $-9 > -12$

20. $0 > -4$

21. $-15 < -7$

22.

The integers in order from least to greatest are: -12, -6, -1, 0, and 4.

23.
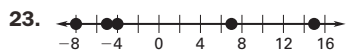
The integers in order from least to greatest are: -8, -5, -4, 7, and 15.

24.
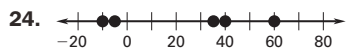
The integers in order from least to greatest are: -10, -5, 35, 40, and 60.

25.
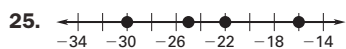
The integers in order from least to greatest are: -30, -25, -22, and -16.

26. The absolute value of -22 is 22.

27. The absolute value of 7 is 7.

28. The absolute value of 21 is 21.

29. The absolute value of -40 is 40.

30. The absolute value of 38 is 38.

31. The absolute value of -42 is 42.

32. The absolute value of -73 is 73.

33. The absolute value of 105 is 105.

34. The opposite of 6 is -6.

35. The opposite of 9 is -9.

36. The opposite of -2 is 2.

37. The opposite of -11 is 11.

38. The opposite of -31 is 31.

39. The opposite of -67 is 67.

40. The opposite of 81 is -81.

41. The opposite of 100 is -100.

42. $-389°F > -392°F$

So, the Hubble data indicated a temperature greater than the Voyager data.

43. When $x = -8$; $-x = -(-8) = 8$

44. When $x = -8$; $|x| - 1 = |-8| - 1 = 8 - 1 = 7$

45. When $x = -8$; $32 - |x| = 32 - |-8| = 32 - 8 = 24$

46. When $x = -8$; $-x - 2 = -(-8) - 2 = 8 - 2 = 6$

47. When $x = -8$; $5|x| = 5|-8| = 5 \cdot 8 = 40$

48. When $x = -8$; $-x - 3 = -(-8) - 3 = 8 - 3 = 5$

49. When $x = -8$; $5 + (-x) = 5 + [-(-8)] = 5 + 8 = 13$

50. When $x = -8$; $|x| + 10 = |-8| + 10 = 8 + 10 = 18$

51. a. 3 meters below: -3

8 meters below: -8

12 meters below: -12

37 meters below: -37

b.
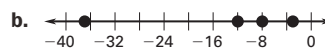
c. Unnamed city, Bay of Bengal is the site whose deepest point is farthest from sea level.

d. Use absolute value to find distance.

Polónia: $|1| = 1$

Helike: $|-3| = 3$

Because $1 < 3$, Polónia is closer to sea level.

52. Absolute value is the distance of a number from 0 on a number line. The distance between 0 and 0 is 0. So, $|0| = 0$.

53. a. Because $-17°C > -19°C$, the temperature increased from Sunday to Monday.

b. Because $-21°C < -18°C$, the temperature decreased from Friday to Saturday.

c. The highest temperature was $-9°C$ on Wednesday. The lowest temperature was $-21°C$ on Saturday.

d. The daily high temperature consistently increased from Sunday through Wednesday and consistently decreased from Wednesday through Saturday.

54. When $a = -2$ and $b = -13$;

$|a| + |b| = |-2| + |-13| = 2 + 13 = 15$

55. When $a = -2$ and $b = -13$;

$-a + (-b) = -(-2) + [-(-13)] = 2 + 13 = 15$

56. When $a = -2$ and $b = -13$;

$-a + |b| = -(-2) + |-13| = 2 + 13 = 15$

57. When $a = -2$ and $b = -13$;

$|b| - |a| = |-13| - |-2| = 13 - 2 = 11$

58. When $b = -13$; $-|b| = -|-13| = -13$

59. When $a = -2$; $|-a| = |-(-2)| = |2| = 2$

60. *Sample answer:* If a number is positive or 0, its distance from 0 on a number line is just the number. For instance, 5 is 5 units from 0. If a number is negative, its distance from 0, which must be positive, is the opposite of the number. For instance, -5 is 5 units from 0.

61. When $x = -7$; $|-x| = |-(-7)| = |7| = 7$

Chapter 1 *continued*

62. When $x = -7$; $|x| + |-x| = |-7| + |-(-7)|$
$$= |-7| + |7|$$
$$= 7 + 7$$
$$= 14$$

63. When $x = -7$; $|x| - |-x| = |-7| - |-(-7)|$
$$= |-7| - |7|$$
$$= 7 - 7$$
$$= 0$$

64. When $x = -7$; $-|-x| = -|-(-7)| = -|7| = -7$

65. Yes; yes; $-x < x$ when x is a positive number, and $-x > x$ when x is a negative number.

1.4 Mixed Review (p. 26)

66.
$$\begin{array}{r} 278 \\ 119 \\ + 602 \\ \hline \end{array} \longrightarrow \begin{array}{r} 300 \\ 100 \\ + 600 \\ \hline 1000 \end{array}$$

67.
$$\begin{array}{r} 588 \\ - 131 \\ \hline \end{array} \longrightarrow \begin{array}{r} 600 \\ - 100 \\ \hline 500 \end{array}$$

68.
$$\begin{array}{r} 112 \\ 193 \\ + 583 \\ \hline \end{array} \longrightarrow \begin{array}{r} 100 \\ 200 \\ + 600 \\ \hline 900 \end{array}$$

69.
$$\begin{array}{r} 700 \\ \times \quad 60 \\ \hline 42,000 \end{array} \longleftarrow \begin{array}{r} 708 \\ \times \quad 62 \\ \hline \end{array} \longrightarrow \begin{array}{r} 800 \\ \times \quad 70 \\ \hline 56,000 \end{array}$$

The product is between 42,000 and 56,000.

70.
$$\begin{array}{r} 100 \\ 300\overline{)30,000} \end{array} \qquad \begin{array}{r} 200 \\ 200\overline{)40,000} \end{array}$$

The quotient $31,217 \div 218$ is between 100 and 200.

71.
$$\begin{array}{r} 300 \\ \times \quad 40 \\ \hline 12,000 \end{array} \longleftarrow \begin{array}{r} 371 \\ \times \quad 47 \\ \hline 47 \end{array} \longrightarrow \begin{array}{r} 400 \\ \times \quad 50 \\ \hline 20,000 \end{array}$$

The product is between 12,000 and 20,000.

72. When $x = 2$ and $y = 8$;
$$6(x + y) = 6(2 + 8) = 6(10) = 60$$

73. When $x = 2$ and $y = 8$;
$$xy + 1 = (2)(8) + 1 = 16 + 1 = 17$$

74. When $x = 2$ and $y = 8$;
$$\frac{x - 22}{y} = \frac{2 - 22}{8} = (2 - 22) \div 8 = -20 \div 8 = -2.5$$

1.4 Standardized Test Practice (p. 26)

75. C; The integers in order from least to greatest are: -35, -17, 2, 16, and 21.

76. I; When $x = 5$;
$$|x| + |-5| = |5| + |-5| = 5 + 5 = 10$$

Mid-Chapter Quiz (p. 27)

1. When $x = 2$; $x + 5 = 2 + 5 = 7$

2. When $y = 14$; $y - 2 = 14 - 2 = 12$

3. When $x = 2$ and $y = 14$; $x + y = 2 + 14 = 16$

4. When $x = 2$ and $y = 14$; $\dfrac{y}{x} = \dfrac{14}{2} = 14 \div 2 = 7$

5. Let $p =$ the number of pages in a report.
Expression: $250p$

6. $11 \cdot 11 \cdot 11 \cdot 11 = 11^4$

7. $(2.6)(2.6)(2.6) = (2.6)^3$

8. $s \cdot s \cdot s \cdot s = s^4$

9. $y \cdot y \cdot y \cdot y \cdot y = y^5$

10. $18 - 3 \cdot 2 = 18 - 6 = 12$

11. $27 \div 3 + 6 = 9 + 6 = 15$

12. $\dfrac{20 + 12}{11 - 3} = (20 + 12) \div (11 - 3) = 32 \div 8 = 4$

13. $4(20 - 3^2) = 4(20 - 9) = 4(11) = 44$

14. When $x = 20$ and $y = 5$;
$$0.5x + y = 0.5(20) + 5 = 10 + 5 = 15$$

15. When $x = 20$ and $y = 5$;
$$\frac{x + 5}{y} = \frac{20 + 5}{5} = (20 + 5) \div 5 = 25 \div 5 = 5$$

16. When $x = 20$ and $y = 5$;
$$3(x - y) = 3(20 - 5) = 3(15) = 45$$

17. When $x = 20$ and $y = 5$;
$$y^2 - x = 5^2 - 20 = 25 - 20 = 5$$

18.
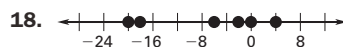
The integers in order from least to greatest are: $-20, -18, -6, -2, 0,$ and 4.

19. $|-24| = 24$
The opposite of -24 is 24.

20. $|8| = 8$
The opposite of 8 is -8.

21. $|31| = 31$
The opposite of 31 is -31.

22. $|-17| = 17$
The opposite of -17 is 17.

23. When $x = -10$;
$$44 - |x| = 44 - |-10| = 44 - 10 = 34$$

Brain Game (p. 27)

top: $(4 + 3 - 5 \times 1) \div 2 = 1$ or $(4 + 3 - 2 \times 1) \div 5 = 1$

lower left: $(3 + 5 \times 1) \div 4 - 2 = 0$ or
$\qquad (5 + 3 \times 1) \div 4 - 2 = 0$

lower right: $(3 \div 1 + 5 - 4) \times 2 = 8$ or
$\qquad (5 \div 1 + 3 - 4) \times 2 = 8$

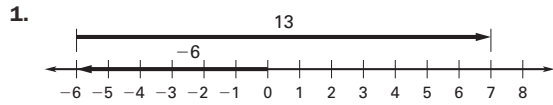### Lesson 1.5

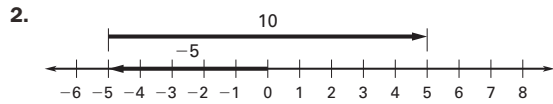### 1.5 Concept Activity (p. 28)

Investigate

1. $-3 + 7 = 4$ **2.** $-1 + (-7) = -8$
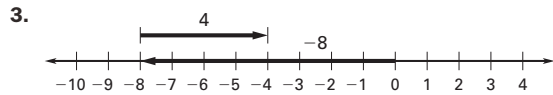
Chapter 1 *continued*

Draw Conclusions

1.

$-6 + 13 = 7$

2.

$-5 + 10 = 5$

3.

$-8 + 4 = -4$

4.

$-1 + 6 = 5$

5.

$10 + (-6) = 4$

6.

$10 + (-12) = -2$

7.

$9 + (-3) = 6$

8.

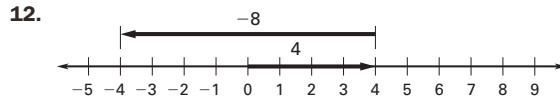$-9 + (-3) = -12$

9.

$10 + (-7) = 3$
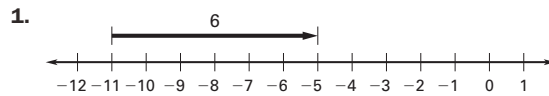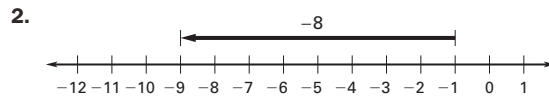
10.

$8 + (-11) = -3$

11.

$-7 + (-8) = -15$

12.
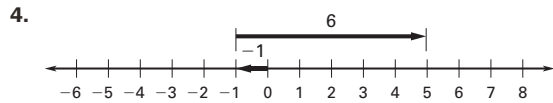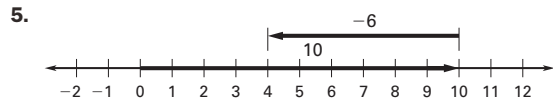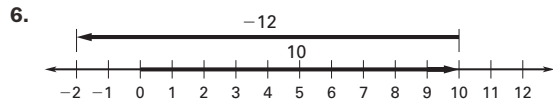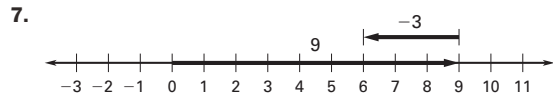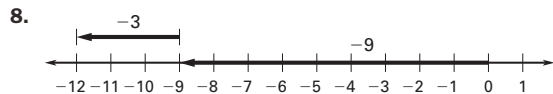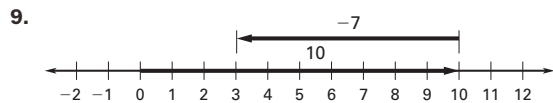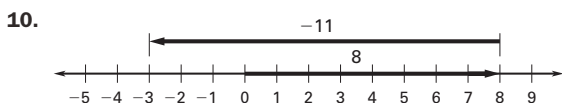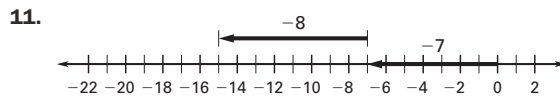
$4 + (-8) = -4$

13. The sum of a positive and a negative integer will be positive if the arrow pointing to the right is longer than the arrow pointing to the left, negative if the arrow pointing to the left is longer than the arrow pointing to the right, and zero if both arrows are the same length.

14. $4 + (-9) = -5$

1.5 Checkpoint (pp. 29–31)

1.

$-11 + 6 = -5$

2.

$-1 + (-8) = -9$

3.
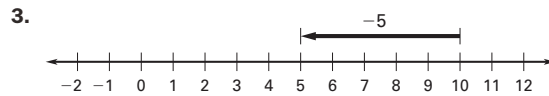
$10 + (-5) = 5$

4. $-41 + 26 = -15$

5. $-19 + (-11) = -30$

6. $52 + (-30) + (-46) = 22 + (-46) = -24$

7. When $a = -18$; $a + (-8) = -18 + (-8) = -26$

8. When $a = -18$; $32 + a = 32 + (-18) = 14$

9. When $a = -18$ and $b = -3$;
$a + b + 30 = -18 + (-3) + 30 = -21 + 30 = 9$

1.5 Guided Practice (p. 31)

1. To add two integers without using a number line, you need to use the *absolute value* of each number.

2. *Sample answer:* The sum of -71 and 43 is negative because when adding integers with different signs, you use the sign of the number with greater absolute value, which is -71.
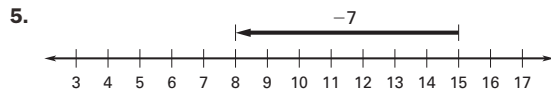
3.

$-9 + 11 = 2$

Chapter 1 *continued*

4.
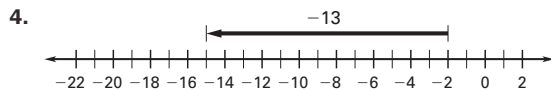
$$-2 + (-13) = -15$$

5.

$$15 + (-7) = 8$$

6. $24 + (-16) = 8$ **7.** $-15 + 3 = -12$

8. $-11 + (-2) = -13$

9. When $x = -9$; $x + 3 = -9 + 3 = -6$

10. When $x = -9$; $-6 + x = -6 + (-9) = -15$

11. When $x = -9$; $x + (-3) = -9 + (-3) = -12$

12. $-18°C + 108°C = 90°C$

The final temperature of the filling was $90°C$.

13. Find the sum of -2 and 5, not -2 and -5.
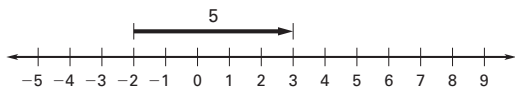
The arrow should start at -2 and move 5 units in the positive direction; $-2 + 5 = 3$.
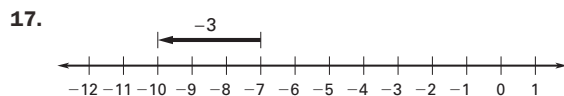
1.5 Practice and Problem Solving (pp. 32–33)
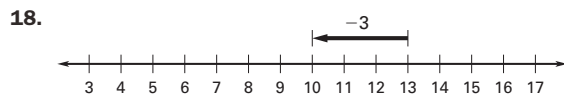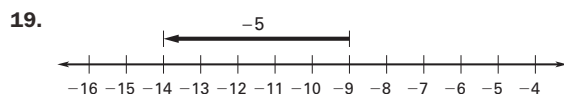
14. A; $-6 + 8 = 2$

15.

$$1 + (-17) = -16$$

16.

$$-4 + 13 = 9$$

17.

$$-7 + (-3) = -10$$

18.

$$13 + (-3) = 10$$

19.

$$-9 + (-5) = -14$$

20.

$$-6 + (-7) = -13$$

21.

$$8 + (-2) = 6$$

22.

$$-3 + 6 = 3$$
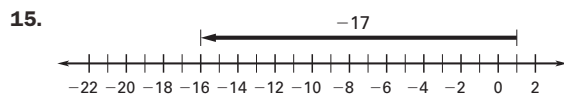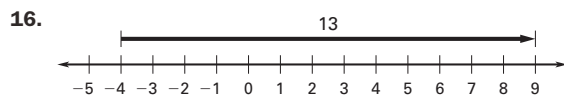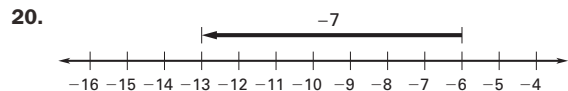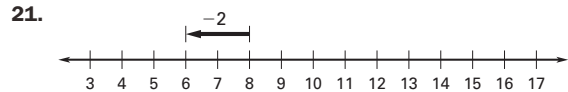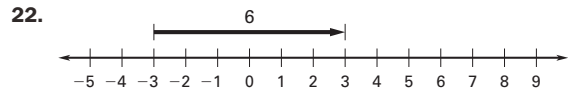
23.
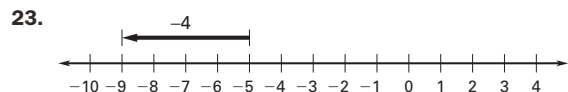
$$-5 + (-4) = -9$$

24. $-54 + 40 = -14$ **25.** $-20 + (-32) = -52$

26. $66 + (-16) = 50$ **27.** $19 + (-45) = -26$

28. $-32 + 17 = -15$ **29.** $-72 + (-30) = -102$

30. $7 + (-9) + 15 = -2 + 15 = 13$

31. $-40 + 33 + 12 = -7 + 12 = 5$

32. $55 + (-28) + (-6) = 27 + (-6) = 21$

33. When $x = -8$; $x + 15 = -8 + 15 = 7$

34. When $y = 4$; $y + (-75) = 4 + (-75) = -71$

35. When $z = -5$; $-19 + z = -19 + (-5) = -24$

36. When $x = -8$ and $y = 4$; $x + y = -8 + 4 = -4$

37. When $x = -8$ and $z = -5$; $x + z = -8 + (-5) = -13$

38. When $y = 4$ and $z = -5$; $y + z = 4 + (-5) = -1$

39.

$$-4 + (-10) = -14$$

Sample answer: The length of the arrow is the absolute value of the second number. The direction of the arrow is right if the second number is positive and left if the second number is negative.

40. a. Game 1: $3 + (-1) = 2$

Game 2: $2 + (-5) = -3$

b. $2 + (-3) = -1$

c. Game 1; the greater the plus-minus rating, the better the rating.

41. $-\$25 + \$100 + (-\$12) = \$75 + (-\$12) = \$63$

Your new balance is $63.

42. $-345 + (-978) = -1323$

Check: $-300 + (-1000) = -1300$

43. $2172 + (-4087) = -1915$

Check: $2200 + (-4100) = -1900$

44. $-1117 + 539 = -578$

Check: $-1100 + 500 = -600$

45. a. $-3623 + (-120) = -3743$

The top of the lake is 3742 meters below the ice surface.

b. $-3743 + (-1200) = -4943$

The bottom of the lake is about 4943 meters below the ice surface.

46. *Sample answer:* 1 and -25; 2 and -26; 3 and -27; I selected any interger for the first integer, then I found a second integer so the sum of the two integers was -24.

47. *Sample answer:* Recall that the absolute value of a number gives the length of the arrow representing the number. Rule for same sign: The sum of two positive numbers is the sum of the lengths of the arrows pointing to the right, or the sum of the absolute values of the numbers. The sum of two negative numbers is the negative number whose absolute value is the sum of the lengths of the arrows pointing to the left, that is, the absolute values of the numbers. Rule for different signs: To add two numbers with different signs, you draw one arrow to the left and the other to the right. The ending point, which indicates the sum, is positive if the longer arrow is the one pointing to the right and is negative if the longer arrow points to the left. The length of the arrow representing the sum is equal to the difference in the lengths of the longer arrow and the shorter arrow. Rule for opposites: The sum of a number and its opposite can be represented by starting at 0 and drawing two arrows of the same length in opposite directions, ending back at 0.

48. $-35 + 16 + (-12) + 7 = -19 + (-12) + 7$

$$= -31 + 7$$
$$= -24$$

49. $-2 + 10 + (-3) + 5 = 8 + (-3) + 5 = 5 + 5 = 10$

50. $90 + (-24) + (-6) + 5 = 66 + (-6) + 5$

$$= 60 + 5$$
$$= 65$$

51. $-9 + 16 + (-12) + 3 = 7 + (-12) + 3$

$$= -5 + 3$$
$$= -2$$

52. When $a = -14$, $b = 5$, and $c = -8$;

$a + b + c = -14 + 5 + (-8) = -9 + (-8) = -17$

53. When $b = 5$ and $c = -8$;

$-15 + b + c = -15 + 5 + (-8) = -10 + (-8) = -18$

54. When $a = -14$ and $c = -8$;

$8 + a + (-4) + c = 8 + (-14) + (-4) + (-8)$

$$= -6 + (-4) + (-8)$$
$$= -10 + (-8)$$
$$= -18$$

55. If x and y are even, then $x + y$ is even. The sum of two even integers is even.

56. If x and y are odd, then $x + y$ is even. The sum of two odd integers is even.

57. If x is even and y is odd, the $x + y$ is odd. The sum of an even integer and an odd integer is odd.

58. $x \le 0$; if $x < 0$, then $|x|$ and x are opposites so their sum is 0; if $x = 0$, then $|x|$ and x are both 0 so their sum is 0.

59. When $x = 12$; $-3 + |-x + 2| = -3 + |-12 + 2|$

$$= -3 + |-10|$$
$$= -3 + 10$$
$$= 7$$

60. $|a + b| = |a| + |b|$ when a and b have the same signs or if a or b is 0.

61. $|a + b| < |a| + |b|$ when a and b have different signs and neither a nor b is 0.

1.5 Mixed Review (p. 33)

62. $x + 14.5$ **63.** $x - 2.75$

64. When $s = 70$; $A = s^2 = 70^2 = 4900$

The area of the lot is 4900 square yards.

65. $|15| = 15$ **66.** $-12 < |12|$ **67.** $|-2| > -2$

1.5 Standardized Test Practice (p. 33)

68. C; When $x = -3$ and $y = 12$;

$x + |y| = -3 + |12| = -3 + 12 = 9$

69. $-10 + |x|$ is greater than 0 when $x > 10$ or $x < -10$. For the expression to be greater than 0, $|x|$ must be greater than 10.

Lesson 1.6

1.6 Checkpoint (p. 35)

1. $2 - 6 = 2 + (-6) = -4$

2. $3 - (-8) = 3 + 8 = 11$

3. $-7 - 4 = -7 + (-4) = -11$

4. $-1 - (-13) = -1 + 13 = 12$

5. When $y = -14$; $y - 3 = -14 - 3 = -14 + (-3) = -17$

6. When $y = -14$; $25 - y = 25 - (-14) = 25 + 14 = 39$

7. When $y = -14$;

$y - 10 = -14 - 10 = -14 + (-10) = -24$

8. When $y = -14$; $-9 - y = -9 - (-14) = -9 + 14 = 5$

9. $\dfrac{\text{Change in}}{\text{temperature}} = \dfrac{\text{New}}{\text{temperature}} - \dfrac{\text{Old}}{\text{temperature}}$

$$= -10°F - 32°F$$
$$= -10°F + (-32°F)$$
$$= -42°F$$

The temperature decreased by 42°F.

Chapter 1 *continued*

10.
$$\frac{\text{Change in}}{\text{temperature}} = \frac{\text{New}}{\text{temperature}} - \frac{\text{Old}}{\text{temperature}}$$
$$= -80°F - (-45°F)$$
$$= -80°F + 45°F$$
$$= -35°F$$

The temperature decreased by 35°F.

11.
$$\frac{\text{Change in}}{\text{temperature}} = \frac{\text{New}}{\text{temperature}} - \frac{\text{Old}}{\text{temperature}}$$
$$= -3°C - 8°C$$
$$= -3°C + (-8°C)$$
$$= -11°C$$

The temperature decreased by 11°C.

12.
$$\frac{\text{Change in}}{\text{temperature}} = \frac{\text{New}}{\text{temperature}} - \frac{\text{Old}}{\text{temperature}}$$
$$= 15°C - (-2°C)$$
$$= 15°C + 2°C$$
$$= 17°C$$

The temperature increased by 17°C.

1.6 Guided Practice (p. 36)

1. $-15 - x$

2. The difference of -45 and -60 is written as
$-45 - (-60)$. To subtract -60, add its opposite, 60.

$-45 + 60$

Add -45 and 60.

$-45 + 60 = 15$

3. $3 - 8 = 3 + (-8) = -5$

4. $6 - (-2) = 6 + 2 = 8$

5. $-9 - 4 = -9 + (-4) = -13$

6. $-5 - (-1) = -5 + 1 = -4$

7. When $m = -6$; $m - 4 = -6 - 4 = -6 + (-4) = -10$

8. When $m = -6$;
$m - 16 = -6 - 16 = -6 + (-16) = -22$

9. When $m = -6$; $7 - m = 7 - (-6) = 7 + 6 = 13$

10. When $m = -6$;
$-7 - m = -7 - (-6) = -7 + 6 = -1$

11. (1) -110; The integer is negative because sea level
represents 0 and below sea level is negative.

(2) -90; The integer is negative because sea level
represents 0 and below sea level is negative.

(3) The difference in elevations will be negative because
you are going down 20 feet to get from -90 feet to
-110 feet.

$-90 - (-110) = 20$

The difference is -20 feet.

1.6 Practice and Problem Solving (pp. 36–38)

12. $8 - 9 = 8 + (-9) = -1$

13. $1 - (-8) = 1 + 8 = 9$

14. $-10 - 6 = -10 + (-6) = -16$

15. $-5 - (-17) = -5 + 17 = 12$

16. $0 - 15 = 0 + (-15) = -15$

17. $2 - (-37) = 2 + 37 = 39$

18. $-20 - 4 = -20 + (-4) = -24$

19. $-1 - (-53) = -1 + 53 = 52$

20. $24 - 41 = 24 + (-41) = -17$

21. $-39 - 32 = -39 + (-32) = -71$

22. $79 - (-98) = 79 + 98 = 177$

23. $-86 - (-34) = -86 + 34 = -52$

24. When $m = -6$; $17 - m = 17 - (-6) = 17 + 6 = 23$

25. When $m = -6$; $4 - m = 4 - (-6) = 4 + 6 = 10$

26. When $m = -6$; $m - 7 = -6 - 7 = -6 + (-7) = -13$

27. When $m = -6$;
$-16 - m = -16 - (-6) = -16 + 6 = -10$

28. When $m = -6$;
$m - 19 = -6 - 19 = -6 + (-19) = -25$

29. When $m = -6$; $m - 3 - 10 = -6 - 3 - 10$
$$= -6 + (-3) + (-10)$$
$$= -9 + (-10)$$
$$= -19$$

30. When $m = -6$; $20 - m - 5 = 20 - (-6) - 5$
$$= 20 + 6 + (-5)$$
$$= 26 + (-5)$$
$$= 21$$

31. When $m = -6$; $14 - 30 - m = 14 - 30 - (-6)$
$$= 14 + (-30) + 6$$
$$= -16 + 6$$
$$= -10$$

32. To subtract -5 from -2, add its opposite, 5.
So, $-2 - (-5) = -2 + 5 = 3$.

33.
$$\frac{\text{Change in}}{\text{temperature}} = \frac{\text{New}}{\text{temperature}} - \frac{\text{Old}}{\text{temperature}}$$
$$= 22°C - (-19°C)$$
$$= 22°C + 19°C$$
$$= 41°C$$

The temperature increased by 41°C.

Chapter 1 *continued*

34. a. Change in temperature:

From pasteurization to aging $= -5°C - 80°C$

$$= -5°C + (-80°C)$$
$$= -85°C$$

From aging to hardening $= -40°C - (-5°C)$

$$= -40°C + 5°C$$
$$= -35°C$$

From hardening to storage $= -15°C - (-40°C)$

$$= -15°C + 40°C$$
$$= 25°C$$

$\left|-85°C\right| = 85°C;$ $\left|-35°C\right| = 35°C;$ $\left|25°C\right| = 25°C$

b. The absolute value of the temperature change was the greatest between pasteurization and aging.

c. Estimates may vary.

$$\frac{5(99-32)}{9} \approx \frac{5(100-30)}{9} = \frac{5(70)}{9} = \frac{350}{9} \approx \frac{360}{9} = 40$$

$$\begin{array}{l} \text{Difference in} \\ \text{temperature} \end{array} = \begin{array}{l} \text{Temperature} \\ \text{in mouth} \end{array} - \begin{array}{l} \text{Temperature} \\ \text{of ice cream} \end{array}$$

$$= 40°C - (-15°C)$$
$$= 40°C + 15°C$$
$$= 55°C$$

The temperature in your mouth is about 55°C greater than the temperature of ice cream just out of the freezer.

35. $\begin{array}{l} \text{Change in} \\ \text{temperature} \end{array} = \begin{array}{l} \text{New} \\ \text{temperature} \end{array} - \begin{array}{l} \text{Old} \\ \text{temperature} \end{array}$

$$= 10°C - (-15°C)$$
$$= 10°C + 15°C$$
$$= 25°C$$

The temperature increased by 25°C.

36. $\begin{array}{l} \text{Change in} \\ \text{temperature} \end{array} = \begin{array}{l} \text{New} \\ \text{temperature} \end{array} - \begin{array}{l} \text{Old} \\ \text{temperature} \end{array}$

$$= -13°F - (-5°F)$$
$$= -13°F + 5°F$$
$$= -8°F$$

The temperature decreased by 8°F.

37. $\begin{array}{l} \text{Change in} \\ \text{elevation} \end{array} = \begin{array}{l} \text{New} \\ \text{elevation} \end{array} - \begin{array}{l} \text{Old} \\ \text{elevation} \end{array}$

$$= -90 - (-120)$$
$$= -90 + 120$$
$$= 30$$

The elevation increased by 30 feet.

38. $\begin{array}{l} \text{Change in} \\ \text{elevation} \end{array} = \begin{array}{l} \text{New} \\ \text{elevation} \end{array} - \begin{array}{l} \text{Old} \\ \text{elevation} \end{array}$

$$= -70 - 30$$
$$= -70 + (-30)$$
$$= -100$$

The elevation decreased by 100 meters.

39. $-15 - 75 - 100 = -15 + (-75) + (-100)$

$$= -90 + (-100)$$
$$= -190$$

40. $-402 + 74 - 281 = -402 + 74 + (-281)$

$$= -328 + (-281)$$
$$= -609$$

41. $-10 - (-525) - 280 = -10 + 525 + (-280)$

$$= 515 + (-280)$$
$$= 235$$

42. $118 - (-2) - 315 = 118 + 2 + (-315)$

$$= 120 + (-315)$$
$$= -195$$

43. When $x = -5$ and $y = 14$;

$-3 - y - x = -3 - 14 - (-5)$

$$= -3 + (-14) + 5$$
$$= -17 + 5$$
$$= -12$$

44. When $y = 14$ and $z = -7$;

$y - (-9) - z = 14 - (-9) - (-7)$

$$= 14 + 9 + 7$$
$$= 23 + 7$$
$$= 30$$

45. When $x = -5$, $y = 14$, and $z = -7$;

$z - y - x = -7 - 14 - (-5)$

$$= -7 + (-14) + 5$$
$$= -21 + 5$$
$$= -16$$

46. When $x = -5$, $y = 14$, and $z = -7$;

$x - y - z = -5 - 14 - (-7)$

$$= -5 + (-14) + 7$$
$$= -19 + 7$$
$$= -12$$

47. Because $-36°C < -12°C$, solution B has a lower freezing point.

$\begin{array}{l} \text{Difference in} \\ \text{freezing points} \end{array} = \text{Solution B} - \text{Solution A}$

$$= -36°C - (-12°C)$$
$$= -36°C + 12°C$$
$$= -24°C$$

The freezing point of solution B is 24°C lower than the freezing point of solution A.

Chapter 1 *continued*

48. Research lab:

$$\frac{\text{Change in}}{\text{temperature}} = \frac{\text{Hot plate}}{\text{temperature}} - \frac{\text{Room}}{\text{temperature}}$$

$$= -1°C - (-30°C)$$
$$= -1°C + 30°C$$
$$= 29°C$$

The hot plate is 29°C warmer than the room temperature.

Regular lab:

$$\frac{\text{Change in}}{\text{temperature}} = \frac{\text{Hot plate}}{\text{temperature}} - \frac{\text{Room}}{\text{temperature}}$$

$$= 300°C - 18°C$$
$$= 300°C + (-18°C)$$
$$= 282°C$$

The hot plate is 282°C warmer than the room temperature.

Because 282°C > 29°C, the difference is greater in the regular lab.

$$282°C - 29°C = 282°C + (-29°C) = 253°C$$

So, the difference in the regular lab is greater by 253°C.

49. First, write 5 as the sum of 6 and a number: $5 = 5 + 0 = 5 + (1 + (-1)) = (5 + 1) + (-1) = 6 + (-1)$. Then, using the rewritten form of 5, subtract 6: $5 - 6 = 6 + (-1) - 6 = -1 + 6 - 6 = -1$.

50. When $x = 18$;

$$3 - (-x) + 8 - 10 = 3 - (-18) + 8 - 10$$
$$= 3 + 18 + 8 + (-10)$$
$$= 21 + 8 + (-10)$$
$$= 29 + (-10)$$
$$= 19$$

51. When $x = 5$; $3 - (-x) + 8 - 10 = 3 - (-5) + 8 - 10$

$$= 3 + 5 + 8 + (-10)$$
$$= 8 + 8 + (-10)$$
$$= 16 + (-10)$$
$$= 6$$

52. When $x = -2$;

$$3 - (-x) + 8 - 10 = 3 - [-(-2)] + 8 - 10$$
$$= 3 - 2 + 8 - 10$$
$$= 3 + (-2) + 8 + (-10)$$
$$= 1 + 8 + (-10)$$
$$= 9 + (-10)$$
$$= -1$$

53. When $x = -3$;

$$3 - (-x) + 8 - 10 = 3 - [-(-3)] + 8 - 10$$
$$= 3 - 3 + 8 - 10$$
$$= 3 + (-3) + 8 + (-10)$$
$$= 0 + 8 + (-10)$$
$$= 8 + (-10)$$
$$= -2$$

54. Let a be a negative integer and b be a positive integer.

a. $a - b = a + (-b)$

The expression is negative because the sum of two negative integers is negative.

b. $b - a = b + (-a)$

The expression is positive because the sum of two positive integers is positive.

c. $|a| + |b|$

The expression is positive because absolute value gives positive integers. The sum of two positive integers is positive.

d. $-|a| - |b| = -|a| + (-|b|)$

The expression is negative because absolute value gives positive integers and the opposite of a positive integer is negative. The sum of two negative integers is negative.

1.6 Mixed Review (p. 38)

55. If you want to arrive at school at 7:45 A.M. and it takes 20 minutes to walk to school, then you must leave your house at 7:25 A.M. If you spend 15 minutes eating breakfast, you must begin eating at 7:10 A.M. Finally, if you need half an hour to shower and get dressed, you need to get up at 6:40 A.M.

The latest you can get up is 6:40 A.M. if you want to arrive at school on time.

56. When $x = 6$ and $y = 12$;

$$5x - y = 5(6) - 12 = 30 - 12 = 18$$

57. When $x = 6$ and $y = 12$;

$$3x + y = 3(6) + 12 = 18 + 12 = 30$$

58. When $x = 6$ and $y = 12$;

$$3(x + y) = 3(6 + 12) = 3(18) = 54$$

59. When $x = 6$ and $y = 12$;

$$\frac{x + y}{3} = \frac{6 + 12}{3} = (6 + 12) \div 3 = 18 \div 3 = 6$$

60. When $x = 6$ and $y = 12$;

$$x + \frac{y}{3} = 6 + \frac{12}{3} = 6 + 4 = 10$$

61. When $x = 6$ and $y = 12$; $7x - (y + 1) = 7(6) - (12 + 1)$

$$= 7(6) - 13$$
$$= 42 - 13$$
$$= 29$$

62. $89 + (-14) = 75$

63. $-104 + 53 = -51$

64. $-67 + (-303) = -370$

1.6 Standardized Test Practice (p. 38)

65. A; **A.** $23 - 25 = 23 + (-25) = -2, |-2| = 2$

B. $23 - (-22) = 23 + 22 = 45, |45| = 45$

C. $-23 - 23 = -23 + (-23) = -46, |-46| = 46$

D. $23 - (-25) = 23 + 25 = 48, |48| = 48$

Chapter 1 *continued*

66. F; $\dfrac{\text{Change in}}{\text{elevation}} = \dfrac{\text{Elevation of}}{\text{sea floor}} - \dfrac{\text{Elevation}}{\text{of cliff}}$

$$= -40 - 1250$$

Brain Game (p. 38)

Sample answer:

$-(-1) + (-2) + (-3) + (-4) = -8$

$-1 - (-2) + (-3) + (-4) = -6$

$-(-1) - (-2) + (-3) + (-4) = -4$

$-1 + (-2) + (-3) - (-4) = -2$

$-1 - (-2) - (-3) + (-4) = 0$

Focus on Data Analysis

Practice (p. 40)

1. Mean:

$$\dfrac{-2 + (-3) + 0 + 1 + 3 + 4 + (-1) + 2}{8} = \dfrac{4}{8} = 0.5$$

Median: $-3, -2, -1, \mathbf{0}, \mathbf{1}, 2, 3, 4$

Median $= \dfrac{0 + 1}{2} = \dfrac{1}{2} = 0.5$

Mode: There is no mode.

Range: $4 - (-3) = 4 + 3 = 7$

2. Mean:

$$\dfrac{51 + 65 + 75 + 43 + 58 + 85 + 75 + 60}{8} = \dfrac{512}{8}$$
$$= 64 \text{ ft}$$

Median: $43, 51, 58, \mathbf{60}, \mathbf{65}, 75, 75, 85$

Median $= \dfrac{60 + 65}{2} = \dfrac{125}{2} = 62.5$ ft

Mode: The value that occurs most often is 75 ft.

Range: $85 - 43 = 42$ ft

3. Mean:

$$\dfrac{\begin{array}{l}88 + 91 + 80 + 95 + 91 + 86 \\ + \; 93 + \; 93 + \; 94 + \; 98 + \; 92\end{array}}{11} = \dfrac{1001}{11} = 91$$

Median: $80, 86, 88, 91, 91, \mathbf{92}, 93, 93, 94, 95, 98$

The median is 92.

Mode: The values that occur most often are 91 and 93.

Range: $98 - 80 = 18$

4. Mean:

$$\dfrac{-3 + (-1) + 0 + 4 + (-1) + 2 + 6}{7} = \dfrac{7}{7} = 1°C$$

Median: $-3, -1, -1, \mathbf{0}, 2, 4, 6$

The median is 0°C.

Mode: The value that occurs most often is $-1°C$.

Range: $6 - (-3) = 9°C$

5. Mean:

$$\dfrac{\begin{array}{l}15 + \; 14 + \; 16 + \; 17 + \; 15 + 14 \\ + \; 17 + 17 + 15 + 17 + 18 + 17\end{array}}{12} = \dfrac{192}{12} = 16$$

Median: $14, 14, 15, 15, 15, \mathbf{16}, \mathbf{17}, 17, 17, 17, 17, 18$

Median $= \dfrac{16 + 17}{2} = 16.5$

Mode: The value that occurs most often is 17.

Range: $18 - 14 = 4$

6. Mean:

$$\dfrac{\begin{array}{l}3 + 26 + (-14) + 19 + (-8) \\ + \; 3 + 89 + (-35) + 3 + 44\end{array}}{10} = \dfrac{130}{10} = 13 \text{ ft}$$

Median: $-35, -14, -8, 3, \mathbf{3}, \mathbf{3}, 19, 26, 44, 89$

Median $= \dfrac{3 + 3}{2} = 3$ ft

Mode: The value that occurs most often is 3 ft.

Range: $89 - (-35) = 124$ ft

7. Mean:

$$\dfrac{55 + 99 + 105 + 109 + 80 + 149 + 99 + 184}{8} = \dfrac{880}{8}$$
$$= \$110$$

Median: $55, 80, 99, \mathbf{99}, \mathbf{105}, 109, 149, 184$

Median $= \dfrac{99 + 105}{2} = \$102$

Mode: The value that occurs most often is \$99.

Range: $184 - 55 = \$129$

8. Mean:

$$\dfrac{\begin{array}{l}509 + 785 + 660 + 1001 + 525 \\ + \;\; 834 \;\; + \; 785 \; + \; 941 \; + \; 800\end{array}}{9} = \dfrac{6840}{9} = 760$$

Median: $509, 525, 660, 785, \mathbf{785}, 800, 834, 941, 1001$

The median is 785.

Mode: The number that occurs most often is 785.

Range: $1001 - 509 = 492$

9. The mean is decreased to 689, the median and mode are unchanged, and the range is increased to 951.

10. The mean, median, mode, and range are all doubled.

Chapter 1 *continued*

Lesson 1.7

1.7 Concept Activity (p. 41)

Investigate

1. Each number in the second column decreases by 3 from one row to the next row.

Expression	Product
3(3)	9
3(2)	6
3(1)	3
3(0)	0
3(−1)	−3
3(−2)	−6

The product of a positive integer and a negative integer is *negative*.

2.

Expression	Product
2(−3)	−6
1(−3)	−3
0(−3)	0
−1(−3)	3
−2(−3)	6
−3(−3)	9

Each number in the second column increases by 3 from one row to the next row.

The product of two negative integers is *positive*.

Draw Conclusions

1. $3(-3) = -9$
2. $3(-4) = -12$
3. $-3(5) = -15$
4. $-5(6) = -30$
5. $10(-2) = -20$
6. $4(-7) = -28$
7. $-8(-5) = 40$
8. $-3(-12) = 36$
9. $4(-2) = -2 + (-2) + (-2) + (-2)$
$\qquad = -4 + (-2) + (-2)$
$\qquad = -6 + (-2)$
$\qquad = -8$

$-3(5) = -3 + (-3) + (-3) + (-3) + (-3)$
$\qquad = -6 + (-3) + (-3) + (-3)$
$\qquad = -9 + (-3) + (-3)$
$\qquad = -12 + (-3)$
$\qquad = -15$

10. The opposite of the opposite of ab is ab.
$(-a)(-b) = ab$.

1.7 Checkpoint (p. 43)

1. $9(-11) = -99$
2. $-6(-8) = 48$
3. $0(-100) = 0$
4. $-4(-8) = 32$
5. $-24 \div 3 = -8$
6. $0 \div (-25) = 0$
7. $-35 \div (-7) = 5$
8. $24 \div (-6) = -4$

1.7 Guided Practice (p. 44)

1. The mean of the data set is the sum of the values divided by the number of values.

2. The signs are the same. If ab is positive, then a and b are either both positive or both negative integers.

3. $-238(-17)$ is positive.
4. $\dfrac{920}{-23}$ is negative.
5. $465(-147)$ is negative.
6. $\dfrac{-256}{-32}$ is positive.
7. $-1209 \div 31$ is negative.
8. $-65(219)$ is negative.
9. $-98 \div (-2)$ is positive.
10. $-99(-716)$ is positive.

11. (1) Change in temperature in one minute: -38

The integer is negative because the temperature is being lowereed.

(2) Total change in temperature after 9 minutes:

$9(-38)$

The product will be negative because the temperature is being lowered.

(3) Temperature:

$228°C - 9(-38)°C = 228°C + (-342°C) = -114°C$

The temperature is $-114°C$.

1.7 Practice and Problem Solving (pp. 45–46)

12. $12(5) = 60$
13. $28 \div 14 = 2$
14. $65 \div (-5) = -13$
15. $6(-22) = -132$
16. $-7(50) = -350$
17. $-26 \div 13 = -2$
18. $-72 \div (-36) = 2$
19. $12(-30) = -360$
20. $\dfrac{175}{-25} = -7$
21. $\dfrac{-51}{-3} = 17$
22. $-17(-20) = 340$
23. $\dfrac{-840}{7} = -120$

24. The numerator should be positive, the product of two negative integers is positive;

$\dfrac{-5(-12)}{-4} = \dfrac{60}{-4} = -15$

25. a. $2(-3) = 0 + (-3) + (-3) = -6$
b. $-2(-3) = 0 - (-3) - (-3) = 0 + 3 + 3 = 6$

26. a.

Expression	Number of integers	Product	Sign of product
−1(−2)	2	2	positive
−1(−2)(−3)	3	−6	negative
−1(−2)(−3)(−4)	4	24	positive
−1(−2)(−3)(−4)(−5)	5	−120	negative

The product of an even number of negative integers is positive. The product of an odd number of negative integers is negative.

b. No; the sign would only depend on the number of negative integers, so the rule would not change.

27. a. Elevation = $\dfrac{\text{Change}}{\text{per minute}} \cdot \dfrac{\text{Number of}}{\text{minutes}}$

= $-100(200)$

= $-20{,}000$

The elevation at that point is 20,000 feet below sea level.

b. $\dfrac{\text{Number}}{\text{of minutes}}$ = Elevation ÷ $\dfrac{\text{Change}}{\text{per minute}}$

= $-1000 \div (-100)$

= 10

It would take 10 minutes to dive 1000 feet below sea level.

28. a. Mean:

$$\dfrac{-46 + (-40) + (-48) + (-51) + (-60)}{5} = \dfrac{-245}{5}$$
$$= -49$$

The mean is -49 meters.

b. Median: $-60, -51, \mathbf{-48}, -46, -40$

The median is -48 meters.

c. Because $-49 < -48$, the mean represents a lower position.

29. $-5(-10)(-25) = 50(-25) = -1250$

30. $16(-4)(-8) = -64(-8) = 512$

31. $360 \div (-36) \div (-2) = -10 \div (-2) = 5$

32. $-72 \div 12 \div 3 = -6 \div 3 = -2$

33. $-2(-14) \div (-7) = 28 \div (-7) = -4$

34. $20(-45) \div (-9) = -900 \div (-9) = 100$

35. $-738 \div 82 < -192 \div (-32)$

36. $288 \div (-36) < 756 \div 18$

37. When $t = 4$; $h = -16t^2 + 80t + 3$

$= -16(4)^2 + 80(4) + 3$

$= -16(16) + 80(4) + 3$

$= -256 + 320 + 3$

$= 64 + 3$

$= 67$

The height is 67 feet.

38. When $x = -4$; $-10x^2 = -10(-4)^2 = -10(16) = -160$

39. When $x = -4$; $\dfrac{72}{x^2} = \dfrac{72}{(-4)^2} = \dfrac{72}{16} = 4.5$

40. When $x = -4$; $-6x^2 = -6(-4)^2 = -6(16) = -96$

41. When $x = -4$; $\dfrac{4x^2}{-10} = \dfrac{4(-4)^2}{-10} = \dfrac{4(16)}{-10} = -6.4$

42. $\dfrac{-4 + (-3) + 5 + 4 + (-3) + n}{7} = 0$

$\dfrac{-7 + 5 + 4 + (-3) + n}{7} = 0$

$\dfrac{-2 + 4 + (-3) + n}{7} = 0$

$\dfrac{2 + (-3) + n}{7} = 0$

$\dfrac{-1 + n}{7} = 0$

$-1 + n = 0$

$n = 1$

The expression is true for $n = 1$.

43. No; the product of an odd number of negative factors is negative, while the product of an even number of negative factors is positive, so $(-1)^n = -1$ is true for any odd positive integer. For example, $(-1)^3 = -1$ but $(-1)^4 = 1$.

44. a. Sometimes; When k is positive, $nk \leq n$. When k is negative or zero, then $nk > n$.

b. Sometimes; When k is positive, $nk \geq n$. When k is negative or zero, then $nk < n$.

1.7 Mixed Review (p. 46)

45. The integers in order from least to greatest are: $-21, -12, -5, 0, 13,$ and 31.

46. The integers in order from least to greatest are: $-70, -54, -45, -22,$ and -16.

47. $-27 + 51 = 24$

48. $-17 + (-12) = -29$

49. $-18 - 33 = -18 + (-33) = -51$

50. $-41 - (-9) = -41 + 9 = -32$

1.7 Standardized Test Practice (p. 46)

51. C; $5 - 4(-6) = 5 - (-24) = 5 + 24 = 29$

52. To find the mean, first find the sum of the data values. Second, count the number of values to get 6. Then, divide by the number of values, 6.

Mean:

$$\dfrac{-12 + 7 + (-22) + (-11) + 20 + (-6)}{6} = \dfrac{-24}{6} = -4$$

The mean of the temperatures is $-4°$F.

Lesson 1.8

1.8 Checkpoint (pp. 47–48)

1. Point C is 4 units to the right of the origin and 2 units up. The x-coordinate is 4, and the y-coordinate is 2. The coordinates are $(4, 2)$.

2. Point D is 2 units down from the origin. The x-coordinate is 0, and the y-coordinate is -2. The coordinates are $(0, -2)$.

3. Point *E* is 4 units to the left of the origin and 1 unit down. The *x*-coordinate is −4, and the *y*-coordinate is −1. The coordinates are (−4, −1).

4–7.
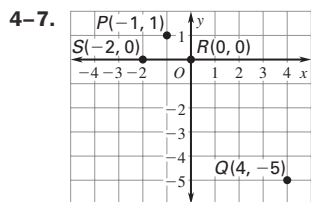
4. Begin at the origin and move 1 unit to the left, then 1 unit up. Point *P* is in Quadrant II.

5. Begin at the origin and move 4 units to the right, then 5 units down. Point *Q* is in Quadrant IV.

6. Point *R* is at the origin.

7. Begin at the origin and move 2 units to the left. Point *S* is on the *x*-axis.

1.8 Guided Practice (p. 49)

1. The point (−12, 7) has an *x*-coordinate of −12 and a *y*-coordinate of 7.

2. No; you can only determine that the point is either in Quadrant II or in Quadrant IV. In these two quadrants, one coordinate must be positive and the other is negative.
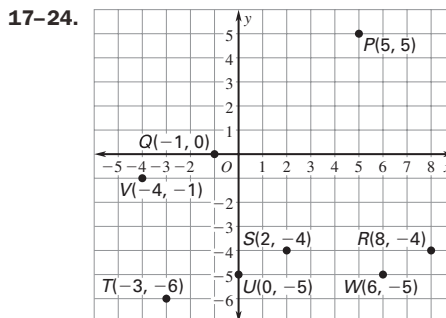
3–6.
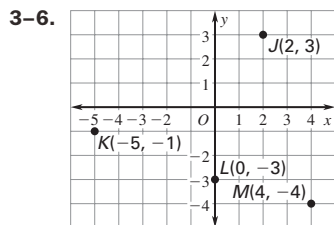
3. Begin at the origin and move 2 units to the right, then 3 units up. Point *J* lies in Quadrant I.

4. Begin at the origin and move 5 units to the left, then 1 unit down. Point *K* lies in Quadrant III.

5. Begin at the origin and move 3 units down. Point *L* lies on the *y*-axis.

6. Begin at the origin and move 4 units to the right, then 4 units down. Point *M* lies in Quadrant IV.

7. (1) (8, 19), (24, 13), (31, 17), (71, 14), (88, 11), (103, 7), (119, 7), (127, 5), (134, 3)

(2)
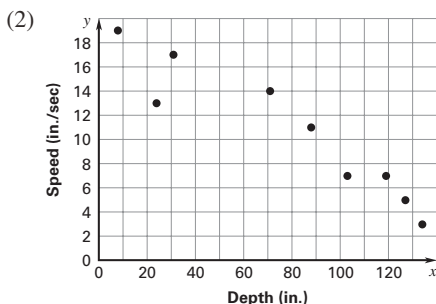
(3) Yes. The points generally fall from left to right. We can conclude that as the depth increases the speed tends to decrease.

1.8 Practice and Problem Solving (pp. 49–51)

8. Point *A* is 4 units to the left of the origin and 2 units up. The *x*-coordinate is −4, and the *y*-coordinate is 2. The coordinates are (−4, 2).

9. Point *B* is 3 units up from the origin. The *x*-coordinate is 0, and the *y*-coordinate is 3. The coordinates are (0, 3).

10. Point *C* is at the origin. The *x*-coordinate is 0, and the *y*-coordinate is 0. The coordinates are (0, 0).

11. Point *D* is 4 units to the right of the origin. The *x*-coordinate is 4, and the *y*-coordinate is 0. The coordinates are (4, 0).

12. Point *E* is 2 units to the left of the origin and 4 units down. The *x*-coordinate is −2, and the *y*-coordinate is −4. The coordinates are (−2, −4).

13. Point *F* is 3 units to the right of the origin and 3 units down. The *x*-coordinate is 3, and the *y*-coordinate is −3. The coordinates are (3, −3).

14. Point *G* is 4 units to the right of the origin and 4 units up. The *x*-coordinate is 4, and the *y*-coordinate is 4. The coordinates are (4, 4).

15. Point *H* is 3 units to the left of the origin and 2 units down. The *x*-coordinate is −3, and the *y*-coordinate is −2. The coordinates are (−3, −2).

16. Begin at the origin and move 6 units to the right, then 3 units down. The point is in Quadrant IV.

17–24.

17. Begin at the origin and move 5 units to the right, then 5 units up. Point *P* is in Quadrant I.

18. Begin at the origin and move 1 unit to the left. Point *Q* is on the *x*-axis.

19. Begin at the origin and move 8 units to the right, then 4 units down. Point *R* is in Quadrant IV.

20. Begin at the origin and move 2 units to the right, then 4 units down. Point *S* is in Quadrant IV.

21. Begin at the origin and move 3 units to the left, then 6 units down. Point *T* is in Quadrant III.

22. Begin at the origin and move 5 units down. Point *U* is on the *y*-axis.

23. Begin at the origin and move 4 units to the the left, then 1 unit down. Point *V* is in Quadrant III.

24. Begin at the origin and move 6 units to the right, then 5 units down. Point W is in Quadrant IV.

25. The first number represents the x-coordinate, which determines horizontal distance from the origin. The second number represents the y-coordinate, which determines vertical distance from the origin. The point $(2, -8)$ is 2 units to the right of the origin and 8 units down.

26. The point is on the x-axis if the y-coordinate is 0. The point is on the y-axis if the x-coordinate is 0.
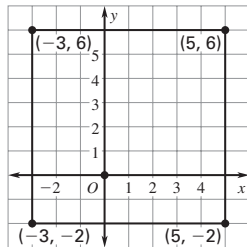
27. a.
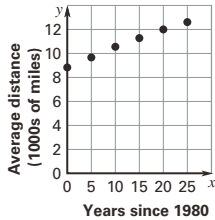
Years since 1980

b. The points rise from left to right. This suggests that as the number of years since 1980 increased, the average passenger car distance increased.

28. a. $(3, 28)$, $(6, 19)$, $(2, 33)$, $(4, 25)$, $(1, 47)$, $(4, 24)$, $(5, 22)$
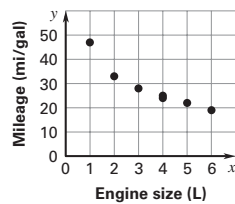
Engine size (L)

b. Yes, as the size of the engine increases, the average highway mileage tends to decrease.
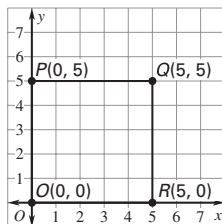
29. a.

b. The figure is a square because all four sides have the same length and all four angles are right angles.

30. a. B: $(3, 2)$; W: $(2, 2)$, $(3, 3)$, $(4, 2)$, $(3, 1)$

b. $(-2, 2)$, $(-3, 3)$, $(-4, 2)$, $(-3, 1)$

31. *Sample answer:*

$P(0, 5)$, $Q(5, 5)$, $R(5, 0)$

Create a square by starting at the origin, moving 5 units up, 5 units right, 5 units down, and back to the origin.

32. (a, b) is in Quadrant II, so a is negative and b is positive. Therefore, (b, a) is in Quadrant IV.

33. (a, b) is in Quadrant II, so a is negative. Therefore, (a, a) is in Quadrant III.

34. (a, b) is in Quadrant II, so b is positive. Therefore, (b, b) is in Quadrant I.

1.8 Mixed Review (p. 51)

35. Let $c =$ the cost in dollars of a ticket.

Expression: $20 - 2c$

36. The sum of two negative integers is *always* negative.

37. The sum of two positive integers is *never* negative.

38. The sum of a negative integer and a positive integer is *sometimes* negative.

39. $-15(3) = -45$

40. $-252 \div 12 = -21$

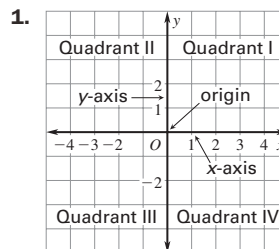**41.** $-63 \div (-3) = 21$

42. $9(-17) = -153$

1.8 Standardized Test Practice (p. 51)

43. B

44. G; Point A is 1 unit to the right of the origin and 3 units down. The x-coordinate is 1, and the y-coordinate is -3. The coordinates are $(1, -3)$.

Brain Game (p. 51)
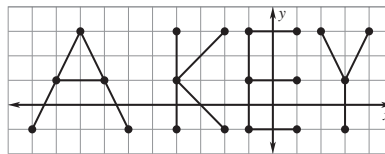
Chapter 1 Review (pp. 52–55)

1.

2. A power is the result of a repeated multiplication of the same factor.

The factor is called the base and the exponent shows the number of times the base is used as a factor.

3. Find the opposite of an integer by changing its sign.

4. A variable expression consists of numbers, variables, and operations.

5. When $p = 12$; $35 - p = 35 - 12 = 23$

6. When $q = 1.5$; $q + 2 = 1.5 + 2 = 3.5$

7. When $p = 12$; $\dfrac{60}{p} = \dfrac{60}{12} = 5$

Chapter 1 *continued*

8. When $q = 1.5$; $16(1.5) = 24$

$$
\begin{array}{r}
16 \\
\times\ 1.5 \\
\hline
8\ 0 \\
+\ 16 \\
\hline
24.0
\end{array}
$$

9. When $p = 12$ and $q = 1.5$; $p + q = 12 + 1.5 = 13.5$

10. When $p = 12$ and $q = 1.5$; $p - q = 12 - 1.5 = 10.5$

11. When $p = 12$ and $q = 1.5$; $\dfrac{p}{q} = \dfrac{12}{1.5} = 8$

$$1.5\overline{)12.}\qquad\qquad 15\overline{)120}$$
$$\underline{120}$$
$$0$$

12. When $p = 12$ and $q = 1.5$; $pq = 12(1.5) = 18$

$$
\begin{array}{r}
12 \\
\times\ 1.5 \\
\hline
6\ 0 \\
12 \\
\hline
18.0
\end{array}
$$

13. $10^4 = 10 \cdot 10 \cdot 10 \cdot 10 = 10{,}000$

14. $(0.3)^3 = (0.3)(0.3)(0.3) = 0.027$

15. $(12.5)^2 = (12.5)(12.5) = 156.25$

16. $3^5 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 243$

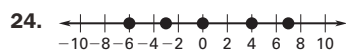**17.** $5^5 = 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 = 3125$

18. $15^2 = 15 \cdot 15 = 225$

19. $(1.2)^3 = (1.2)(1.2)(1.2) = 1.728$
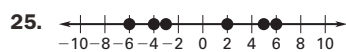
20. $(0.8)^4 = (0.8)(0.8)(0.8)(0.8) = 0.4096$

21. $20 \cdot 5 + 7 \cdot 3 = 100 + 21 = 121$

22. $\dfrac{5 + 4}{3} - 2 = (5 + 4) \div 3 - 2 = 9 \div 3 - 2 = 3 - 2 = 1$

23. $28 \div (5 - 1) \cdot 3 = 28 \div 4 \cdot 3 = 7 \cdot 3 = 21$

24.

The integers in order from least to greatest are: -6, -3, 0, 4, and 7.

25.

The integers in order from least to greatest are: -6, -4, -3, 2, 5, and 6.

26.

The integers in order from least to greatest are: -12, -8, -7, 1, and 4.

27. The absolute value of 18 is 18.

The opposite of 18 is -18.

28. The absolute value of -9 is 9.

The opposite of -9 is 9.

29. The absolute value of 4 is 4.

The opposite of 4 is -4.

30. The absolute value of -100 is 100.

The opposite of -100 is 100.

31. $12 + (-18) = -6$

32. $-8 + (-7) = -15$

33. $-27 + 38 = 11$

34. $-11 + (-18) = -29$

35. $61 + (-44) = 17$

36. $-13 + (-21) = -34$

37. $-21 + 9 = -12$

38. $-22 + (-7) = -29$

39.
$$\begin{aligned}
\text{Temperature at 2:00 P.M.} &= \text{Temperature at 6:00 A.M.} + \text{Increase in temperature} \\
&= -5°\text{F} + 22°\text{F} \\
&= 17°\text{F}
\end{aligned}$$

At 2:00 P.M., the temperature was $17°$F.

40. $0 - 8 = 0 + (-8) = -8$

41. $-2 - (-2) = -2 + 2 = 0$

42. $-46 - 29 = -46 + (-29) = -75$

43. $6 - (-13) = 6 + 13 = 19$

44. $-15 - (-17) = -15 + 17 = 2$

45. $31 - 40 = 31 + (-40) = -9$

46. $-16 - 9 = -16 + (-9) = -25$

47. $20 - (-11) = 20 + 11 = 31$

48.
$$\begin{aligned}
\text{Difference in elevation} &= -30 - 118 \\
&= -30 + (-118) \\
&= -148
\end{aligned}$$

There is a difference in elevation of 148 feet.

49. $-9(-12) = 108$

50. $52 \div (-4) = -13$

51. $-17(3) = -51$

52. $90 \div (-15) = -6$

53. $\dfrac{-80}{-16} = 5$

54. $20(-12) = -240$

55. $\dfrac{48}{-16} = -3$

**56.** $-33(-3) = 99$

57. Point Q is 1 unit to the right of the origin and 2 units up. The x-coordinate is 1 and the y-coordinate is 2. The coordinates of point Q are $(1, 2)$.

58. Point R is 2 units down from the origin. The x-coordinate is 0 and the y-coordinate is -2. The coordinates of point R are $(0, -2)$.

59. Point S is 3 units to the left of the origin and 3 units down. The x-coordinate is -3 and the y-coordinate is -3. The coordinates of point S are $(-3, -3)$.

60. Point T is 1 unit to the right of the origin and 3 units down. The x-coordinate is 1 and the y-coordinate is -3. The coordinates of point T are $(1, -3)$.

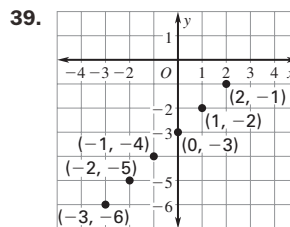**61–64.**
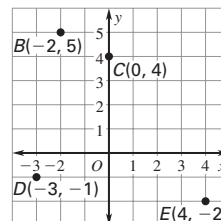
Chapter 1 *continued*

61. Begin at the origin and move 2 units to the left, then 5 units up. Point B is in Quadrant II.

62. Begin at the origin and move 4 units up. Point C is on the y-axis.

63. Begin at the origin and move 3 units to the left, then 1 unit down. Point D is in Quadrant III.

64. Begin at the origin and move 4 units to the right, then 2 units down. Point E is in Quadrant IV.

Chapter 1 Test (p. 56)

1. When $y = 16$; $y + 9 = 16 + 9 = 25$

2. When $z = 4$; $11 - z = 11 - 4 = 7$

3. When $y = 16$ and $z = 4$; $\dfrac{y}{z} = \dfrac{16}{4} = 4$

4. When $y = 16$ and $z = 4$; $yz = 16(4) = 64$

5. 8 squared; $8^2 = 8 \cdot 8 = 64$

6. 2 to the seventh power;
$2^7 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 128$

7. 0.2 to the fifth power;
$(0.2)^5 = (0.2)(0.2)(0.2)(0.2)(0.2) = 0.00032$

8. 0.7 to the fourth power;
$(0.7)^4 = (0.7)(0.7)(0.7)(0.7) = 0.2401$

9. When $s = 50$; $V = s^3 = 50^3 = 125{,}000$

The volume of the footstool is 125,000 cubic centimeters.

10. $70.2 + 4(3.5) = 70.2 + 14 = 84.2$

11. $\dfrac{75 - 39}{4 \cdot 3} = (75 - 39) \div (4 \cdot 3) = 36 \div 12 = 3$

12. $90 \div 5 + 4 = 18 + 4 = 22$

13. $18 + 30 \div 6 = 18 + 5 = 23$

14. When $r = 4$ and $s = 6$;
$3.5s + r = 3.5(6) + 4 = 21 + 4 = 25$

15. When $r = 4$ and $s = 6$;
$(r + 1)^2 - s = (4 + 1)^2 - 6 = 5^2 - 6 = 25 - 6 = 19$

16. When $r = 4$ and $s = 6$;
$4r + s^2 = 4(4) + 6^2 = 4(4) + 36 = 16 + 36 = 52$

17. When $r = 4$;
$2(r^2 - 15) = 2(4^2 - 15) = 2(16 - 15) = 2(1) = 2$

18. The absolute value of -78 is 78.

The opposite of -78 is 78.

19. The absolute value of 121 is 121.

The opposite of 121 is -121.

20. The absolute value of -33 is 33.

The opposite of -33 is 33.

21. The absolute value of 19 is 19.

The opposite of 19 is -19.

22. $35 + (-11) = 24$ **23.** $-28 + (-40) = -68$

24. $-38 + (-8) = -46$ **25.** $43 + (-22) = 21$

26. $5 - (-16) = 5 + 16 = 21$

27. $-60 - 7 = -60 + (-7) = -67$

28. $-19 - 35 = -19 + (-35) = -54$

29. $-48 - (-72) = -48 + 72 = 24$

30. $-20(32) = -640$ **31.** $\dfrac{-76}{4} = -19$

32. $-25(-30) = 750$ **33.** $840 \div (-24) = -35$

34. $18(-4) = -72$ **35.** $700 \div (-35) = -20$

36. $-12(-16) = 192$ **37.** $\dfrac{-270}{-18} = 15$

38. Mean:

$\dfrac{\begin{array}{l}-\$190 + \$75 + (-\$65) + \$100 + \$72 + (-\$54) \\ + (-\$62) + (-\$87) + \$92 + \$81 + (-\$73) + \$63\end{array}}{12} = \dfrac{-\$48}{12}$

$= -\$4$

39.

The points lie on a line.

Chapter 1 Standardized Test (p. 57)

1. C   **2.** I   **3.** C

4. G; $-11 + 24 + (-32) = 13 + (-32) = -19$

5. B; $-32 - (-15) = -32 + 15 = -17$

6. F   **7.** D

8. $24 \div (-3) = -8$

9. Total cost: $5d = 5 \times 6 = 30$

The cost of buying the posters is $30.

10. Area: $12 \times 12 = 144$

The area of the square is 144 square inches.

11. When $x = 3$ and $y = 5$;
$x + y^2 = 3 + 5^2 = 3 + 25 = 28$

12. To find the mean of the integers, first find the sum of the four integers. Next, count the number of values to get 4. Then, divide the sum by the number of values, 4.

$\text{Mean} = \dfrac{-6 + 12 + (-2) + (-16)}{4}$

$= \dfrac{6 + (-2) + (-16)}{4}$

$= \dfrac{4 + (-16)}{4}$

$= \dfrac{-12}{4}$

$= -3$

So, the mean of the yards gained or lost is -3.

Chapter 1 *continued*

13. a. (6, 36), (9, 44), (10, 46), (12, 52), (15, 61), (16, 67)

Height (ft) vs **Thickness (in.)**
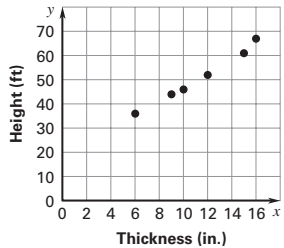
b. As the height of the trees increases, the thickness of their trunks tends to increase.

Focus On Problem Solving

Practice (p. 59)

1. (1) Relevant information: All information is needed.

(2) Missing information: No information is missing.

(3) Solve problem:

Cost per pound is $\frac{\$3.92}{4} = \$.98$.

Cost of 6 pounds is $\frac{\$.98}{1 \text{ lb}} \times 6 \text{ lb} = \$5.88$.

2. (1) Relevant information: All information is needed.

(2) Missing information: There is not enough information to determine the number of cookies you can make.

(3) Solve problem: To make 3 batches, you need

$3 \text{ batches} \times \frac{6 \text{ cups}}{1 \text{ batch}} = 18 \text{ cups cereal}$.

There are $1\frac{1}{2} \times 10 = 15$ cups of cereal per box.

So, you need $\frac{18}{15} = 1\frac{1}{5}$ boxes of cereal.

3. (1) Relevant information: All information is needed.

(2) Missing information: You need to know the number of cups in a quart to solve the problem.

(3) Solve problem: Find the number of cups in 2 quarts.

$2 \text{ quarts} \times \frac{4 \text{ cups}}{1 \text{ quart}} = 8 \text{ cups}$

Because you have added 3 cups already, you need to add $8 - 3 = 5$ cups of water.

Sample answer: You can find the information in a dictionary or almanac, or on the Internet.

4. (1) Relevant information: You do not need the average speed or number of hours driven per day.

(2) Missing information: No information is missing.

—CONTINUED—

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4. —CONTINUED—

(3) Solve problem: Find the distance that the car can travel on a full tank of gas.

$\frac{28 \text{ miles}}{1 \text{ gallon}} \times 10 \text{ gallons} = 280 \text{ miles}$

The number of full tanks needed to reach the

destination is $\frac{880 \text{ miles}}{280 \text{ miles}} \approx 3.1$ full tanks.

So, your family will have to stop 3 times to fill the gas tank because the car started with a full tank.

5. (1) Relevant information: All information is needed.

(2) Missing information: No information is missing.

(3) Solve problem: Find the time you will wait in line. After 5 minutes, there will be $52 - 24 = 28$ people in front of you. After 10 minutes, there will be $28 - 24 = 4$ people in front of you. So, you will wait in line for 15 minutes.

In addition, you will spend 3 minutes on the ride and 10 minutes walking to the show. The total time is $15 + 3 + 10 = 28$ minutes.

Yes, you will make the 2:00 show on time.

6. (1) Relevant information: You do not need the number of games played.

(2) Missing information: There is not enough information to determine the teams' average points scored per game in 2002.

(3) Solve problem: The turnover margin for 2002 is $t - g = (7 + 12) - (25 + 12) = 19 - 37 = -18$.

Because $-18 < -9$, you can determine that the team did not improve its turnover margin from 2001 to 2002.

7. (1) Relevant information: You do not need the precipitation information.

(2) Missing information: No information is missing.

(3) Solve problem: Find the departure from normal temperature for each day.

Day	$a - n$
Sunday	$33 - 39 = -6°F$
Monday	$42 - 38 = 4°F$
Tuesday	$25 - 38 = -13°F$
Wednesday	$24 - 37 = -13°F$
Thursday	$38 - 37 = 1°F$
Friday	$29 - 37 = -8°F$
Saturday	$36 - 36 = 0°F$

Find the mean departure from normal temperature for the week.

$\frac{-6 + 4 + (-13) + (-13) + 1 + (-8) + 0}{7} = \frac{-35}{7}$

$= -5$

The mean departure from normal temperature for the week is $-5°F$.