Chapter 1

1.1 Exercises

2. a. $2 < 5$
Two is less than five.

b. $5 > 2$
Five is greater than two.

c. We can use the inequality symbols to show the relationship between 5 and 2 in two different ways.

4. a. 23,981
↑
ten thousands

b. 23,981
↑
hundreds

6. a. 913,728
↑
hundred thousands

b. 913,728
↑
ten thousands

8. a. 3,098,269
↑
hundred thousands

b. 3,098,269
↑
thousands

10. $7632 = 7000 + 600 + 30 + 2$

12. $3562 = 3000 + 500 + 60 + 2$

14. $913{,}045 = 900{,}000 + 10{,}000 + 3000 + 40 + 5$

16. \$274
$274 = 200 + 70 + 4$
2 hundred-dollar bills, 7 ten-dollar bills, and 4 one-dollar bills

18. \$96

a. $96 = 90 + 6$
9 ten-dollar bills and 6 one-dollar bills; answers may vary.

b. $96 = 90 + 5 + 1$
9 ten-dollar bills, 1 five-dollar bill, and 1 one-dollar bill; answers may vary.

20. 4032
The number begins with 4 in the thousands place. The word name is four thousand, thirty-two.

22. 33,224
The number begins with 3 in the ten thousands place. The word name is thirty-three thousand, two hundred twenty-four.

24. \$379
Write 379.00 in the box following \$. Write "Three hundred seventy-nine and 00/100" on the line preceding DOLLARS.

26. 3 ? 1
3 is greater than 1.
$3 > 1$

28. 9 ? 6
9 is greater than 6.
$9 > 6$

30. 9 ? 11
9 is less than 11.
$9 < 11$

32. 0 ? 9
0 is less than 9.
$0 < 9$

34. 3010 ? 3210
3010 is less than 3210.
$3010 < 3210$

36. 101,351 ? 101,251
101,351 is greater than 101,251.
$101{,}351 > 101{,}251$

38. Seven *is less than* ten.
↓ ↓ ↓
7 < 10

40. Six *is greater than* four.
↓ ↓ ↓
6 > 4

42. 85
Identify the round-off place digit: 8̲5.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Replace the digit to the right with a zero.
90

44. 123
Identify the round-off place digit: 1̲23.
The digit to the right is less than 5. Do not change the round-off place digit. Replace the digit to the right with a zero.
120

46. 12,790
Identify the round-off place digit: 12,7̲90.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Replace all digits to the right with zeros.
12,800

48. 701,529
Identify the round-off place digit: 701,5̲29.
The digit to the right is less than 5. Do not change the round-off place digit. Replace all digits to the right with zeros.
701,500

50. 56,212
Identify the round-off place digit: 5̲6,212.
The digit to the right is less than 5. Do not change the round-off place digit. Replace all digits to the right with zeros.
56,000

52. 312,540
Identify the round-off place digit: 31̲2,540.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Replace all digits to the right with zeros.
313,000

54. 1,395,999
Identify the round-off place digit: 1,3̲95,999.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Replace all digits to the right with zeros.
1,400,000

56. 3,116,201
Identify the round-off place digit: 3,1̲16,201.
The digit to the right is less than 5. Do not change the round-off place digit. Replace all digits to the right with zeros.
3,100,000

58. 3,484,800 inches
Identify the round-off place digit: 3,48̲4,800.
The digit to the right is less than 5. Do not change the round-off place digit. Replace all digits to the right with zeros.
3,480,000 inches

60. Caravan Crew ? Charger Rallye
$29,195 ? $27,395
29,195 is greater than 27,395.
$29,195 > $27,395
Caravan Crew > Charger Rallye

62. $29,605
Identify the round-off place digit: 2̲9,605.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Since the round-off place digit is 9, place a zero in the round-off place and increase the digit in the next place to the left by 1. Replace all digits to the right with zeros.
$30,000

64. 44,972
Identify the round-off place digit: 44,9̲72.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Since the round-off place digit is 9, place a zero in the round-off place and increase the digit in the next place to the left by 1. Replace all digits to the right with zeros.
45,000

66. 5,311,192,809,000
Identify the round-off place digit:
5,311,19̲2,809,000.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Replace all digits to the right with zeros.
5,311,193,000,000

68. 5 hours and 40 minutes
Since 40 minutes is more than one-half hour, we round up.
6 hours

70. 15 yards, 4 inches
Since 4 inches is less than one-half yard, we round down.
15 yards

Classroom Quiz 1.1

1. 5301 = 5000 + 300 + 1

2. a. 8 ? 0
8 is greater than 0.
$8 > 0$

b. 2 ? 11
2 is less than 11.
$2 < 11$

3. 3571

a. Identify the round-off place digit: 3571.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Replace all digits to the right with zeros.
4000

b. Identify the round-off place digit: 3571.
The digit to the right is less than 5. Do not change the round-off place digit. Replace all digits to the right with zeros.
3570

1.2 Understanding the Concept
Addition Facts Made Simple

1. $8 + 5 = (3 + 5) + 5 = 3 + (5 + 5) = 3 + 10 = 13$

2. $6 + 8 = 6 + (6 + 2) = (6 + 6) + 2 = 12 + 2 = 14$

1.2 Understanding the Concept
Using Inductive Reasoning to Reach a Conclusion

1. 8, 14, 20, 26, 32, 38, ...
We observe a pattern that each number is 6 more than the preceding number: $14 = 8 + 6$, $20 = 14 + 6$, and so on. Therefore, if we add 6 to 38, we conclude that the next number in the sequence is 44.

2. 17, 28, 39, 50, 61, ...
We observe a pattern that each number is 11 more than the preceding number: $28 = 17 + 11$, $39 = 28 + 11$, and so on. Therefore, if we add 11 to 61, we conclude that the next number in the sequence is 72.

1.2 Exercises

2. $n \quad + \quad 4$
$\downarrow \quad \downarrow \quad \downarrow$
some number plus four
Answers may vary.

4. Because the commutative property allows us to change the order of addition *without* changing the value of the sum.

6. $4 + (x + 3) = 4 + (3 + x)$
The order of the addition is changed. This is the commutative property of addition.

8. Two added to a number: $m + 2$

10. the sum of eight and x: $8 + x$ or $x + 8$

12. Twelve more than a number: $y + 12$

14. A number plus four: $y + 4$

16. $y + 6 = 6 + y$

18. $5 + x = x + 5$

20. By the commutative property of addition,
$8790 + 157 = 157 + 8790$, so
$157 + 8790 = 8947$.

22. By the commutative property of addition,
$8 + x = x + 8$, so $x + 8 = 31$.

24. $a + 6 + 2 = a + (6 + 2) = a + 8$

26. $4 + 4 + y = (4 + 4) + y = 8 + y = y + 8$

28. $x + 3 + 0 = x + (3 + 0) = x + 3$

30. $(x + 5) + 1 = x + (5 + 1) = x + 6$

32. $3 + (4 + x) = (3 + 4) + x = 7 + x$

34. $(a + 3) + 7 = a + (3 + 7) = a + 10$

36. $(y + 1) + 4 = y + (1 + 4) = y + 5$

38. $(4+x)+5 = (x+4)+5 = x+(4+5) = x+9$

40. $5+(3+a) = (5+3)+a = 8+a = a+8$

42.
$$\begin{aligned} 3+(n+2)+1 &= (3+n)+(2+1) \\ &= (n+3)+3 \\ &= n+(3+3) \\ &= n+6 \end{aligned}$$

44.
$$\begin{aligned} (6+x+4)+4 &= (x+6+4)+4 \\ &= (x+10)+4 \\ &= x+(10+4) \\ &= x+14 \end{aligned}$$

46.
$$\begin{aligned} (2+n+8)+5 &= (n+2+8)+5 \\ &= (n+10)+5 \\ &= n+(10+5) \\ &= n+15 \end{aligned}$$

48. a. Replace n with 4.
$n + 8 = 4 + 8 = 12$
When n is equal to 4, $n + 8$ is equal to 12.

b. Replace n with 7.
$n + 8 = 7 + 8 = 15$
When n is equal to 7, $n + 8$ is equal to 15.

50. Replace a with 5 and b with 10.
$a + b = 5 + 10 = 15$
When a is 5 and b is 10, $a + b$ is 15.

52. Replace x with 11, y with 18, and z with 15.
$x + y + z = 11 + 18 + 15 = 44$
When a is 11, b is 18, and c is 15, $x + y + z$ is 44.

54. Replace x with 33 and y with 43.
$x + y + 21 = 33 + 43 + 21 = 97$
When x is 33 and y is 43, $x + y + 21$ is 97.

56. a. $\text{Bonus} = x + y + 250$
$= 150 + 15 + 250$
$= \$415$

b. $\text{Bonus} = x + y + 250 = 125 + 18 + 250 = \$393$

58.
$$\begin{array}{r} 71 \\ +\ 12 \\ \hline 83 \end{array}$$

60.
$$\begin{array}{r} 331 \\ +\ 57 \\ \hline 388 \end{array}$$

62.
$$\begin{array}{r} 33 \\ 11 \\ 6 \\ +\ 4 \\ \hline 54 \end{array}$$

64.
$$\begin{array}{r} 308 \\ 7 \\ 245 \\ +\ 75 \\ \hline 635 \end{array}$$

66.
$$\begin{array}{r} 531 \\ 217 \\ +\ 18 \\ \hline 766 \end{array}$$

68.
$$\begin{array}{r} 562 \\ 65 \\ +\ 133 \\ \hline 760 \end{array}$$

70.
$$\begin{array}{r} 3366 \\ 152 \\ +\ 485 \\ \hline 4003 \end{array}$$

72.
$$\begin{array}{r} 836{,}147 \\ 99 \\ 2{,}413 \\ +\ 4{,}000 \\ \hline 842{,}659 \end{array}$$

74.
$$\begin{array}{r} 2{,}902 \\ 9{,}050 \\ 12 \\ +\ 986{,}100 \\ \hline 998{,}064 \end{array}$$

76. a.
$$\begin{array}{r} 3477 \\ +\ 4614 \\ \hline 8091 \end{array}$$
Total deposits were \$8091.

b.
$$\begin{array}{r} 120 \\ 3500 \\ +\ 1388 \\ \hline 5008 \end{array}$$
Total debits were \$5008.

78.
$$\begin{array}{r} 562 \\ 276 \\ 142 \\ +\ 495 \\ \hline 1475 \end{array}$$
Shawnee spent \$1475 on her car.

80. 7 in. + 1 in. + 7 in. + 1 in. = 16 in.
The perimeter is 16 inches.

82. 8 ft + 8 ft + 8 ft + 8 ft = 32 ft
The perimeter is 32 feet.

84. 3 ft + 8 ft + 8 ft = 19 ft
The perimeter is 19 feet.

86. The length of the unlabeled side is 7 ft + 24 ft or 31 ft.
25 ft + 7 ft + 8 ft + 24 ft + 17 ft + 31 ft = 112 ft
The perimeter is 112 feet.

88. The length of the unlabeled side on the left is 140 in., and the length of the right side of the figure is 140 in. + 20 in. or 160 in.
$140 \text{ in.} + 55 \text{ in.} + 20 \text{ in.} + 150 \text{ in.} + 160 \text{ in.} + 205 \text{ in.}$
$= 730 \text{ in.}$
The perimeter is 730 inches.

90. 2, 4, 6, 8, 10, 12, ...
Each number is 2 more than the preceding number. The next number is 12 + 2 or 14.

92. 24, 31, 38, 45, 52, 59, 66, ...
Each number is 7 more than the preceding number. The next number is 66 + 7 or 73.

94. 12, 25, 38, 51, 64, ...
Each number is 13 more than the preceding number. The next number is 64 + 13 or 77.

Classroom Quiz 1.2

1. a. $(5+x)+6=(x+5)+6=x+(5+6)=x+11$

b. $1+(5+n+6)=1+(5+6+n)$
$=1+(11+n)$
$=(1+11)+n$
$=12+n$ or $n+12$

2. Replace m with 2.
$m^2+5=2^2+5=4+5=9$
When m is equal to 2, m^2+5 is equal to 9.

3. The length of the unlabeled side on the left is 14 ft, and the length of the right side of the figure is 14 ft + 13 ft or 27 ft.
14 ft + 14 ft + 13 ft + 115 ft + 27 ft + 129 ft
= 312 ft
The perimeter is 312 feet.

1.3 Understanding the Concept
Money and Borrowing

1. We can borrow only from a place value that has a nonzero whole number. In $400 there are only 100-dollar bills to borrow from.

2. When we change the ten-dollar bill to 10 one-dollar bills, we have 0 ten-dollar bills and 10 one-dollar bills which is similar to borrowing in subtraction.

1.3 Exercises

2. 10 − 2: Two subtracted from 10
Answers may vary.

4. The phrase "five less than x" written using symbols, is $5 - x$. This statement is false.

6. 7 − 5 = 2

8. 8 − 4 = 4

10. 9 − 6 = 3

12. 6 − 5 = 1

14. 14 − 0 = 14

16. 12 − 12 = 0

18. 900 − 800 = 100
900 − 801 = 99
900 − 802 = 98
900 − 803 = 97
900 − 804 = 96
900 − 805 = 95
900 − 806 = 94

20. 800 − 700 = 100
800 − 701 = 99
800 − 702 = 98
800 − 703 = 97
800 − 704 = 96
800 − 705 = 95

22. Three decreased by a number: $3 - a$

24. The difference of three and a number: $3 - n$

26. Seven subtracted from a number: $x - 7$

28. Eight minus two: 8 − 2

30. Nine less than twelve: 12 − 9

32. Replace n with 6.
$9 - n = 9 - 6 = 3$
If n is equal to 6, $9 - n$ is equal to 3.

34. Replace n with 1.
$9 - n = 9 - 1 = 8$
If n is equal to 1, $9 - n$ is equal to 8.

36. Replace x with 5.
$x - 2 = 5 - 2 = 3$
If x is equal to 5, $x - 2$ is equal to 3.

38. Replace x with 10.
$x - 2 = 10 - 2 = 8$
If x is equal to 10, $x - 2$ is equal to 8.

40.
$$\begin{array}{r} 98 \\ -\ 25 \\ \hline 73 \end{array} \qquad \text{Check:} \quad \begin{array}{r} 25 \\ +\ 73 \\ \hline 98 \end{array}$$

42.
$$\begin{array}{r} 76 \\ -\ 41 \\ \hline 35 \end{array} \qquad \text{Check:} \quad \begin{array}{r} 41 \\ +\ 35 \\ \hline 76 \end{array}$$

44.
$$\begin{array}{r} 57 \\ -\ 38 \\ \hline 19 \end{array} \qquad \text{Check:} \quad \begin{array}{r} 38 \\ +\ 19 \\ \hline 57 \end{array}$$

46.
$$\begin{array}{r} 73 \\ -\ 35 \\ \hline 38 \end{array} \qquad \text{Check:} \quad \begin{array}{r} 35 \\ +\ 38 \\ \hline 73 \end{array}$$

48.
$$\begin{array}{r} 764 \\ -\ 545 \\ \hline 219 \end{array} \qquad \text{Check:} \quad \begin{array}{r} 545 \\ +\ 219 \\ \hline 764 \end{array}$$

50.
$$\begin{array}{r} 700 \\ -\ 29 \\ \hline 671 \end{array} \qquad \text{Check:} \quad \begin{array}{r} 671 \\ +\ 29 \\ \hline 700 \end{array}$$

52.
$$\begin{array}{r} 8711 \\ -\ 644 \\ \hline 8067 \end{array} \qquad \text{Check:} \quad \begin{array}{r} 8067 \\ +\ 644 \\ \hline 8711 \end{array}$$

54.
$$\begin{array}{r} 8801 \\ -\ 4583 \\ \hline 4218 \end{array} \qquad \text{Check:} \quad \begin{array}{r} 4583 \\ +\ 4218 \\ \hline 8801 \end{array}$$

56.
$$\begin{array}{r} 29,002 \\ -\ 3,667 \\ \hline 25,335 \end{array} \qquad \text{Check:} \quad \begin{array}{r} 3,667 \\ +\ 25,335 \\ \hline 29,002 \end{array}$$

58.
$$\begin{array}{r} 796,020 \\ -\ 68,431 \\ \hline 727,589 \end{array} \qquad \text{Check:} \quad \begin{array}{r} 68,431 \\ +\ 727,589 \\ \hline 796,020 \end{array}$$

60. The length of the unlabeled side on the top is 20 in. − 8 in. or 12 in., and the length of the right side of the figure is 18 in. − 7 in. or 11 in.
18 in. + 12 in. + 7 in. + 8 in. + 11 in. + 20 in. = 76 in.
The perimeter is 76 inches.

62. The length of the unlabeled side on the right is 20 in. − 9 in. or 11 in., and the length of the unlabeled top side of the figure is 38 in. − 17 in. or 21 in.
20 in. + 17 in. + 9 in. + 21 in. + 11 in. + 38 in. = 116 in.
The perimeter is 116 inches.

64. a. Blue: 275,000 − 5,000 = 270,000
Bowhead: 60,000 − 8500 = 51,500
Humpback: 150,000 − 20,000 = 130,000
The Blue Whale had the largest decline.

b. The total decline is
270,000 + 51,500 + 130,000 = 451,500

66.
$$\begin{array}{r} 100 \\ -\ 56 \\ \hline 44 \end{array}$$
The top speed of Ghostrider is 44 miles per hour slower than the top speed of Superman the Escape.

68.
$$\begin{array}{r} 300 \\ -\ 115 \\ \hline 185 \end{array}$$
The maximum drop of Superman the Escape is 185 feet greater than that of Colossus.

70.
$$\begin{array}{r} 7900 \\ -\ 2160 \\ \hline 5740 \end{array}$$
The difference in diameter of Earth and the moon is 5740 miles.

72. Eight minus y: $8 - y$
Replace y with 3.
$8 - y = 8 - 3 = 5$
If y is equal to 3, eight minus y is equal to 5.

Cumulative Review

73. 5,117,206 > 13,842

74. 2,386,702 > 117,401

75.
$$\begin{array}{r} 120 \\ 135 \\ +\ 105 \\ \hline 360 \end{array}$$
Edward worked 360 hours in the three-month period.

76.
$$\begin{array}{r} 430 \\ 32 \\ 12 \\ 28 \\ +\ \ 6 \\ \hline 508 \end{array}$$
Drew paid \$508 for the dog and all the supplies.

Classroom Quiz 1.3

1. a. A number subtracted from 8: $8 - n$

b. Two less than a number: $n - 2$

c. Four decreased by a number: $4 - n$

2. a.
$$\begin{array}{r} 11,055 \\ -\ 6,294 \\ \hline 4,761 \end{array}$$
Check:
$$\begin{array}{r} 6,294 \\ +\ 4,761 \\ \hline 11,055 \end{array}$$

b.
$$\begin{array}{r} 502,401 \\ -\ 291,632 \\ \hline 210,769 \end{array}$$
Check:
$$\begin{array}{r} 291,632 \\ +\ 210,769 \\ \hline 502,401 \end{array}$$

3.
$$\begin{array}{r} 4822 \\ -\ 3788 \\ \hline 1034 \end{array}$$
The first bid was \$1034 greater.

1.4 Understanding the Concept
Memorizing Multiplication Facts

1. a. $3(7) = 2(7) + 7 = 14 + 7 = 21$

b. $4(8) = 5(8) - 8 = 40 - 8 = 32$

c. $6(8) = 5(8) + 8 = 40 + 8 = 48$

d. $9(8) = 10(8) - 8 = 80 - 8 = 72$

1.4 Exercises

2. a. $7y$: seven times a number

b. xy: the product of x and y

4. 4 times 2:

★ ★ ★ ★
★ ★ ★ ★

Shapes may vary

★ ★
★ ★
★ ★
★ ★

6. $3(6 \cdot 5) = (6 \cdot 5) \cdot 3$
The order of the multiplication is changed. This is the commutative property of multiplication.

8. $4 \cdot 5(3x) = (4 \cdot 5 \cdot 3) \cdot x = 60x$

10. $(4y) \cdot 3 \cdot 2 = 4 \cdot y \cdot 3 \cdot 2 = (4 \cdot 3 \cdot 2) \cdot y = 24y$

12. a.

	White	Pale Blue	Rose
Beige	Beige White	Beige Pale Blue	Beige Rose
Gray	Gray White	Gray Pale Blue	Gray Rose
Blue	Blue White	Blue Pale Blue	Blue Rose
Light Brown	Light Brown White	Light Brown Pale Blue	Light Brown Rose

b. $4(3) = 12$ different combinations

14. $10(5) = 50$ different ice cream dishes

16. $4(7) = 28$
The factors are 4 and 7. The product is 28.

18. $7a = 49$
The factors are 7 and a. The product is 49.

20. A number times 5: $x \cdot 5 = 5x$

22. Double a number: $2x$

24. The product of a and b: ab

26. If $a \cdot b = 0$ and $a = 10$, then $b = 0$.

28. By the associative and commutative properties of multiplication, $b(a \cdot c) = (b \cdot a) \cdot c = (a \cdot b) \cdot c$, so $(a \cdot b) \cdot c = 30$.

30. $(4)(5)(2)(2) = (4)(2)(5)(2) = (4 \cdot 2)(5 \cdot 2) = (8)(10) = 80$

32. $(5)(4)(3)(2) = (4)(3)(5)(2) = (4 \cdot 3)(5 \cdot 2) = (12)(10) = 120$

34. $9 \cdot 0 \cdot 8 \cdot 6 = 0$

36. $3 \cdot 2 \cdot 4 \cdot 5 = (3 \cdot 4) \cdot (2 \cdot 5) = 12 \cdot 10 = 120$

38. $7(5b) = (7 \cdot 5)b = 35b$

40. $3(x \cdot 8) = 3(8 \cdot x) = (3 \cdot 8)x = 24x$

42. $2(a \cdot 9) = 2(9 \cdot a) = (2 \cdot 9)a = 18a$

44. $5(8 \cdot x) = (5 \cdot 8)x = 40x$

46. $2(3)(5 \cdot z) = 6(5 \cdot z) = (6 \cdot 5)z = 30z$

48. $0(7)(z \cdot 8) = 0$

50. $4(7)(x \cdot 1) = 28x$

52. $6 \cdot 4(3y) = 24(3y) = (24 \cdot 3)y = 72y$

54. $(4a)5 \cdot 2 = 4a(5 \cdot 2) = 4a(10) = (4 \cdot 10)a = 40a$

56. $4(3a) \cdot 5 = (4 \cdot 3)a \cdot 5 = 12a \cdot 5 = 12 \cdot 5 \cdot a = 60a$

58.
$$\begin{array}{r} 926 \\ \times \quad 8 \\ \hline 7408 \end{array}$$

60.
$$\begin{array}{r} 405 \\ \times \quad 6 \\ \hline 2430 \end{array}$$

62.
$$\begin{array}{r} 578 \\ \times \quad 500 \\ \hline 289,000 \end{array}$$

64.
$$\begin{array}{r} 871 \\ \times \quad 300 \\ \hline 261,300 \end{array}$$

66.
$$\begin{array}{r} 81 \\ \times \ 34 \\ \hline 324 \\ 243 \\ \hline 2754 \end{array}$$

68.
$$\begin{array}{r} 44 \\ \times \ 68 \\ \hline 352 \\ 264 \\ \hline 2992 \end{array}$$

70.
$$\begin{array}{r} 668 \\ \times \quad 95 \\ \hline 3\,340 \\ 60\,12 \\ \hline 63,460 \end{array}$$

72.
$$\begin{array}{r} 322 \\ \times \quad 74 \\ \hline 1\,288 \\ 22\,54 \\ \hline 23,828 \end{array}$$

74.
$$\begin{array}{r} 632 \\ \times \quad 201 \\ \hline 632 \\ 126\,40 \\ \hline 127,032 \end{array}$$

76.
$$\begin{array}{r} 631 \\ \times \quad 201 \\ \hline 631 \\ 126\,20 \\ \hline 126,831 \end{array}$$

78.
$$\begin{array}{r} 4456 \\ \times \quad 578 \\ \hline 35\,648 \\ 311\,92 \\ 2\,228\,0 \\ \hline 2,575,568 \end{array}$$

80.
$$\begin{array}{r} 9002 \\ \times \quad 563 \\ \hline 27\,006 \\ 540\,12 \\ 4\,501\,0 \\ \hline 5,068,126 \end{array}$$

82.
$$\begin{array}{r} 23,109 \\ \times \quad 605 \\ \hline 115\,545 \\ 13\,865\,40 \\ \hline 13,980,945 \end{array}$$

84.
$$\begin{array}{r} 86,246 \\ \times \quad 2000 \\ \hline 172,492,000 \end{array}$$

86.
$$\begin{array}{r} 450 \\ \times \quad 6 \\ \hline 2700 \end{array}$$
The plane travels 2700 miles.

88.
$$\begin{array}{r} 12 \\ \times \ 6 \\ \hline 72 \end{array}$$
John has 72 plants.

90.
$$\begin{array}{r} 116 \\ \times \ 9 \\ \hline 1044 \end{array}$$
The player will gain 1044 rushing yards in the season.

92.
$$\begin{array}{r} 35 \\ \times \ 50 \\ \hline 1750 \end{array}$$
Each floor requires 1750 tiles.
$$\begin{array}{r} 1750 \\ \times \quad 2 \\ \hline 3500 \end{array}$$
Robert needs 3500 tiles to complete two floors.
$$\begin{array}{r} 75 \\ \times \ 46 \\ \hline 450 \\ 300 \\ \hline 3450 \end{array}$$
Robert ordered 3450 tiles.
No, Robert does not have enough tiles to complete the job because he needs 3500 tiles but only ordered 3450 tiles.

94. a. The bar for Boston is labeled 41. The high temperature was 41°F.

b. The high temperature in Burlington was 30°F.
$$\begin{array}{r} 30 \\ \times \ 2 \\ \hline 60 \end{array}$$
The high temperature in Buffalo was 60°F.

96. $(4x)(2y)(6z) = (4 \cdot 2 \cdot 6)(x \cdot y \cdot z) = 48xyz$

98. $2(3x)(3y)(5z) = (2 \cdot 3 \cdot 3 \cdot 5)(x \cdot y \cdot z) = 90xyz$

100. $8a(5b)2c = (8 \cdot 5 \cdot 2)(a \cdot b \cdot c) = 80abc$

Cumulative Review

102.
$$\begin{array}{r} 426,862 \\ + \quad 2,128 \\ \hline 428,990 \end{array}$$

103.
$$\begin{array}{r} 7000 \\ - \ 142 \\ \hline 6858 \end{array}$$

104. 826,540
Identify the round-off place digit: 82<u>6</u>,540.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Replace all digits to the right with zeros.
827,000

105. 168,406,000
Identify the round-off place digit: 168,4<u>0</u>6,000.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Replace all digits to the right with zeros.
168,410,000

106.
$$\begin{array}{r} 120 \\ - \ 97 \\ \hline 23 \end{array}$$
The bill was $23 less than the budget allotment.

107.
$$\begin{array}{r} 920 \\ - \ 455 \\ \hline 465 \end{array}$$
Mary Ann must drive 465 miles the second day.

Classroom Quiz 1.4

1. The product of four and a number: $4n$

2.
$$\begin{array}{r} 2051 \\ \times \quad 107 \\ \hline 14\ 357 \\ 205\ 10 \\ \hline 219,457 \end{array}$$

3. $2x(5y)(4) = (2 \cdot 5 \cdot 4)(x \cdot y) = 40xy$

1.5 Understanding the Concept
The Commutative Property and Division

1. $a \div b = b \div a$ when a and b are equal.

1.5 Understanding the Concept Conclusions and Inductive Reasoning

1. 1, 1, 2, …
Notice that 1 + 0 = 1 and 1 + 1 = 2. If we follow a pattern of adding consecutive whole numbers (0, 1, 2, …) to the preceding number, the next number is 2 + 2 = 4.
Notice that 1 · 1 = 1 and 1 · 2 = 2. If we follow a pattern of multiplying the preceding number by consecutive counting numbers (1, 2, 3, …), the next number is 2 · 3 = 6.

1.5 Exercises

2. There are 320 ÷ 16 rows.

4. Each person paid $n \div 5$.

6. (b) and (c) are correct.

8. Eight divided by a number: $8 \div a$

10. Sixty-three jelly beans divided equally among three children: 63 ÷ 3

12. The quotient of forty-four and eleven: 44 ÷ 11

14. The quotient of eleven and forty-four: 11 ÷ 44

16. 25 ÷ 25 = 1

18. $\frac{0}{99} = 0$

20. 45 ÷ 0 undefined

22. 60 ÷ 9 = 6 R 6

$$\begin{array}{r} 6 \\ 9\overline{)60} \\ \underline{54} \\ 6 \end{array}$$

Check: 6(9) + 6 = 54 + 6 = 60

24. 3726 ÷ 6 = 621

$$\begin{array}{r} 621 \\ 6\overline{)3726} \\ \underline{36} \\ 12 \\ \underline{12} \\ 6 \\ \underline{6} \\ 0 \end{array}$$

Check: 6(621) = 3726

26. 4046 ÷ 6 = 674 R 2

$$\begin{array}{r} 674 \\ 6\overline{)4046} \\ \underline{36} \\ 44 \\ \underline{42} \\ 26 \\ \underline{24} \\ 2 \end{array}$$

Check: 6(674) + 2 = 4044 + 2 = 4046

28. 1863 ÷ 20 = 93 R 3

$$\begin{array}{r} 93 \\ 20\overline{)1863} \\ \underline{180} \\ 63 \\ \underline{60} \\ 3 \end{array}$$

Check: 20(93) + 3 = 1860 + 3 = 1863

30. 783 ÷ 20 = 39 R 3

$$\begin{array}{r} 39 \\ 20\overline{)783} \\ \underline{60} \\ 183 \\ \underline{180} \\ 3 \end{array}$$

Check: 20(39) + 3 = 780 + 3 = 783

32. 6436 ÷ 32 = 201 R 4

$$\begin{array}{r} 201 \\ 32\overline{)6436} \\ \underline{64} \\ 36 \\ \underline{32} \\ 4 \end{array}$$

Check: 32(201) + 4 = 6432 + 4 = 6436

34. 1301 ÷ 2 = 54 R 5

$$\begin{array}{r} 54 \\ 24\overline{)1301} \\ \underline{120} \\ 101 \\ \underline{96} \\ 5 \end{array}$$

Check: 24(54) + 5 = 1296 + 5 = 1301

36. $1350 \div 16 = 84$ R 6

$$\begin{array}{r} 84 \\ 16\overline{)1350} \\ \underline{128} \\ 70 \\ \underline{64} \\ 6 \end{array}$$

Check: $16(84) + 6 = 1344 + 6 = 1350$

38. $12{,}854 \div 42 = 306$ R 2

$$\begin{array}{r} 306 \\ 42\overline{)12854} \\ \underline{126} \\ 254 \\ \underline{252} \\ 2 \end{array}$$

Check: $42(306) + 2 = 12{,}852 + 2 = 12{,}854$

40. $37{,}780 \div 118 = 320$ R 20

$$\begin{array}{r} 320 \\ 118\overline{)37780} \\ \underline{354} \\ 238 \\ \underline{236} \\ 20 \end{array}$$

Check: $118(320) + 20 = 37{,}760 + 20 = 37{,}780$

42. $123{,}264 \div 136 = 906$ R 48

$$\begin{array}{r} 906 \\ 136\overline{)123264} \\ \underline{1224} \\ 864 \\ \underline{816} \\ 48 \end{array}$$

Check: $136(906) + 48 = 123{,}216 + 48 = 123{,}264$

44. $21{,}945 \div 29 = 756$ R 21

$$\begin{array}{r} 756 \\ 29\overline{)21945} \\ \underline{203} \\ 164 \\ \underline{145} \\ 195 \\ \underline{174} \\ 21 \end{array}$$

Check: $29(756) + 21 = 21{,}924 + 21 = 21{,}945$

46.

$$\begin{array}{r} 3 \\ 21\overline{)75} \\ \underline{63} \\ 12 \end{array}$$

The remainder is 12, so 12 tickets were donated to the homeless shelter.

48.

$$\begin{array}{r} 17 \\ 65\overline{)1105} \\ \underline{65} \\ 455 \\ \underline{455} \\ 0 \end{array}$$

The ticket price should be $17.

50.

$$\begin{array}{r} 625 \\ 250\overline{)156250} \\ \underline{1500} \\ 625 \\ \underline{500} \\ 1250 \\ \underline{1250} \\ 0 \end{array}$$

The rancher should allow 625 cows on the field.

52.

$$\begin{array}{r} 7 \\ 14\overline{)98} \\ \underline{98} \\ 0 \end{array}$$

The pattern is 7 inches wide.

54. a.

$$\begin{array}{r} 14 \\ 15\overline{)218} \\ \underline{15} \\ 68 \\ \underline{60} \\ 8 \end{array}$$

He can completely fill 14 cases.

b. After filling 14 cases, he will have 8 cars left to give to his brother.

56. 4, 16, 64, 256, ...
Each number after the first is the preceding number multiplied by 4. The next number is 4×256 or 1024.

58. 0, 2, 6, 12, 20, ...
Add 2 to the first number to obtain the second. Add 4 to the second number to obtain the third. Add 6, and then add 8. The next number is $20 + 10$ or 30.

60. 1, 6, 8, 13, 15, 20, ...
Alternate adding 5 and adding 2 to the preceding number. The next number is 20 + 2 or 22.

62. 1, 4, 8, ...
Alternate multiplying the preceding number by 4 and multiplying the preceding number by 2. The next number is 4(8) = 32.
Add 3 to the first number to obtain the second.
Add 4 to the second number to obtain the third.
Add 5 to the third number to obtain the fourth:
The next number is 8 + 5 or 13.

64. a. $(48 \div 6) \div 2 = 8 \div 2 = 4$

b. $48 \div (6 \div 2) = 48 \div 3 = 16$

c. Division is not associative.

Cumulative Review

65. Seven plus x equals eleven: $7 + x = 11$

66.
$$\begin{array}{r} 1060 \\ -\ 114 \\ \hline 946 \end{array}$$

67.
$$\begin{array}{r} 4031 \\ \times\ \ 202 \\ \hline 8\,062 \\ 806\,20 \\ \hline 814,262 \end{array}$$

68. 556,432
Identify the round-off place: 55<u>6</u>,432.
The digit to the right is less than 5. Do not change the round-off digit. Replace all digits to the right with zeros.
556,000

69.
$$\begin{array}{r} 1389 \\ -\ 430 \\ \hline 959 \end{array} \qquad \begin{array}{r} 959 \\ -\ 495 \\ \hline 464 \end{array}$$
Leo must drive 464 miles the third day.

70.
$$\begin{array}{r} 29,599 \\ -\ 6,200 \\ \hline 23,399 \end{array} \qquad \begin{array}{r} 23,399 \\ -\ 5,500 \\ \hline 17,899 \end{array}$$
The balance is $17,899.

Classroom Quiz 1.5

1. a. The quotient of twenty and two: $20 \div 2$

b. The quotient of two and twenty: $2 \div 20$

2. $10,577 \div 35 = 302$ R 7
$$\begin{array}{r} 302 \\ 35\overline{)10577} \\ \underline{105} \\ 77 \\ \underline{70} \\ 7 \end{array}$$

3.
$$\begin{array}{r} 1245000 \\ 5\overline{)6225000} \\ \underline{5} \\ 12 \\ \underline{10} \\ 22 \\ \underline{20} \\ 25 \\ \underline{25} \\ 0 \end{array}$$
Each investor will pay $1,245,000.

1.6 Exercises

2. What number cubed is equal to 27?

4. $4 \cdot 4 = 4^2$

6. $x \cdot x = x^2$

8. $z = z^1$

10. $7 \cdot 7 \cdot 7 = 7^3$

12. $8 \cdot 8 \cdot x \cdot x \cdot x = 8^2 x^3$

14. $3 \cdot 3 \cdot y \cdot y \cdot y \cdot y = 3^2 y^4$

16. $6 \cdot 6 \cdot x \cdot y \cdot y = 6^2 xy^2$

18. $x \cdot x \cdot x \cdot x \cdot x \cdot 7 \cdot 7 = x^5 7^2$ or $7^2 x^5$

20. a. $7^6 = 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7$

b. $x^2 = x \cdot x$

22. $3^3 = 3 \cdot 3 \cdot 3 = 27$

24. $6^2 = 6 \cdot 6 = 36$

26. Repeated multiplication of 1 will always equal 1.
$1^{15} = 1$

28. $3^2 = 3 \cdot 3 = 9$

30. $9^3 = 9 \cdot 9 \cdot 9 = 729$

32. $8^1 = 8$

34. $2^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$

36. 10^5 is a 1 with 5 trailing zeros.
$10^5 = 100,000$

38. $y^3 = (3)^3 = 3 \cdot 3 \cdot 3 = 27$
When $y = 3$, y^3 is equal to 27.

40. $b^{18} = (1)^{18} = 1$
When $b = 1$, b^{18} is equal to 1.

42. Three cubed: 3^3

44. Four to the seventh power: 4^7

46. $3 \cdot 5 - 2 = 15 - 2 = 13$

48. $6^3 + 4 - 8 = 216 + 4 - 8 = 220 - 8 = 212$

50. $4 \cdot 2^2 = 4 \cdot 4 = 16$

52. $4 \cdot 4^2 = 4 \cdot 16 = 64$

54. $4^3 - 8 + 7 = 64 - 8 + 7 = 56 + 7 = 63$

56. $5 + 3 \cdot 9 = 5 + 27 = 32$

58. $8 + (7 + 4^3) + 8 + (7 + 64) = 8 + 71 = 79$

60.
$$\begin{aligned} 6^2 \div 6 \times 2 + 1 &= 36 \div 6 \times 2 + 1 \\ &= 6 \times 2 + 1 \\ &= 12 + 1 \\ &= 13 \end{aligned}$$

62. $3 \times 12 \div 4 + 2 = 36 \div 4 + 2 = 9 + 2 = 11$

64. $3^3 + 6 \div 3 = 27 + 2 = 29$

66.
$$\begin{aligned} \frac{(5 + 15 \div 5)}{(9 - 5)} &= (5 + 15 \div 5) \div (9 - 5) \\ &= (5 + 3) \div 4 \\ &= 8 \div 4 \\ &= 2 \end{aligned}$$

68.
$$\begin{aligned} \frac{(16 - 4)}{(36 \div 6 \times 2)} &= (16 - 4) \div (36 \div 6 \times 2) \\ &= 12 \div (6 \times 2) \\ &= 12 \div 12 \\ &= 1 \end{aligned}$$

70.
$$\begin{aligned} 3 + 4(5 \cdot 2 + 8) - 3 &= 3 + 4(10 + 8) - 3 \\ &= 3 + 4 \cdot 18 - 3 \\ &= 3 + 72 - 3 \\ &= 75 - 3 \\ &= 72 \end{aligned}$$

72.
$$\begin{aligned} 88 - 3(2 + 6 \cdot 4) + 6 &= 88 - 3(2 + 24) + 6 \\ &= 88 - 3(26) + 6 \\ &= 88 - 78 + 6 \\ &= 10 + 6 \\ &= 16 \end{aligned}$$

74.
$$\begin{aligned} 2 + 12(3 \cdot 2 + 1) - 10 &= 2 + 12(6 + 1) - 10 \\ &= 2 + 12(7) - 10 \\ &= 2 + 84 - 10 \\ &= 86 - 10 \\ &= 76 \end{aligned}$$

76.
$$\begin{aligned} 63 \cdot 4 - 5(3^2 + 4 \cdot 2^3) + 5 &= 252 - 5(9 + 4 \cdot 8) + 5 \\ &= 252 - 5(9 + 32) + 5 \\ &= 252 - 5(41) + 5 \\ &= 252 - 205 + 5 \\ &= 47 + 5 \\ &= 52 \end{aligned}$$

78.
$$\begin{aligned} 42 \cdot 5 - 3(5^2 + 2 \cdot 4^2) + 3 &= 210 - 3(25 + 2 \cdot 16) + 3 \\ &= 210 - 3(25 + 32) + 3 \\ &= 210 - 3(57) + 3 \\ &= 210 - 171 + 3 \\ &= 39 + 3 \\ &= 42 \end{aligned}$$

80. She should have squared 4 first and then multiplied by 2 to get 32.

82. $10^1 \cdot 10^2 = 10 \cdot 10 \cdot 10 = 10^3 = 10^{1+2}$
$10^1 \cdot 10^3 = 10 \cdot 10 \cdot 10 \cdot 10 = 10^4 = 10^{1+3}$
$10^1 \cdot 10^4 = 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 10^5 = 10^{1+4}$
We add the exponents to determine the exponent of the product.

Cumulative Review

83.
$$\begin{array}{r} 4079 \\ +\ 2762 \\ \hline 6841 \end{array}$$

84.
$$\begin{array}{r} 8900 \\ -\ 477 \\ \hline 8423 \end{array}$$

85.
$$\begin{array}{r} 387 \\ \times\ 196 \\ \hline 2322 \\ 34\,83 \\ 38\,7 \\ \hline 75{,}852 \end{array}$$

86. The product of two and some number: $2x$

Classroom Quiz 1.6

1. a. $6 \cdot 6 \cdot a \cdot a \cdot a = 6^2 a^3$

b. $7 \cdot 7 \cdot 7 \cdot 7 = 7^4$

2. a. $3^3 = 3 \cdot 3 \cdot 3 = 27$

b. $1^{11} = 1$

3.
$$\begin{aligned} 3^3 - 2(12 \div 4 + 2) + 7 &= 3^3 - 2(3+2) + 7 \\ &= 3^3 - 2(5) + 7 \\ &= 3^3 - 10 + 7 \\ &= 27 - 10 + 7 \\ &= 17 + 7 \\ &= 24 \end{aligned}$$

Use Math to Save Money

1.
$$\begin{array}{r} 200.00 \\ 150.50 \\ 120.25 \\ 50.00 \\ +\ 25.00 \\ \hline 545.75 \end{array}$$
The total amount of her deposits is \$545.75.

2.
$$\begin{array}{r} 238.50 \\ 75.00 \\ 200.00 \\ 28.56 \\ +\ 36.00 \\ \hline 578.06 \end{array}$$
The total amount of her checks is \$578.06.

3. Since \$578.06 > \$545.75, she spent more than she deposited, but the \$300.50 would help her to cover her expenses.

4. 300.50 + 545.75 − 578.06 = 268.19
Assume her balance is \$268.19.

5. Eventually she will be in debt.

6. Answers will vary.

7. Answers will vary.

How Am I Doing? Sections 1.1–1.6

1. 9062 = 9000 + 60 + 2

2. 16 < 22

3. 17,248,954 = 17,200,000 to the nearest hundred thousand.

4. a. $(6+a)+3 = (a+6)+3 = a+(6+3) = a+9$

b.
$$\begin{aligned} (6+x+4)+2 &= (x+6+4)+2 \\ &= (x+10)+2 \\ &= x+(10+2) \\ &= x+12 \end{aligned}$$

5. Replace x with 9 and y with 11.
$x + y = 9 + 11 = 20$

6.
$$\begin{array}{r} 9\,532 \\ 251 \\ +\ 322 \\ \hline 10{,}105 \end{array}$$

7. The length of the bottom side is 8 in. + 6 in. or 14 in. The length of the other unlabeled side is 11 in. − 9 in. or 2 in.
9 in. + 8 in. + 2 in. + 6 in. + 11 in. + 14 in. = 50 in.
The perimeter is 50 inches.

8. Eleven decreased by a number: $11 - x$

9.
$$\begin{array}{r} 39,204 \\ -\ 5,982 \\ \hline 33,222 \end{array} \qquad \text{Check:} \quad \begin{array}{r} 33,222 \\ +\ 5,982 \\ \hline 39,204 \end{array}$$

10. Double a number: $2x$

11. $2(4)(y \cdot 5) = 8(5 \cdot y) = (8 \cdot 5)y = 40y$

12.
$$\begin{array}{r} 2371 \\ \times\ \ 126 \\ \hline 14\,226 \\ 47\,42 \\ 237\,1 \\ \hline 298,746 \end{array}$$

13. $6(12) = 72$ rooms

14. The quotient of 144 and x: $144 \div x$

15. $\dfrac{362,664}{721} = 503$ R 1

$$\begin{array}{r} 503 \\ 721\overline{)362664} \\ \underline{3605} \\ 2164 \\ \underline{2163} \\ 1 \end{array}$$

16. $n \cdot n \cdot n \cdot n \cdot 3 \cdot 3 \cdot 3 = n^4 \cdot 3^3 = 3^3 n^4$

17. $4^3 = 4 \cdot 4 \cdot 4 = 64$

18. $2 \cdot 3^2 = 2 \cdot 9 = 18$

19.
$$\begin{aligned} (2+10)+12 \div 6-3^2 &= (2+10)+12 \div 6-9 \\ &= 12+12 \div 6-9 \\ &= 12+2-9 \\ &= 14-9 \\ &= 5 \end{aligned}$$

1.7 Exercises

2. $3(6-4) = 3 \cdot 6 - 3 \cdot 4$ represents the distributive property of multiplication over subtraction.

4. a. $4(5x) = 4 \cdot 5 \cdot 4 \cdot x$ is false because we only use the distributive property when the terms inside the parentheses are added or subtracted.

b. $4(5 + x) = 4 \cdot 5 + 4 \cdot x$ is true because the terms inside the parentheses are added and we can use the distributive property.

6. $9(y + 2) = 9 \cdot \boxed{y} + 9 \cdot \boxed{2}$

8. $8(x - 1) = 8 \cdot \boxed{x} - 8 \cdot \boxed{1}$

10. Seven times x plus three: $7x + 3$

12. Eleven times five minus two: $11 \cdot 5 - 2$

14. Nine times the sum of four and six: $9(4 + 6)$

16. Double the sum of x and one: $2(x + 1)$

18. Three times the difference of six and x: $3(6 - x)$

20. a. Five times six plus one:
$5 \cdot 6 + 1 = 30 + 1 = 31$

b. Eight times the sum of six and one:
$8(6 + 1) = 8(7) = 56$

22. a. Two times seven minus one:
$2 \cdot 7 - 1 = 14 - 1 = 13$

b. Two times the difference of seven and one:
$2(7 - 1) = 2(6) = 12$

24. a. Nine times four plus one:
$9 \cdot 4 + 1 = 36 + 1 = 37$

b. Nine times the sum of four and one:
$9(4 + 1) = 9(5) = 45$

26. Replace m with 4 and n with 5.
$3m + 2n = 3(4) + 2(5) = 12 + 10 = 22$

28. Replace x with 8 and y with 5.
$9x - 2y = 9(8) - 2(5) = 72 - 10 = 62$

30. Replace y with 13.
$$\frac{(y+7)}{5} = \frac{(13+7)}{5} = \frac{20}{5} = 4$$

32. Replace m with 6 and n with 3.

$$\frac{(m^2-6)}{n}=\frac{(6^2-6)}{3}=\frac{(36-6)}{3}=\frac{30}{3}=10$$

34. Replace x with 3 and y with 6.

$$\frac{(x^3+9)}{y}=\frac{(3^3+9)}{6}=\frac{(27+9)}{6}=\frac{36}{6}=6$$

36. Replace n with 3 and m with 7.

$$\frac{(n^2+5)}{m}=\frac{(3^2+5)}{7}=\frac{(9+5)}{7}=\frac{14}{7}=2$$

38. Replace y with 18.

$$\frac{(y-3)}{3}=\frac{(18-3)}{3}=\frac{15}{3}=5$$

40. Replace x with 4 and y with 6.

$5x + 4y = 5 \cdot 4 + 4 \cdot 6 = 20 + 24 = 44$

42. Replace x with 6 and y with 11.

$$\frac{(x^2-3)}{y}=\frac{(6^2-3)}{11}=\frac{(36-3)}{11}=\frac{33}{11}=3$$

44. $2(x + 1) = 2 \cdot x + 2 \cdot 1 = 2x + 2$

46. $6(n - 4) = 6 \cdot n - 6 \cdot 4 = 6n - 24$

48. $4(x - 3) = 4 \cdot x - 4 \cdot 3 = 4x - 12$

50. $5(x + 9) = 5 \cdot x + 5 \cdot 9 = 5x + 45$

52.
$$\begin{aligned}4(x+2)+6&=4\cdot x+4\cdot 2+6\\&=4x+8+6\\&=4x+14\end{aligned}$$

54. $7(y+1)+3=7\cdot y+7\cdot 1+3=7y+7+3=7y+10$

56. $3(x+2)+5=3\cdot x+3\cdot 2+5=3x+6+5=3x+11$

58. $5(y+1)-2=5\cdot y+5\cdot 1-2=5y+5-2=5y+3$

60. $6(x+1)-3=6\cdot x+6\cdot 1-3=6x+6-3=6x+3$

62. Replace a with 5 and b with 3.

$ab^2+4=5\cdot 3^2+4=5\cdot 9+4=45+4=49$

64. Replace a with 3 and b with 7.

$$\begin{aligned}\frac{(a^3-4)-3^2}{b}&=\frac{(3^3-4)-3^2}{7}\\&=\frac{(27-4)-9}{7}\\&=\frac{23-9}{7}\\&=\frac{14}{7}\\&=2\end{aligned}$$

66. a.
$$\begin{aligned}&(x+4)+(x+4)+(x+4)\\&=(x+x+x)+(4+4+4)\\&=3x+12\end{aligned}$$

b. $3(x + 4) = 3 \cdot x + 3 \cdot 4 = 3x + 12$

c. The answers are the same.

Cumulative Review

67. $8(2)(x \cdot 4) = 16(4x) = 64x$

68. Replace x with 2.

$4 + x = 4 + 2 = 6$

69. Replace x with 1 and y with 3.

$x + y + 4 = 1 + 3 + 4 = 4 + 4 = 8$

70.
$$\begin{array}{r}2001\\-\ 463\\\hline 1538\end{array}$$

Classroom Quiz 1.7

1. Two times the sum of x and three: $2(x + 3)$

2.
$$\begin{aligned}2(a+6)+3&=2\cdot a+2\cdot 6+3\\&=2a+12+3\\&=2a+15\end{aligned}$$

3. a. Replace a with 1 and b with 5.

$4a + 6b = 4 \cdot 1 + 6 \cdot 5 = 4 + 30 = 34$

b. Replace m with 6 and n with 8.

$$\frac{m^2-4}{n}=\frac{(6^2-4)}{8}=\frac{(36-4)}{8}=\frac{32}{8}=4$$

1.8 Understanding the Concept
Evaluate or Solve?

1. Answers will vary.

1.8 Exercises

2. $8x$: eight times x or the product of eight and x.

4. $6x = 30$: six times what number equals thirty?

6. $4x + 2xy$ cannot be added because the variable parts, x and xy, are not the same.

8. When two expressions are separated by an equals sign, we call it an equation.

10. The numerical part of x is 1 and is called the coefficient of the term.

12. In the expression $12x + 9x$, $12x$ and $9x$ are called like terms.

14. $10x - 2x = 8x$

16. $2ab + 4ab = 6ab$

18. $7a + 2ab + 2ab = 7a + 4ab$

20. Six y's: $6y$

22. $x + x + x + x + x = 5x$

24. In $2m + 4b + 6m + 3x + 4b$, $2m$ and $6m$ are like terms; $4b$ and $4b$ are like terms.

26. In $7x + 3xy + 4 + 2xy$, $3xy$ and $2xy$ are like terms.

28. $13x + 3x = (13 + 3)x = 16x$

30. $7m - m = 7m - 1m = (7 - 1)m = 6m$

32. $4a + 8a + 3a = (4 + 8 + 3)a = 15a$

34.
$$\begin{aligned} 9y + 2b + 2y + b &= (9y + 2y) + (2b + 1b) \\ &= (9 + 2)y + (2 + 1)b \\ &= 11y + 3b \end{aligned}$$

36.
$$\begin{aligned} 7ab + 5x + 5ab &= (7ab + 5ab) + 5x \\ &= (7 + 5)ab + 5x \\ &= 12ab + 5x \end{aligned}$$

38.
$$\begin{aligned} 5mn + 6m + 1 + 2mn &= (5mn + 2mn) + 6m + 1 \\ &= (5 + 2)mn + 6m + 1 \\ &= 7mn + 6m + 1 \end{aligned}$$

40. $11xy - 2xy + 3 = (11 - 2)xy + 3 = 9xy + 3$

42.
$$\begin{aligned} 12ab + 6 + 5ab + 2 &= (12ab + 5ab) + (6 + 2) \\ &= (12 + 5)ab + 8 \\ &= 17ab + 8 \end{aligned}$$

44.
$$\begin{aligned} &(6a + 5b) + 2b + (6a + 5b) + 2b \\ &= (6a + 6a) + (5b + 2b + 5b + 2b) \\ &= 12a + 14b \end{aligned}$$
The perimeter is $12a + 14b$.

46.
$$\begin{aligned} &(3x + 4y) + (9x + 7y) + (3x + 4y) + (9x + 7y) \\ &= (3x + 9x + 3x + 9x) + (4y + 7y + 4y + 7y) \\ &= 24x + 22b \end{aligned}$$
The perimeter is $24x + 22y$.

48.
$$\begin{aligned} (3a + 2b) + 6b + a &= (3a + a) + (2b + 6b) \\ &= 4a + 8b \end{aligned}$$
The perimeter is $4a + 8b$.

50. When twenty-four is added to a number, the result is fifty.
$24 + x = 50$

52. What number times two is equal to forty?
$2x = 40$

54. If a number is subtracted from twelve, the result is two.
$12 - n = 2$

56. Twenty-two divided by what number is equal to eleven?
$\frac{22}{n} = 11$ or $22 \div n = 11$

58. Sherie's checking account balance, S, plus \$14 equals \$56.
$S + 14 = 56$

60. The price of the ticket, P, decreased by \$5 equals \$16.
$P - 5 = 16$

62. Replace the variable with 3.
$5 - x = 3$
$5 - 3 \stackrel{?}{=} 3$
$2 = 3$, false
No, 3 is not a solution.

64. Replace the variable with 20.
$x + 6 = 26$
$20 + 6 \stackrel{?}{=} 26$
$26 = 26$, true
Yes, 20 is a solution.

66. $x + 4 = 10$
What number plus four is equal to ten?
$6 + 4 = 10$
The solution is $x = 6$.
Check: $x + 4 = 10$
$6 + 4 \stackrel{?}{=} 10$
$10 = 10$ ✓

68. $13 - n = 10$
Thirteen minus what number is equal to ten?
$13 - 3 = 10$
The solution is $n = 3$.
Check: $13 - n = 10$
$13 - 3 \stackrel{?}{=} 10$
$10 = 10$ ✓

70. $x - 2 = 0$
What number minus 2 is equal to 0?
$2 - 2 = 0$
The solution is $x = 2$.
Check: $x - 2 = 0$
$2 - 2 \stackrel{?}{=} 0$
$0 = 0$ ✓

72. $21 + x = 25$
Twenty-one plus what number is equal to 25?
$21 + 4 = 25$
The solution is $x = 4$.
Check: $21 + x = 25$
$21 + 4 \stackrel{?}{=} 25$
$25 = 25$ ✓

74. $44 - n = 42$
Forty-four minus what number is equal to 42?
$44 - 2 = 42$
The solution is $n = 2$.
Check: $44 - n = 42$
$44 - 2 \stackrel{?}{=} 42$
$42 = 42$ ✓

76. $7y = 14$
Seven times what number equals fourteen?
$7(2) = 14$
The solution is $y = 2$.
Check: $7y = 14$
$7(2) \stackrel{?}{=} 14$
$14 = 14$ ✓

78. $9x = 63$
Nine times what number equals 63?
$9(7) = 63$
The solution is $x = 7$.
Check: $9x = 63$
$9(7) \stackrel{?}{=} 63$
$63 = 63$ ✓

80. $10y = 30$
Ten times what number equals thirty?
$10(3) = 30$
The solution is $y = 3$.
Check: $10y = 30$
$10(3) \stackrel{?}{=} 30$
$30 = 30$ ✓

82. $\frac{12}{x} = 1$
Twelve divided by what number is equal to 1?
$\frac{12}{12} = 1$
The solution is $x = 12$.
Check: $\frac{12}{x} = 1$
$\frac{12}{12} \stackrel{?}{=} 1$
$1 = 1$ ✓

84. $\frac{20}{x} = 2$
Twenty divided by what number is equal to 2?
$\frac{20}{10} = 2$
The solution is $x = 10$.
Check: $\frac{20}{x} = 2$
$\frac{20}{10} \stackrel{?}{=} 2$
$2 = 2$ ✓

86. $(x + 6) + 5 = 13$
$x + (6 + 5) = 13$
$x + 11 = 13$
What number plus eleven is equal to thirteen?
$2 + 11 = 13$
The solution is $x = 2$.
Check:
$(x + 6) + 5 = 13$
$(2 + 6) + 5 \stackrel{?}{=} 13$
$8 + 5 \stackrel{?}{=} 13$
$13 = 13$ ✓

88. $(3+x)+2=7$
$(x+3)+2=7$
$x+(3+2)=7$
$x+5=7$
What number plus five is equal to seven?
$2+5=7$
The solution is $x=2$.
Check:
$(3+x)+2=7$
$(3+2)+7 \stackrel{?}{=} 7$
$5+2 \stackrel{?}{=} 7$
$7=7$ ✓

90. $2+(8+x)=12$
$(2+8)+x=12$
$10+x=12$
Ten plus what number is equal to twelve?
$10+2=12$
The solution is $x=2$.
Check: $2+(8+x)=12$
$2+(8+2) \stackrel{?}{=} 12$
$2+10 \stackrel{?}{=} 12$
$12=12$ ✓

92. $6n+n=21$
$6n+1n=21$
$(6+1)n=21$
$7n=21$
Seven times what number is equal to 21?
$7(3)=21$
The solution is $n=3$.
Check: $6n+n=21$
$6\cdot 3+3 \stackrel{?}{=} 21$
$18+3 \stackrel{?}{=} 21$
$21=21$ ✓

94. $3y+y+2y=12$
$3y+1y+2y=12$
$(3+1+2)y=12$
$6y=12$
Six times what number is equal to 12?
$6(2)=12$
The solution is $y=2$.
Check: $3y+y+2y=12$
$3\cdot 2+2+2\cdot 2 \stackrel{?}{=} 12$
$6+2+4 \stackrel{?}{=} 12$
$12=12$ ✓

96. $\frac{30}{x}=15$
Thirty divided by what number is equal to 15?
$\frac{30}{2}=15$
The solution is $x=2$.
Check: $\frac{30}{x}=15$
$\frac{30}{2} \stackrel{?}{=} 15$
$15=15$ ✓

98. $38-n=34$
Thirty-eight minus what number is equal to thirty-four?
$38-4=34$
The solution is $n=4$.
Check: $38-n=34$
$38-4 \stackrel{?}{=} 34$
$34=34$ ✓

100. $(6+x)+1=10$
$(x+6)+1=10$
$x+(6+1)=10$
$x+7=10$
What number plus 7 is equal to 10?
$3+7=10$
The solution is $x=3$.
Check: $(6+x)+1=10$
$(6+3)+1 \stackrel{?}{=} 10$
$9+1 \stackrel{?}{=} 10$
$10=10$ ✓

102. $4y+y+2y=14$
$4y+1y+2y=14$
$(4+1+2)y=14$
$7y=14$
Seven times what number is equal to fourteen?
$7(2)=14$
The solution is $y=2$.
Check: $4y+y+2y=14$
$4\cdot 2+2+2\cdot 2 \stackrel{?}{=} 14$
$8+2+4 \stackrel{?}{=} 14$
$14=14$ ✓

104. Three added to what number equals nine?

a. $3+x=9$

b. $3+6=9$
The solution is $x=6$.

106. Four times what number is equal to twelve?

a. $4n = 12$

b. $4(3) = 12$
The solution is $n = 3$.

108. $30 + 30 + x = 110$
$60 + x = 110$
Sixty plus what number is equal to 110?
60 + 50 = 110
The solution is $x = 50$.
The length of the missing side is 50 yards.

110. $(2 + 8x^2) + 9 + (4x^2 + 6) + x^2$
$= (8x^2 + 4x^2 + x^2) + (2 + 9 + 6)$
$= (8 + 4 + 1)x^2 + 17$
$= 13x^2 + 17$

112. a. $5x + 4x + 6y = (5 + 4)x + 6y = 9x + 6y$

b. $(5x)(6y) = (5 \cdot 6)(x \cdot y) = 30xy$

114. a. $6a + 7y + 3a = (6 + 3)a + 7y = 9a + 7y$

b. $(6a)(7y) = (6 \cdot 7)(a \cdot y) = 42ay$

116. a. From the graph, we see that a zebra can run 40 miles per hour and a Cape hunting dog can run 45 miles per hour. Since 45 > 40, the Cape hunting dog is faster.

b. From the graph, we see that a cheetah's speed is 70 miles per hour. Since this is twice the speed of a rabbit, a rabbit's speed is 35 miles per hour.

Cumulative Review

117. "Split equally between" describes division. The answer is (d).

118. "Find the number of items in an array" describes multiplication. The answer is (c).

119. "Find the total" describes addition. The answer is (a).

120. "How much less" describes subtraction. The answer is (b).

Classroom Quiz 1.8

1. $2m + 6n + 9m + 7n = (2m + 9m) + (6n + 7n)$
$= (2 + 9)m + (6 + 7)n$
$= 11m + 13n$

2. a. $\frac{16}{x} = 8$
Sixteen divided by what number is equal to eight?
$\frac{16}{2} = 8$
The solution is $x = 2$.
Check: $\frac{16}{x} = 8$
$\frac{16}{2} \stackrel{?}{=} 8$
$8 = 8$ ✓

b. $4a - 2a = 8$
$(4 - 2)a = 8$
$2a = 8$
Two times what number equals eight?
2(4) = 8
The solution is $x = 4$.
Check: $4a - 2a = 8$
$4 \cdot 4 - 2 \cdot 4 \stackrel{?}{=} 8$
$16 - 8 \stackrel{?}{=} 8$
$8 = 8$ ✓

c. $3 + (x + 5) = 11$
$3 + (5 + x) = 11$
$(3 + 5) + x = 11$
$8 + x = 11$
Eight plus what number is equal to eleven?
8 + 3 = 11
The solution is $x = 3$.
Check: $3 + (x + 5) = 11$
$3 + (3 + 5) \stackrel{?}{=} 11$
$3 + 8 \stackrel{?}{=} 11$
$11 = 11$ ✓

3. a. What number divided by two equals eight?
$\frac{x}{2} = 8$
$\frac{16}{2} = 8$
The solution is $x = 16$.

b. Randy's savings account balance, R, increased by \$20 equals \$70.
$R + 20 = 70$
What number plus 20 equals 70?
$50 + 20 = 70$
The solution is $R = 50$.
Randy's balance is \$50.

1.9 Exercises

2. a. Round to the nearest ten, the costs are \$40, \$40, \$10, and \$90.
\$40 + \$40 + \$10 + \$90 = \$180
Julio spent about \$180.

b. \$41 + \$37 + \$13 + \$89 = \$180
Emma spent \$180.

c. Yes, the estimate is reasonable since; it is the same as the amount spent.

4. Year 1: 15,300 rounds to 15,000.
Year 2: 14,880 rounds to 15,000.
Year 3: 9100 rounds to 9000.
Year 4: 13,950 rounds to 14,000.
15,000 mi + 15,000 mi = 30,000 mi
Mike drove his truck about 30,000 miles the first two years.
9000 mi + 14,000 mi = 23,000 mi
He drove about 23,000 miles the second two years.
30,000 mi − 23,000 mi = 7000 mi
Mike drove his truck about 7000 more miles the first two years than the second two years.

6. Find the total cost.

10 washers	= 10(320) = \$3200
5 dryers	= 5(400) = \$2000
20 dishwashers	= 20(450) = \$9000
	Total: \$14,200

Divide the total cost by the number of owners.
$14{,}200 \div 200 = 71$
The assessment will be \$71 for each student.

8.

5 adult tickets	= 5(17) = \$ 85
4 student tickets	= 4(9) = \$ 36
3 child tickets	= 3(8) = \$ 24
	Total: \$145

Ranak and her friends spent \$145 on tickets.

10. 6 ft + 12 ft + 6 ft + 2 ft = 26 ft
Rosa will need 26 feet of molding.

12. a.

5 tagged players	= 5(3) = 15 points
pulling the flag	= 22 points
hanging the flag	= 50 points
3 players left	= 3(1) = 3 points
	Total: 90 points

The Alpha team had 90 points at the end of the match.

b. 7 tagged players = 7(3) = 21 points
5 players left = 5(1) = 5 points
Total: 26 points
The Greyhounds received 26 points in the match.

14. a.

Gather the facts	What am I asked to do?	How do I proceed?	Key points to remember
Apartment expenses: rent–$920 utilities–$96 telephone–$56	Calculate each roommate's share of monthly expenses.	**1.** Add to find the sum of all expenses. **2.** Divide the result in step 1 by 4.	The expenses must be shared equally by 4 roommates.

b. Find the sum of all the expenses.
$920 + $96 + $56 = $1072
Divide the total expenses by 4.
$1072 ÷ 4 = $268
Each roommate's share is $268.

16. a. Subtract the expenses from the amount sold in tickets to find the profit.

$$\begin{array}{r} 2568 \\ -\ 1062 \\ \hline 1506 \end{array}$$

The PTA's profit was $1506.

b. Divide the profit by 3.
1506 ÷ 3 = 502
Each club received $502.

18. The job at ComTec pays 12(3200) = $38,400 per year. Assuming 52 weeks per year, the programming position at BLM Accountants pays 52(40)(16) = $33,280 per year.
Since 38,400 > 33,280, the job at ComTec pays more.

20. The salary option pays 12(1800) = $21,600 per year. Assuming 52 weeks per year, the commission option pays 52(10)(40) = $20,800 per year.
Since 21,600 > 20,800, the salary option pays more.

22. a. Divide the total number of stamps by 2.
2500 ÷ 2 = 1250
Lester donated 1250 stamps to the senior citizen group.

b. There are 1250 stamps left. Divide this number by the number of grandchildren.
1250 ÷ 5 = 250
Each grandchild will receive 250 stamps.

24. a. Find the total of Marsha's purchases.
230 + 140 + 180 = 550
Divide the total by 50.
550 ÷ 50 = 11
Marsha earned 11(5) = 55 points from total purchases. She earned an additional 25 points for having one purchase over $200.
55 + 25 = 80
Marsha earned 80 points in June.

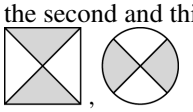
b. Divide the number of points by 10.
$80 \div 10 = 8$
Marsha earned 8 discount dollars.

26. a. Find the total of Ian's purchases.
$80 + 160 + 220 = 460$
Divide the total by 50.
$460 \div 50 = 9$ R 10
Ian earned $9(10) = 90$ points from total purchases. He earned an additional 50 points for having one purchase over \$200.
$90 + 50 = 140$

b. Divide the number of points by 25.
$140 \div 25 = 5$ R 15
Ian earned five \$5 discounts for a total of \$25 in discounts.

28. 4, 16, 36, 64, 100, ...
Write the numbers in exponent form.
$2^2, 4^2, 6^2, 8^2, 10^2, ...$
The sequence consists of the squares of consecutive even numbers. The next even number is 12, so the next number in the sequence is $12^2 = 144$.

30. The sequence alternates between two consecutive squares and two consecutive circles, so the next figure is a square and the one after that is a circle. The pattern of shaded regions is rotated in each figure. The fifth figure is identical to the first figure. The next two figures are identical to the second and third figures in the sequence.



Cumulative Review

32. $4 \cdot 3 \cdot 2 \cdot 5 = (4 \cdot 3) \cdot (2 \cdot 5) = 12 \cdot 10 = 120$

33. $6x = 30$
Six times what number equals 30?
$6(5) = 30$
The solution is $x = 5$.

34. $x + 9 = 12$
What number plus 9 equals 12?
$3 + 9 = 12$
The solution is $x = 3$.

Classroom Quiz 1.9

1. Find the total of Melissa's purchases.
$542 + 47 + 149 + 286 = 1024$
Divide the total by 100.
$1024 \div 100 = 10$ R 24
Melissa earned $10(5) = 50$ points in June.

2. Balance & Deposits: 3050, 93, 133, + 220 = 3496
Withdrawals: 50, + 76 = 126
Subtract the withdrawals from the total of the balance and deposits.
$3496 - 126 = 3370$
His ending balance was \$3370.
$3370 \div 2 = 1685$
Jesse will have \$1685 left in his savings account.

3. a. Two 30×36: 2(316) = 632
One 36×48: 1(397) = 397
Two 48×42: 2(452) = 904
Total: \$1933
The total cost is \$1933.

b. Rounded to the nearest ten the prices are \$320, \$320, \$400, 4450, and \$450.
$320 + 320 + 400 + 450 + 450 = 1940$
The total cost is about \$1940.

c. $1940 - 1933 = 7$
The difference is \$7.

You Try It

1. In words, 23,327,414 is written as twenty-three million, three hundred twenty-seven thousand, four hundred fourteen.

2. $2 ? 11$ 2 is less than 11. $2 < 11$
$17 ? 13$ 17 is greater than 13. $17 > 13$

3. 133,442
Identify the round-off place digit: 13<u>3</u>,442.
The digit to the right is less than 5. Do not change the round-off place digit. Replace all digits to the right with zeros.
133,000

4. $(x + 6) + 8 = x + (6 + 8) = x + 14$

5.
$$\begin{array}{r} 121 \\ 46 \\ 592 \\ +\ \ 3 \\ \hline 762 \end{array}$$

6. unlabeled vertical side: 9 m − 2 m = 7 m
unlabeled horizontal side: 18 m − 6 m = 12 m
6 + 2 + 12 + 7 + 18 + 9 = 54 m
The perimeter is 54 meters.

7.
$$\begin{array}{r} 47,621 \\ -\ 5,935 \\ \hline 41,686 \end{array}$$

8. a. Twice a number: $2n$

b. Five times a number: $5n$

c. A number times eight: $x \cdot 8$

d. The product of four and two: $4 \cdot 2$

9. $4(y \cdot 5) = 4(5 \cdot y) = (4 \cdot 5)y = 20y$

10.
$$\begin{array}{r} 468 \\ \times\ \ 251 \\ \hline 468 \\ 2340 \\ 93\,6 \\ \hline 117,468 \end{array}$$

11. a. The quotient of six and x: $6 \div x$

b. The quotient of x and six: $x \div 6$

c. A number divided by 3: $n \div 3$

12. $988 \div 21 = 47$ R 1
$$\begin{array}{r} 47 \\ 21\overline{)988} \\ \underline{84} \\ 148 \\ \underline{147} \\ 1 \end{array}$$

13. a. $8 \cdot 8 \cdot 8 \cdot n \cdot n = 8^3 n^2$

b. $2^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$

14.
$$\begin{aligned} 4 + 8 \div 2^2 \cdot 5 - 3^2 &= 4 + 8 \div 4 \cdot 5 - 9 \\ &= 4 + 2 \cdot 5 - 9 \\ &= 4 + 10 - 9 \\ &= 14 - 9 \\ &= 5 \end{aligned}$$

15. a. Four times the difference of x and 5: $4(x - 5)$

b. Four times x minus five: $4x - 5$

16. $7(n - 3) = 7 \cdot n - 7 \cdot 3 = 7n - 21$

17. $4mn + 2n + 6mn = 10mn + 2n$

18. a.
$$\begin{aligned} 4n &= 24 \\ 4 \cdot 6 &= 24 \\ n &= 6 \end{aligned}$$

b.
$$\begin{aligned} \frac{35}{x} &= 7 \\ \frac{35}{5} &= 7 \\ x &= 5 \end{aligned}$$

19.
$$\begin{aligned} 3 + (x + 2) &= 15 \\ 3 + (2 + x) &= 15 \\ (3 + 2) + x &= 15 \\ 5 + x &= 15 \\ 5 + 10 &= 15 \\ x &= 10 \end{aligned}$$

20.
$$\begin{aligned} 10 - x &= 2 \\ 10 - 8 &= 2 \\ x &= 8 \end{aligned}$$

21. a. Replace x with 3 and y with 2.
$5x + 3y = 5(3) + 3(2) = 15 + 6 = 21$
When $x = 3$ and $y = 2$, $5x + 3y = 21$.

b. Replace x with 10.
$$\frac{(x-4)}{3} = \frac{(10-4)}{3} = \frac{6}{3} = 2$$
When $x = 10$, $\dfrac{x-4}{3} = 2$.

22. \$2499 rounds to \$2500.
\$2130 rounds to \$2100.
\$2500 − \$2100 = \$400
Sara saved approximately \$400.

Chapter 1 Review Problems

1. A rectangle is a four-sided figure with adjoining sides that are perpendicular and opposite sides that are equal.

2. A square is a rectangle with all sides equal.

3. A right angle is an angle that measures 90°.

4. A triangle is a three-sided figure with three angles.

5. The perimeter is the distance around an object.

6. Factors are the numbers or variables that we multiply.

7. A term is a number, a variable, or a product of a number and one or more variables.

8. A constant term is a term that has no variable.

9. The coefficient is the number factor in a term.

10. Like terms are terms with identical variable parts.

11. An equation is two expressions separated by an equals sign.

12. **a.** In the number 175,493, the digit 7 is in the ten thousands place.

b. In the number 175,493, the digit 5 is in the thousands place.

13. \$187
Write 187.00 in the box following \$. Write "One hundred eighty-seven and 00/100" on the line preceding DOLLARS.

14. 7694 = 7000 + 600 + 90 + 4

15. 5831 = 5000 + 800 + 30 + 1

16. 2 ? 8
2 is less than 8.
$2 < 8$

17. 12 ? 0
12 is greater than 0.
$12 > 0$

18. Six is greater than one: $6 > 1$

19. Three is less than five: $3 < 5$

20. 61,269
Identify the round-off place digit: 61,2̲69.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Replace all digits to the right with zeros.
61,300

21. 382,240
Identify the round-off place digit: 382,2̲40.
The digit to the right is less than 5. Do not change the round off place digit. Replace all digits to the right with zeros.
382,200

22. 6,365,534
Identify the round-off place digit: 6,3̲65,534.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Replace all digits to the right with zeros.
6,400,000

23. 8,118,701
Identify the round-off place digit: 8,1̲18,701.
The digit to the right is less than 5. Do not change the round-off place digit. Replace all digits to the right with zeros.
8,100,000

24. Seven more than a number: $x + 7$

25. The sum of some number and five: $n + 5$

26. $7 + (9 + x) = (7 + 9) + x = 16 + x$

27. $(2 + n) + 9 = (n + 2) + 9 = n + (2 + 9) = n + 11$

28.
$$\begin{aligned} 5+(n+2) &= (n+2)+5 \\ &= n+(2+5) \\ &= n+7 \text{ or } 7+n \end{aligned}$$

29.
$$\begin{aligned} (5+x+3)+2 &= (x+5+3)+2 \\ &= (x+8)+2 \\ &= x+10 \end{aligned}$$

30.
$$\begin{array}{r} 8398 \\ 372 \\ +\ 255 \\ \hline 9025 \end{array}$$

31.
$$\begin{array}{r} 17,456 \\ 213 \\ +\ 982 \\ \hline 18,651 \end{array}$$

32.
$$\begin{array}{r} 1434 \\ 1596 \\ 1423 \\ +\ 1565 \\ \hline 6018 \end{array}$$
A total of 6018 students attend the college.

33. The length of the right side of the figure is $8 + 5 = 13$ meters, and the length of the bottom is $13 + 7 = 20$ meters.
$8 \text{ m} + 13 \text{ m} + 5 \text{ m} + 7 \text{ m} + 13 \text{ m} + 20 \text{ m} = 66 \text{ m}$
The perimeter is 66 meters.

34. Eight decreased by a number: $8 - n$

35. The difference of a number and six: $n - 6$

36. Ten subtracted from a number: $x - 10$

37. Replace x with 3.
$8 - x = 8 - 3 = 5$
If x is equal to 3, then $8 - x$ is equal to 5.

38. Replace y with 15.
$y - 9 = 15 - 9 = 6$
If y is equal to 15, then $y - 9$ is equal to 6.

39.
$$\begin{array}{r} 8502 \\ -\ 2957 \\ \hline 5545 \end{array}$$
Check:
$$\begin{array}{r} 2957 \\ +\ 5545 \\ \hline 8502 \end{array}$$

40.
$$\begin{array}{r} 9021 \\ -\ 5862 \\ \hline 3159 \end{array}$$
Check:
$$\begin{array}{r} 5862 \\ +\ 3159 \\ \hline 9021 \end{array}$$

41.
$$\begin{array}{r} 29{,}104 \\ -\ 4{,}988 \\ \hline 24{,}116 \end{array}$$
Check:
$$\begin{array}{r} 24{,}116 \\ +\ 4{,}988 \\ \hline 29{,}104 \end{array}$$

42. The player won 4900,000 in 2009 and $522,000 in 2006.
$$\begin{array}{r} 900{,}000 \\ -\ 522{,}000 \\ \hline 378{,}000 \end{array}$$
The player won $378,000 more in 2009.

43. The player won $450,000 in 2005 and $720,000 in 2008.
$$\begin{array}{r} 720{,}000 \\ -\ 450{,}000 \\ \hline 270{,}000 \end{array}$$
The player won $270,000 less in 2005.

44. $4x = 32$
The factors are 4 and x.

45. Triple a number: $3x$

46. $7y = 63$
Seven times what number equals 63?

47. $7 \cdot 2 \cdot 3 \cdot 0 = 0$

48. $5 \cdot 3 \cdot 2 \cdot 2 = (5 \cdot 2) \cdot (3 \cdot 2) = 10 \cdot 6 = 60$

49. $6(y \cdot 7) = 6(7y) = (6 \cdot 7)y = 42y$

50. $3(5)(x \cdot 2) = 15(2x) = (15 \cdot 2)x = 30x$

51. $3(2)(x \cdot 4) = 6(4x) = (6 \cdot 4)x = 24x$

52.
$$\begin{array}{r} 416 \\ \times\ 2000 \\ \hline 832{,}000 \end{array}$$

53.
$$\begin{array}{r} 4251 \\ \times\ 352 \\ \hline 8\ 502 \\ 212\ 55 \\ 1\ 275\ 3 \\ \hline 1{,}496{,}352 \end{array}$$

54.
$$\begin{array}{r} 6424 \\ \times\ 903 \\ \hline 19\ 272 \\ 5\ 781\ 60 \\ \hline 5{,}800{,}872 \end{array}$$

55.
$$\begin{array}{r} 17 \\ \times 18 \\ \hline 136 \\ 17 \\ \hline 306 \end{array}$$
Lisa can travel 306 miles.

56. There are $6 \times 21 = 126$ apartments, so there are $4 \times 126 = 504$ doors.

57. There are $300 \div 20$ rows.

58. Each person will receive $500 \div n$.

59. Five divided by a number: $5 \div y$

60. The quotient of a number and thirteen: $n \div 13$

61. $10 \div 0$ undefined

62. $33 \div 33 = 1$

63. $1456 \div 29 = 50$ R 6

$$\begin{array}{r} 50 \\ 29\overline{)1456} \\ \underline{145} \\ 06 \\ \underline{0} \\ 6 \end{array}$$

64. $369{,}757 \div 922 = 401$ R 35

$$\begin{array}{r} 401 \\ 922\overline{)369757} \\ \underline{3688} \\ 957 \\ \underline{922} \\ 35 \end{array}$$

65. $\dfrac{510{,}144}{846} = 603$ R 6

$$\begin{array}{r} 603 \\ 846\overline{)510144} \\ \underline{5076} \\ 2544 \\ \underline{2538} \\ 6 \end{array}$$

66.

$$\begin{array}{r} 111 \\ 4\overline{)447} \\ \underline{4} \\ 04 \\ \underline{4} \\ 07 \\ \underline{4} \\ 3 \end{array}$$

The remainder is 3. The club deposited \$3.

67.

$$\begin{array}{r} 147 \\ 24\overline{)3528} \\ \underline{24} \\ 112 \\ \underline{96} \\ 168 \\ \underline{168} \\ 0 \end{array}$$

The payments will be \$147.

68. $2 \cdot 2 \cdot 2 \cdot n \cdot n = 2^3 n^2$

69. $z \cdot z \cdot z \cdot z \cdot 5 \cdot 5 \cdot 5 = z^4 \cdot 5^3$ or $5^3 z^4$

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

71. $6^5 = 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6$

72. $10^3 = 10 \cdot 10 \cdot 10 = 1000$

73. $2^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$

74. Six cubed: 6^3

75. x to the fifth power: x^5

76.
$$\begin{aligned} 6 + 24 \div 8 - 2^2 &= 6 + 24 \div 8 - 4 \\ &= 6 + 3 - 4 \\ &= 9 - 4 \\ &= 5 \end{aligned}$$

77. $(15 + 25 \div 5) \div (8 - 4) = (15 + 5) \div 4 = 20 + 4 = 5$

78. $5 \cdot 2^2 = 5 \cdot 4 = 20$

79. a. Three times x plus two: $3x + 2$

b. Three times the sum of x and two: $3(x + 2)$

80. a. Four times x minus five: $4x - 5$

b. Four times the difference of x and five: $4(x - 5)$

81. a. Three times seven plus one:
$3 \cdot 7 + 1 = 21 + 1 = 22$

b. Three times the sum of seven and one:
$3(7 + 1) = 3(8) = 24$

82. Replace x with 3 and y with 2.

$$\frac{x^3 - 1}{y} = \frac{3^3 - 1}{2} = \frac{27 - 1}{2} = \frac{26}{2} = 13$$

If x is equal to 3 and y is equal to 2, $\dfrac{x^3 - 1}{y}$ is equal to 13.

83. Replace m with 8 and n with 2.
$2m + 3n = 2 \cdot 8 + 3 \cdot 2 = 16 + 6 = 22$
If m is equal to 8 and n is equal to 2, $2m + 3n$ is equal to 22.

84. $5(x + 1) = 5x + 5(1) = 5x + 5$

85. $4(x - 1) = 4x - 4(1) = 4x - 4$

86. $3(x+1)+5 = 3 \cdot x + 3 \cdot 1 + 5 = 3x + 3 + 5 = 3x + 8$

87. $2x + x + 6x = 2x + 1x + 6x = (2 + 1 + 6)x = 9x$

88. $5x + 6y + 6x = (5x + 6x) + 6y$
$= (5 + 6)x + 6y$
$= 11x + 6y$

89. $3xy + 5y + 2xy + 8y = (3xy + 2xy) + (5y + 8y)$
$= (3 + 2)xy + (5 + 8)y$
$= 5xy + 13y$

90. $(2x + 4y) + (3x + y) + (2x + 4y) + (3x + y)$
$= (2x + 3x + 2x + 3x) + (4y + y + 4y + y)$
$= 10x + 10y$
The perimeter is $10x + 10y$.

91. $x + 2 = 9$
What number plus two is equal to nine?
$7 + 2 = 9$
The solution is $x = 7$.
Check: $x + 7 = 9$
$2 + 7 \stackrel{?}{=} 9$
$9 = 9$ ✓

92. $10 - n = 6$
Ten minus what number is equal to six?
$10 - 4 = 6$
The solution is $n = 4$.
Check: $10 - n = 6$
$10 - 4 \stackrel{?}{=} 6$
$6 = 6$ ✓

93. $(3 + x) + 1 = 8$
$(x + 3) + 1 = 8$
$x + (3 + 1) = 8$
$x + 4 = 8$
What number plus four is equal to eight?
$4 + 4 = 8$
The solution is $x = 4$.
Check: $(3 + x) + 1 = 8$
$(3 + 4) + 1 \stackrel{?}{=} 8$
$7 + 1 \stackrel{?}{=} 8$
$8 = 8$ ✓

94. $2 + (n + 7) = 10$
$2 + (7 + n) = 10$
$(2 + 7) + n = 10$
$9 + n = 10$
Nine plus what number is equal to ten?
$9 + 1 = 10$
The solution is $n = 1$.
Check: $2 + (n + 7) = 10$
$2 + (1 + 7) \stackrel{?}{=} 10$
$2 + 8 \stackrel{?}{=} 10$
$10 = 10$ ✓

95. $9x = 27$
Nine times what number is equal to 27?
$9(3) = 27$
The solution is $x = 3$.
Check: $9x = 27$
$9 \cdot 3 \stackrel{?}{=} 27$
$27 = 27$ ✓

96. $\frac{15}{x} = 5$
Fifteen divided by what number is equal to five?
$15 \div 3 = 5$
The solution is $x = 3$.
Check: $\frac{15}{x} = 5$
$\frac{15}{3} \stackrel{?}{=} 5$
$5 = 5$ ✓

97. $12n - n = 22$
$12n - 1n = 22$
$(12 - 1)n = 22$
$11n = 22$
Eleven times what number equals 22?
$11(2) = 22$
The solution is $n = 2$.
Check: $12n - n = 22$
$12 \cdot 2 - 2 \stackrel{?}{=} 22$
$24 - 2 \stackrel{?}{=} 22$
$22 = 22$ ✓

98. $y + 3y + 2y = 12$
$1y + 3y + 2y = 12$
$(1 + 3 + 2)y = 12$
$6y = 12$
Six times what number is equal to 12?
$6(2) = 12$
The solution is $y = 2$.

Check: $y + 3y + 2y = 12$
$2 + 3 \cdot 2 + 2 \cdot 2 \stackrel{?}{=} 12$
$2 + 6 + 4 \stackrel{?}{=} 12$
$12 = 12$ ✓

99. What number subtracted from eighteen equals three?

a. $18 - x = 3$

b. $18 - 15 = 3$
The solution is $x = 15$.

100. What number increased by five equals eleven?

a. $x + 5 = 11$

b. $6 + 5 = 11$
The solution is $x = 6$.

101. Triple what number is equal to twelve?

a. $3 \cdot x = 12$

b. $3 \cdot 4 = 12$
The solution is $x = 4$.

102. Rounded to the nearest ten, the costs are \$30, \$30, \$90, and \$160.
\$30 + \$30 + \$90 + \$160 = \$310
Joseph will pay about \$310.

103. Find the total deductions.

$$\begin{array}{r} 499 \\ 218 \\ +\ 97 \\ \hline 814 \end{array}$$

Subtract the amount of the deductions from the salary.

$$\begin{array}{r} 3560 \\ -\ 814 \\ \hline 2746 \end{array}$$

The check was \$2746 after deductions.

104. **a.**

Balance & Deposits	Withdrawals
5021	799
759	533
2534	+ 88
+ 532	1420
8846	

Subtract the withdrawals from the total of the balance and deposits.

$$\begin{array}{r} 8846 \\ -\ 1420 \\ \hline 7426 \end{array}$$

Her ending balance was \$7426.

b. $7426 \div 2 = 3713$
Jean will have \$3713 in each account.

105. The perimeter of the living room is $20 + 25 + 20 + 25 = 90$ feet, and the perimeter of the dining room is $15 + 18 + 15 + 18 = 66$ feet. Ruth Ann needs to purchase a total of $90 + 66$ or 156 feet of crown molding. At \$3 per foot, the total cost is $\$3 \times 156$ or \$468.

How Am I Doing? Chapter 1 Test

1. $1525 = 1000 + 500 + 20 + 5$

2. **a.** 7 ? 2
7 is greater than 2.
$7 > 2$

b. 5 ? 0
5 is greater than 0.
$5 > 0$

3. 2925

a. Identify the round-off place digit: 2925.
The digit to the right is 5 or more. Increase the round-off place digit by 1. Replace all digits to the right with zeros.
3000

b. Identify the round-off place digit: 2925.
The digit to the right is less than 5. Do not change the round-off place digit. Replace all digits to the right with zeros.
2900

4. **a.**
$$\begin{aligned} 3 + (8 + x) &= (8 + x) + 3 \\ &= (x + 8) + 3 \\ &= x + (8 + 3) \\ &= x + 11 \end{aligned}$$

b. $5 + y + 2 = y + 5 + 2 = y + 7$

c.
$$\begin{aligned} 1 + (n + 2) + 4 &= (n + 2) + 1 + 4 \\ &= (n + 2) + 5 \\ &= n + (2 + 5) \\ &= n + 7 \end{aligned}$$

5.
$$\begin{array}{r} 12,389 \\ 4 \\ +\ 2,302 \\ \hline 14,695 \end{array}$$

6.
$$\begin{array}{r} 244,869,201 \\ +\ \ 19,077 \\ \hline 244,888,278 \end{array}$$

7. a.
$$\begin{array}{r} 613 \\ -\ \ 75 \\ \hline 538 \end{array}$$

b.
$$\begin{array}{r} 20,105 \\ -\ 7,826 \\ \hline 12,279 \end{array}$$

8. The length of the unlabeled top side is $9 - 7 = 2$ feet, and the length of the right side of the figure is $6 - 1 = 5$ feet.
6 ft + 2 ft + 1 ft + 7 ft + 5 ft + 9 ft = 30 ft
The perimeter is 30 feet.

9. $2(4)(y \cdot 2) = 8(2y) = (8 \cdot 2)y = 16y$

10. a.
$$\begin{array}{r} 432 \\ \times\ \ 312 \\ \hline 864 \\ 4\ 32\ \ \\ 129\ 6\ \ \\ \hline 134,784 \end{array}$$

b.
$$\begin{array}{r} 2031 \\ \times\ \ 129 \\ \hline 18\ 279 \\ 40\ 62\ \ \\ 203\ 1\ \ \\ \hline 261,999 \end{array}$$

11. a. $492 \div 12 = 41$
$$\begin{array}{r} 41 \\ 12\overline{)492} \\ \underline{48} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

b. $5523 \div 46 = 120$ R 3
$$\begin{array}{r} 120 \\ 46\overline{)5523} \\ \underline{46} \\ 92 \\ \underline{92} \\ 03 \\ \underline{0} \\ 3 \end{array}$$

12. a. Seven subtracted from a number: $n - 7$

b. The product of ten and a number: $10n$

c. y to the fourth power: y^4

d. 7 cubed: 7^3

e. Six times the sum of x and nine: $6(x + 9)$

13. a.
$$\begin{aligned} 3xy + 2y + 4xy - 2 &= (3xy + 4xy) + 2y - 2 \\ &= (3+4)xy + 2y - 2 \\ &= 7xy + 2y - 2 \end{aligned}$$

b.
$$\begin{aligned} 2m + 5 + m + 6mn &= (2m + m) + 5 + 6mn \\ &= (2m + 1m) + 5 + 6mn \\ &= (2+1)m + 5 + 6mn \\ &= 3m + 5 + 6mn \end{aligned}$$

14. $3(y + 4) = 3 \cdot y + 3 \cdot 4 = 3y + 12$

15.
$$\begin{aligned} 8(x+1) + 2 &= 8 \cdot x + 8 \cdot 1 + 2 \\ &= 8x + 8 + 2 \\ &= 8x + 10 \end{aligned}$$

16. a. Replace x with 16 and y with 4.
$2x - 3y = 2 \cdot 16 - 3 \cdot 4 = 32 - 12 = 20$
If x is equal to 16 and y is equal to 4, $2x - 3y$ is equal to 20.

b. Replace a with 9 and b with 7.
$$\frac{a^2 - 4}{b} = \frac{9^2 - 4}{7} = \frac{81 - 4}{7} = \frac{77}{7} = 11$$
If $a = 9$ and $b = 7$, then $\dfrac{a^2 - 4}{b} = 11$.

17. $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot n \cdot n \cdot n = 6^5 n^3$

18. a. $5^3 = 5 \cdot 5 \cdot 5 = 125$

b. $10^5 = 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 100,000$

19. $24 \div 4 - 2 \cdot 3 = 6 - 2 \cdot 3 = 6 - 6 = 0$

20. $6^2 - 7 + 3 \cdot 4 = 36 - 7 + 3 \cdot 4$
$= 36 - 7 + 12$
$= 29 + 12$
$= 41$

21. $3 \cdot 2 + 4(7 - 1) = 3 \cdot 2 + 4(6)$
$= 6 + 4(6)$
$= 6 + 24$
$= 30$

22. a. $7 + x = 13$
Seven plus what number is equal to thirteen?
$7 + 6 = 13$
The solution is $x = 6$.

b. $\frac{x}{4} = 2$
What number divided by four is equal to two?
$8 \div 4 = 2$
The solution is $x = 8$.

c. $x + 3x = 36$
$1x + 3x = 36$
$(1 + 3)x = 36$
$4x = 36$
Four times what number is equal to 36?
$4(9) = 36$
The solution is $x = 9$.

d. $5 + (b + 2) = 18$
$5 + (2 + b) = 18$
$(5 + 2) + b = 18$
$7 + b = 18$
Seven plus what number is equal to eighteen?
$7 + 11 = 18$
The solution is $b = 11$.

e. $9n - n = 32$
$9n - 1n = 32$
$(9 - 1)n = 32$
$8n = 32$
Eight times what number is equal to 32?
$8(4) = 32$
The solution is $n = 4$.

23. Fred's checking account balance, B, decreased by \$155 equals \$275: $B - 155 = 275$.

24. What number divided by six equals two?

a. $x \div 6 = 2$

b. $12 \div 6 = 2$
The solution is $x = 12$.

25. Three subtracted from what number equals one.

a. $x - 3 = 1$

b. $4 - 3 = 1$
The solution is $x = 4$.

26. a.
$$\begin{array}{rr} 412 \text{ adults} = 412(25) = & \$10,300 \\ 280 \text{ children} = 280(18) = & \$\ 5,040 \\ \text{Total:} & \$15,340 \end{array}$$
The total income from tickets was \$15,340.

b. Subtract the expenses from the income.
$$\begin{array}{r} 15,340 \\ -\ 7,350 \\ \hline 7,990 \end{array}$$
The profit for the event was \$7990.

27. Beth has four choices of types of sandwiches and three choices of breads. Multiply to find the number of different sandwiches.
$4(3) = 12$
There are 12 different sandwiches possible.

28. Find the total deductions.
$$\begin{array}{r} 265 \\ 78 \\ +\ 57 \\ \hline 400 \end{array}$$
Subtract the amount of the deductions from the salary.
$$\begin{array}{r} 1540 \\ -\ 400 \\ \hline 1140 \end{array}$$
The check was \$1140 after deductions.

29.
$$\begin{array}{r} 525 \\ 525 \\ 200 \\ +\ 40 \\ \hline 1290 \end{array}$$
Fred needed \$1290 to move into the apartment.

30. a. Rounded to the nearest hundred, the expenses are \$800, \$200, \$100, \$200 and \$300.
\$800 + \$200 + \$100 + \$200 + \$300 = \$1600
Sylvia's expenses were about \$1600.

b. Rounded to the nearest hundred, Sylvia's income was \$1900.
1900 − 1600 = 300
Sylvia had about \$300 left.

31. Divide the total number of miles by 2 to find how many 3-point awards Elizabeth will accumulate.
5000 ÷ 2 = 2500
Multiply this number by 3 to obtain the total number of points.
3(2500) = 7500
Elizabeth will accumulate 7500 points.