

***Algebra Foundations 2nd edition Martin Gay
Solutions Manual***

SKU: 9780135239247-SOLUTIONS

Chapter 1

Section 1.2 Practice Exercises

1. The place value of the 8 in 38,760,005 is millions.
2. The place value of the 8 in 67,890 is hundreds.
3. The place value of the 8 in 481,922 is ten-thousands.
4. 54 is written as fifty-four.
5. 678 is written as six hundred seventy-eight.
6. 93,205 is written as ninety-three thousand, two hundred five.
7. 679,430,105 is written as six hundred seventy-nine million, four hundred thirty thousand, one hundred five.
8. Thirty-seven in standard form is 37.
9. Two hundred twelve in standard form is 212.
10. Eight thousand, two hundred seventy-four in standard form is 8,274 or 8274.
11. Five million, fifty-seven thousand, twenty-six in standard form is 5,057,026.
12. 4,026,301
 $= 4,000,000 + 20,000 + 6000 + 300 + 1$
13. a. Find Australia in the “Country” column. Read from left to right until the “bronze” column is reached. Australia won 10 bronze medals.

b. Find the countries for which the entry in the “Total” column is greater than 60. The United States, China, and Great Britain won more than 60 medals.

Vocabulary, Readiness & Video Check 1.2

1. The numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, ... are called whole numbers.
2. The number 1286 is written in standard form.
3. The number “twenty-one” is written in words.
4. The number $900 + 60 + 5$ is written in expanded form.

5. In a whole number, each group of 3 digits is called a period.
6. The place value of the digit 4 in the whole number 264 is ones.
7. hundreds
8. To read (or write) a number, read from left to right.
9. 80,000
10. Boxer

Exercise Set 1.2

2. The place value of the 5 in 905 is ones.
4. The place value of the 5 in 6527 is hundreds.
6. The place value of the 5 in 79,050,000 is ten-thousands.
8. The place value of the 5 in 51,682,700 is ten-millions.
10. 316 is written as three hundred sixteen.
12. 5445 is written as five thousand, four hundred forty-five.
14. 42,009 is written as forty-two thousand, nine.
16. 3,204,000 is written as three million, two hundred four thousand.
18. 47,033,107 is written as forty-seven million, thirty-three thousand, one hundred seven.
20. 254 is written as two hundred fifty-four.
22. 114,813 is written as one hundred fourteen thousand, eight hundred thirteen.
24. 60,320,000,000 is written as sixty billion, three hundred twenty million.
26. 11,239 is written as eleven thousand, two hundred thirty-nine.
28. 202,700 is written as two hundred two thousand, seven hundred.

30. Four thousand, four hundred sixty-eight in standard form is 4468.
32. Seventy-three thousand, two in standard form is 73,002.
34. Sixteen million, four hundred five thousand, sixteen in standard form is 16,405,016.
36. Two million, twelve in standard form is 2,000,012.
38. Six hundred forty thousand, eight hundred eighty-one in standard form is 640,881.
40. Two hundred thirty-four thousand in standard form is 234,000.
42. One thousand, eight hundred fifteen in standard form is 1815.
44. Two hundred fifty-seven million, six hundred ninety-eight thousand, one hundred eighty-three in standard form is 257,698,183.
46. Seven hundred nine in standard form is 709.
48. $789 = 700 + 80 + 9$
50. $6040 = 6000 + 40$
52. $20,215 = 20,000 + 200 + 10 + 5$
54. $99,032 = 90,000 + 9000 + 30 + 2$
56. $47,703,029 = 40,000,000 + 7,000,000 + 700,000 + 3000 + 20 + 9$
58. Mount Baker erupted in 1792, which is in standard form.
60. Mount Shasta and Mount St. Helens have each had two eruptions listed.
62. Mount St. Helens has an eruption listed in 1980. All other eruptions listed in the table occurred before this one.
64. More German shepherds are registered than Golden retrievers.
66. German shepherds are second in popularity. 26 is written as twenty-six.
68. The maximum height of an average-size standard poodle is 26 inches.

70. The largest number is 77,753.

72. Yes

74. answers may vary

76. A quadrillion in standard form is 1,000,000,000,000,000.

Section 1.3 Practice Exercises

$$\begin{array}{r} 1. \quad 4135 \\ + 252 \\ \hline 4387 \end{array}$$

$$\begin{array}{r} 2. \quad \begin{array}{r} 1111 \\ 47,364 \\ + 135,898 \\ \hline 183,262 \end{array} \end{array}$$

3. Notice $12 + 8 = 20$ and $4 + 6 = 10$.
 $12 + 4 + 8 + 6 + 5 = 20 + 10 + 5 = 35$

$$\begin{array}{r} 4. \quad \begin{array}{r} 122 \\ 6432 \\ 789 \\ 54 \\ + 28 \\ \hline 7303 \end{array} \end{array}$$

5. a. $14 - 6 = 8$ because $8 + 6 = 14$.

b. $20 - 8 = 12$ because $12 + 8 = 20$

c. $93 - 93 = 0$ because $0 + 93 = 93$.

d. $42 - 0 = 42$ because $42 + 0 = 42$.

$$\begin{array}{r} 6. \quad \text{a.} \quad \begin{array}{r} 9143 \\ - 122 \\ \hline 9021 \end{array} \quad \text{Check:} \quad \begin{array}{r} 9021 \\ + 122 \\ \hline 9143 \end{array} \end{array}$$

$$\begin{array}{r} \text{b.} \quad \begin{array}{r} 978 \\ - 851 \\ \hline 127 \end{array} \quad \text{Check:} \quad \begin{array}{r} 127 \\ + 851 \\ \hline 978 \end{array} \end{array}$$

$$\begin{array}{r} 7. \quad \text{a.} \quad \begin{array}{r} 817 \\ 697 \\ - 49 \\ \hline 648 \end{array} \quad \text{Check:} \quad \begin{array}{r} 648 \\ + 49 \\ \hline 697 \end{array} \end{array}$$

$$\begin{array}{r} 212 \\ \text{b. } \cancel{326} \\ - 245 \\ \hline 81 \end{array} \quad \text{Check: } \begin{array}{r} 81 \\ + 245 \\ \hline 326 \end{array}$$

$$\begin{array}{r} 1234 \\ \text{c. } - 822 \\ \hline 412 \end{array} \quad \text{Check: } \begin{array}{r} 412 \\ + 822 \\ \hline 1234 \end{array}$$

$$\begin{array}{r} 9 \\ 3 \cancel{10}^{10} \\ \text{8. a. } \cancel{1000} \\ - 164 \\ \hline 236 \end{array} \quad \text{Check: } \begin{array}{r} 236 \\ + 164 \\ \hline 400 \end{array}$$

$$\begin{array}{r} 9 \\ 9 \cancel{10}^{10} \\ \text{b. } \cancel{1000} \\ - 762 \\ \hline 238 \end{array} \quad \text{Check: } \begin{array}{r} 238 \\ + 762 \\ \hline 1000 \end{array}$$

9. $2 \text{ cm} + 8 \text{ cm} + 15 \text{ cm} + 5 \text{ cm} = 30 \text{ cm}$
The perimeter is 30 centimeters.

10. $647 + 647 + 647 = 1941$
The perimeter is 1941 feet.

$$\begin{array}{r} 15,759 \\ - 458 \\ \hline 15,301 \end{array}$$

The radius of Neptune is 15,301 miles.

12. a. The country with the fewest threatened amphibians corresponds to the shortest bar, which is Madagascar.

- b. To find the total number of threatened amphibians for Madagascar, Peru, and Mexico, we add.

$$\begin{array}{r} 69 \\ 102 \\ + 211 \\ \hline 382 \end{array}$$

The total number of threatened amphibians for Madagascar, Peru, and Mexico is 382.

Calculator Explorations

- $89 + 45 = 134$
- $76 + 97 = 173$
- $285 + 55 = 340$

$$4. 8773 + 652 = 9425$$

$$5. 985 + 1210 + 562 + 77 = 2834$$

$$6. 465 + 9888 + 620 + 1550 = 12,523$$

$$7. 865 - 95 = 770$$

$$8. 76 - 27 = 49$$

$$9. 147 - 38 = 109$$

$$10. 366 - 87 = 279$$

$$11. 9625 - 647 = 8978$$

$$12. 10,711 - 8925 = 1786$$

Vocabulary, Readiness & Video Check 1.3

- The sum of 0 and any number is the same number.
- In $35 + 20 = 55$, the number 55 is called the sum and 35 and 20 are each called an addend.
- The difference of any number and that same number is 0.
- The difference of any number and 0 is the same number.
- In $37 - 19 = 18$, the number 37 is the minuend, the 19 is the subtrahend, and the 18 is the difference.
- The distance around a polygon is called its perimeter.
- Since $7 + 10 = 10 + 7$, we say that changing the order in addition does not change the sum. This property is called the commutative property of addition.
- Since $(3 + 1) + 20 = 3 + (1 + 20)$, we say that changing the grouping in addition does not change the sum. This property is called the associative property of addition.
- To add whole numbers, we line up place values and add from right to left.
- We cannot take 7 from 2 in the ones place, so we borrow one ten from the tens place and move it over to the ones place to give us $10 + 2$ or 12.
- triangle; 3

12. To find the sale price, subtract the discount from the regular price.

Exercise Set 1.3

$$\begin{array}{r} 2. \quad 27 \\ + 31 \\ \hline 58 \end{array}$$

$$\begin{array}{r} 4. \quad 37 \\ + 542 \\ \hline 579 \end{array}$$

$$\begin{array}{r} 6. \quad 23 \\ 45 \\ + 30 \\ \hline 98 \end{array}$$

$$\begin{array}{r} 8. \quad 236 \\ + 6243 \\ \hline 6479 \end{array}$$

$$\begin{array}{r} 10. \quad \quad 1 \\ 17,427 \\ + 821,059 \\ \hline 838,486 \end{array}$$

$$\begin{array}{r} 12. \quad 3 \\ 5 \\ 8 \\ 5 \\ + 7 \\ \hline 28 \end{array}$$

$$\begin{array}{r} 14. \quad 22 \\ 64 \\ 28 \\ 56 \\ 25 \\ + 32 \\ \hline 205 \end{array}$$

$$\begin{array}{r} 16. \quad 11 \ 2 \\ 16 \\ 1056 \\ 748 \\ + 7770 \\ \hline 9590 \end{array}$$

$$\begin{array}{r} 18. \quad 1 \ 1 \ 1 \ 1 \\ 6789 \\ 4321 \\ + 5555 \\ \hline 16,665 \end{array}$$

$$\begin{array}{r} 20. \quad 1 \ 1 \ 1 \\ 26 \\ 582 \\ 4 \ 763 \\ + 62,511 \\ \hline 67,882 \end{array}$$

$$\begin{array}{r} 22. \quad 1 \ 1 \ 1 \ 2 \ 1 \ 2 \\ 504,218 \\ 321,920 \\ 38,507 \\ + 594,687 \\ \hline 1,459,332 \end{array}$$

$$\begin{array}{r} 24. \quad 957 \\ - 257 \\ \hline 700 \end{array} \quad \begin{array}{r} \text{Check:} \quad 700 \\ + 257 \\ \hline 957 \end{array}$$

$$\begin{array}{r} 26. \quad 55 \\ - 29 \\ \hline 26 \end{array} \quad \begin{array}{r} \text{Check:} \quad 1 \\ 26 \\ + 29 \\ \hline 55 \end{array}$$

$$\begin{array}{r} 28. \quad 674 \\ - 299 \\ \hline 375 \end{array} \quad \begin{array}{r} \text{Check:} \quad 11 \\ 375 \\ + 299 \\ \hline 674 \end{array}$$

$$\begin{array}{r} 30. \quad 300 \\ - 149 \\ \hline 151 \end{array} \quad \begin{array}{r} \text{Check:} \quad 11 \\ 151 \\ + 149 \\ \hline 300 \end{array}$$

$$\begin{array}{r} 32. \quad 5349 \\ - 720 \\ \hline 4629 \end{array} \quad \begin{array}{r} \text{Check:} \quad 1 \\ 4629 \\ + 720 \\ \hline 5349 \end{array}$$

$$\begin{array}{r} 34. \quad 724 \\ - 16 \\ \hline 708 \end{array} \quad \begin{array}{r} \text{Check:} \quad 1 \\ 708 \\ + 16 \\ \hline 724 \end{array}$$

$$\begin{array}{r} 36. \quad 1983 \\ - 1914 \\ \hline 69 \end{array}$$

$$\begin{array}{r} \text{Check:} \quad 1 \\ 69 \\ + 1914 \\ \hline 1983 \end{array}$$

$$\begin{array}{r} 38. \quad 40,000 \\ - 23,582 \\ \hline 16,418 \end{array}$$

$$\begin{array}{r} \text{Check:} \quad 11 \ 11 \\ 16,418 \\ + 23,582 \\ \hline 40,000 \end{array}$$

$$\begin{array}{r} 40. \quad 6050 \\ - 1878 \\ \hline 4172 \end{array}$$

$$\begin{array}{r} \text{Check:} \quad 111 \\ 4172 \\ + 1878 \\ \hline 6050 \end{array}$$

$$\begin{array}{r} 42. \quad 62,222 \\ - 39,898 \\ \hline 22,324 \end{array}$$

$$\begin{array}{r} \text{Check:} \quad 11 \ 11 \\ 22,324 \\ + 39,898 \\ \hline 62,222 \end{array}$$

$$\begin{array}{r} 44. \quad 986 \\ - 48 \\ \hline 938 \end{array}$$

$$\begin{array}{r} 46. \quad 80 \\ 93 \\ 17 \\ 9 \\ + 2 \\ \hline 201 \end{array}$$

$$\begin{array}{r} 48. \quad 10,000 \\ - 1786 \\ \hline 8214 \end{array}$$

$$\begin{array}{r} 50. \quad 12,468 \\ 3 \ 211 \\ + 1 \ 988 \\ \hline 17,667 \end{array}$$

52. $3 + 4 + 5 = 12$
The perimeter is 12 centimeters.

54. Opposite sides of a rectangle have the same length.
 $9 + 3 + 9 + 3 = 12 + 12 = 24$
The perimeter is 24 miles.

56. $6 + 5 + 7 + 3 + 4 + 7 + 5 = 37$
The perimeter is 37 inches.

58. The unknown vertical side has length $3 + 5 = 8$ feet. The unknown horizontal side has length $8 + 4 = 12$ feet.
 $8 + 3 + 4 + 5 + 12 + 8 = 40$
The perimeter is 40 feet.

60. "Find the sum" indicates addition.

$$\begin{array}{r} 1 \\ 802 \\ + 6487 \\ \hline 7289 \end{array}$$

The sum of 802 and 6487 is 7289.

62. "Find the total" indicates addition.

$$\begin{array}{r} 1 \ 2 \\ 89 \\ 45 \\ 2 \\ 19 \\ + 341 \\ \hline 496 \end{array}$$

The total of 89, 45, 2, 19, and 341 is 496.

64. "Find the difference" indicates subtraction.

$$\begin{array}{r} 16 \\ - 5 \\ \hline 11 \end{array}$$

The difference of 16 and 5 is 11.

66. "Increased by" indicates addition.

$$\begin{array}{r} 712 \\ + 38 \\ \hline 750 \end{array}$$

712 increased by 38 is 750.

68. "Less" indicates subtraction.

$$\begin{array}{r} 25 \\ - 12 \\ \hline 13 \end{array}$$

25 less 12 is 13.

70. "Subtracted from" indicates subtraction.

$$\begin{array}{r} 90 \\ - 86 \\ \hline 4 \end{array}$$

86 subtracted from 90 is 4.

72. Subtract 40,639 thousand from 43,939 thousand.

$$\begin{array}{r} 43,939 \\ - 40,639 \\ \hline 3 \ 300 \end{array}$$

California's projected population increase is 3300 thousand.

74. Subtract the discount from the regular price.

$$\begin{array}{r} 547 \\ - 99 \\ \hline 448 \end{array}$$

The sale price is \$448.

76. 164,000

$$\begin{array}{r} + 40,000 \\ \hline 204,000 \end{array}$$

The total U.S. land area drained by the Ohio and Tennessee sub-basins is 204,000 square miles.

78. 189,000

$$\begin{array}{r} - 75,000 \\ \hline 114,000 \end{array}$$

The Upper Mississippi sub-basin drains 114,000 square miles more than the Lower Mississippi sub-basin.

80. Opposite sides of a rectangle have the same length.

$$60 + 45 + 60 + 45 = 210$$

The perimeter is 210 feet.

82. 59,320

$$\begin{array}{r} - 55,492 \\ \hline 3,828 \end{array}$$

They traveled 3828 miles on their trip.

84. 87,011

$$\begin{array}{r} + 52,547 \\ \hline 139,558 \end{array}$$

The total number of F-Series trucks and Silverados sold that month was 139,558.

86. The shortest bar corresponds to the quietest reading. Leaves rustling is the quietest.

88. 100

$$\begin{array}{r} - 70 \\ \hline 30 \end{array}$$

The difference in sound intensity between live rock music and loud television is 30 dB.

90. 119

$$\begin{array}{r} - 99 \\ \hline 20 \end{array}$$

The difference in volume between the mid-size and a sub-compact car is 20 cubic feet.

92. Opposite sides of a rectangle have the same length.

$$18 + 12 + 18 + 12 = 60$$

The perimeter of the puzzle is 60 inches.

94. Indiana has the fewest CVS pharmacies.

- 96.
- $356 + 867 + 756 + 313 + 301 + 486 + 313 + 309 + 408 + 659 = 4768$

The total number of CVS pharmacies in the ten states listed is 4768.

98. The total number of CVS pharmacies in the states listed in the table is 4768.

$$4768$$

$$+ 3048$$

$$\hline 7816$$

There are 7816 CVS pharmacies in the 50 states.

100. 5193

$$+ 1222$$

$$\hline 6415$$

The total highway mileage in Rhode Island is 6415 miles.

102. The minuend is 2863 and the subtrahend is 1904.

104. The minuend is 86 and the subtrahend is 25.

106. answers may vary

108. 773

$$659$$

$$+ 481$$

$$\hline 1913$$

The given sum is correct.

110. 19

$$214$$

$$49$$

$$+ 651$$

$$\hline 933$$

The given sum is incorrect, the correct sum is 933.

112. 389

$$+ 89$$

$$\hline 478$$

The given difference is correct.

$$\begin{array}{r}
 11 \\
 114. \quad 7168 \\
 + \quad 547 \\
 \hline
 7715
 \end{array}$$

The given difference is incorrect.

$$\begin{array}{r}
 7615 \\
 - \quad 547 \\
 \hline
 7068
 \end{array}$$

$$\begin{array}{r}
 116. \quad 10,244 \\
 - \quad 8,534 \\
 \hline
 1,710
 \end{array}$$

118. answers may vary

Section 1.4 Practice Exercises

1. a. To round 57 to the nearest ten, observe that the digit in the ones place is 7. Since the digit is at least 5, we add 1 to the digit in the tens place. The number 57 rounded to the nearest ten is 60.
- b. To round 641 to the nearest ten, observe that the digit in the ones place is 1. Since the digit is less than 5, we do not add 1 to the digit in the tens place. The number 641 rounded to the nearest ten is 640.
- c. To round 325 to the nearest ten observe that the digit in the ones place is 5. Since the digit is at least 5, we add 1 to the digit in the tens place. The number 325 rounded to the nearest ten is 330.
2. a. To round 72,304 to the nearest thousand, observe that the digit in the hundreds place is 3. Since the digit is less than 5, we do not add 1 to the digit in the thousands place. The number 72,304 rounded to the nearest thousand is 72,000.
- b. To round 9222 to the nearest thousand, observe that the digit in the hundreds place is 2. Since the digit is less than 5, we do not add 1 to the digit in the thousands place. The number 9222 rounded to the nearest thousand is 9000.
- c. To round 671,800 to the nearest thousand, observe that the digit in the hundreds place is 8. Since this digit is at least 5, we add 1 to the digit in the thousands place. The number 671,800 rounded to the nearest thousand is 672,000.

3. a. To round 3474 to the nearest hundred, observe that the digit in the tens place is 7. Since this digit is at least 5, we add 1 to the digit in the hundreds place. The number 3474 rounded to the nearest hundred is 3500.
- b. To round 76,243 to the nearest hundred, observe that the digit in the tens place is 4. Since this digit is less than 5, we do not add 1 to the digit in the hundreds place. The number 76,243 rounded to the nearest hundred is 76,200.
- c. To round 978,965 to the nearest hundred, observe that the digit in the tens place is 6. Since this digit is at least 5, we add 1 to the digit in the hundreds place. The number 978,965 rounded to the nearest hundred is 979,000.

$$\begin{array}{rcl}
 4. \quad 49 & \text{rounds to} & 50 \\
 25 & \text{rounds to} & 30 \\
 32 & \text{rounds to} & 30 \\
 51 & \text{rounds to} & 50 \\
 98 & \text{rounds to} & + 100 \\
 & & \hline
 & & 260
 \end{array}$$

$$\begin{array}{rcl}
 5. \quad 3785 & \text{rounds to} & 4000 \\
 - 2479 & \text{rounds to} & - 2000 \\
 & & \hline
 & & 2000
 \end{array}$$

$$\begin{array}{rcl}
 6. \quad 11 & \text{rounds to} & 10 \\
 16 & \text{rounds to} & 20 \\
 19 & \text{rounds to} & 20 \\
 + 31 & \text{rounds to} & + 30 \\
 & & \hline
 & & 80
 \end{array}$$

The total distance is approximately 80 miles.

$$\begin{array}{rcl}
 7. \quad 2930 & \text{rounds to} & 3000 \\
 18,166 & \text{rounds to} & 18,000 \\
 + 189 & \text{rounds to} & + 0 \\
 & & \hline
 & & 21,000
 \end{array}$$

In 2015, there were approximately 21,000 reported cases of these diseases.

Vocabulary, Readiness & Video Check 1.4

1. To graph a number on a number line, darken the point representing the location of the number.
2. Another word for approximating a whole number is rounding.

3. The number 65 rounded to the nearest ten is 70, but the number 61 rounded to the nearest ten is 60.
4. An exact number of products is 1265, but an estimate is 1000.
5. 3 is in the place we're rounding to (tens), and the digit to the right of this place is 5 or greater, so we need to add 1 to the 3.
6. On a number line, 22 is closer to 20 than 30. Thus, 22 rounded to the nearest ten is 20.
7. Each circled digit is to the right of the place value being rounded to and is used to determine whether we add 1 to the digit in the place value being rounded to.
14. To round 179,406 to the nearest hundred, observe that the digit in the tens place is 0. Since this digit is less than 5, we do not add 1 to the digit in the hundreds place. The number 179,406 rounded to the nearest hundred is 179,400.
16. To round 96,501 to the nearest thousand, observe that the digit in the hundreds place is 5. Since this digit is at least 5, we add 1 to the digit in the thousands place. The number 96,501 rounded to the nearest thousand is 97,000.
18. To round 99,995 to the nearest ten, observe that the digit in the ones place is 5. Since this digit is at least 5, we add 1 to the digit in the tens place. The number 99,995 rounded to the nearest ten is 100,000.

Exercise Set 1.4

2. To round 273 to the nearest ten, observe that the digit in the ones place is 3. Since this digit is less than 5, we do not add 1 to the digit in the tens place. The number 273 rounded to the nearest ten is 270.
4. To round 846 to the nearest ten, observe that the digit in the ones place is 6. Since this digit is at least 5, we add 1 to the digit in the tens place. The number 846 rounded to the nearest ten is 850.
6. To round 8494 to the nearest hundred, observe that the digit in the tens place is 9. Since this digit is at least 5, we add 1 to the digit in the hundreds place. The number 8494 rounded to the nearest hundred is 8500.
8. To round 898 to the nearest ten, observe that the digit in the ones place is 8. Since this digit is at least 5, we add 1 to the digit in the tens place. The number 898 rounded to the nearest ten is 900.
10. To round 82,198 to the nearest thousand, observe that the digit in the hundreds place is 1. Since this digit is less than 5, we do not add 1 to the digit in the thousands place. The number 82,198 rounded to the nearest thousand is 82,000.
12. To round 42,682 to the nearest ten-thousand, observe that the digit in the thousands place is 2. Since this digit is less than 5, we do not add 1 to the digit in the ten-thousands place. The number 42,682 rounded to the nearest ten-thousand is 40,000.
20. To round 39,523,698 to the nearest million, observe that the digit in the hundred-thousands place is 5. Since this digit is at least 5, we add 1 to the digit in the millions place. The number 39,523,698 rounded to the nearest million is 40,000,000.
22. Estimate 7619 to a given place value by rounding it to that place value. 7619 rounded to the tens place is 7620, to the hundreds place is 7600, and to the thousands place is 8000.
24. Estimate 7777 to a given place value by rounding it to that place value. 7777 rounded to the tens place is 7780, to the hundreds place is 7800, and to the thousands place is 8000.
26. Estimate 85,049 to a given place value by rounding it to that place value. 85,049 rounded to the tens place is 85,050, to the hundreds place is 85,000, and to the thousands place is 85,000.
28. To round 171,874 to the nearest thousand, observe that the digit in the hundreds place is 8. Since this digit is at least 5, we add 1 to the digit in the thousands place. Therefore 171,874 miles rounded to the nearest thousand is 172,000 miles.
30. To round 38,387 to the nearest thousand, observe that the digit in the hundreds place is 3. Since this digit is less than 5, we do not add 1 to the digit in the thousands place. Therefore, 38,387 points rounded to the nearest thousand is 38,000 points.

32. To round 327,637,919 to the nearest million, observe that the digit in the hundred-thousands place is 6. Since this digit is at least 5, we add 1 to the digit in the millions place. Therefore, 327,637,919 rounded to the nearest million is 328,000,000.

34. To round 2,110,000 to the nearest million, observe that the digit in the hundred-thousands place is 1. Since this digit is less than 5, we do not add 1 to the digit in the millions place. Therefore, \$2,110,000 rounded to the nearest million is \$2,000,000.

36. To round 14,616,000,000 to the nearest ten-million, observe that the digit in the millions place is 6. Since this digit is at least 5, we add 1 to the digit in the ten-millions place. Therefore, 14,616,000,000 bushels rounded to the nearest ten-million is 14,620,000,000 bushels.

38.

52	rounds to	50
33	rounds to	30
15	rounds to	20
<u>+ 29</u>	rounds to	<u>+ 30</u>
		130

40.

555	rounds to	560
<u>- 235</u>	rounds to	<u>- 240</u>
		320

42.

4050	rounds to	4100
3133	rounds to	3100
<u>+ 1220</u>	rounds to	<u>+ 1200</u>
		8400

44.

1989	rounds to	2000
<u>- 1870</u>	rounds to	<u>- 1900</u>
		100

46.

799	rounds to	800
1655	rounds to	1700
<u>+ 271</u>	rounds to	<u>+ 300</u>
		2800

48. $522 + 785$ is approximately $520 + 790 = 1310$.
The answer of 1307 is correct.

50. $542 + 789 + 198$ is approximately $540 + 790 + 200 = 1530$.
The answer of 2139 is incorrect.

52. $5233 + 4988$ is approximately $5200 + 5000 = 10,200$.
The answer of 9011 is incorrect.

54.

89	rounds to	90
97	rounds to	100
100	rounds to	100
79	rounds to	80
75	rounds to	80
<u>+ 82</u>	rounds to	<u>+ 80</u>
		530

The total score is approximately 530.

56.

588	rounds to	600
689	rounds to	700
277	rounds to	300
143	rounds to	100
59	rounds to	100
<u>+ 802</u>	rounds to	<u>+ 800</u>
		2600

The total distance is approximately 2600 miles.

58.

1895	rounds to	1900
<u>- 1524</u>	rounds to	<u>- 1500</u>
		400

The difference in price is approximately \$400.

60.

64	rounds to	60
41	rounds to	40
<u>+ 133</u>	rounds to	<u>+ 130</u>
		230

The total distance is approximately 230 miles.

62.

51,746	rounds to	52,000
<u>- 49,713</u>	rounds to	<u>- 50,000</u>
		2 000

The increase is approximately 2000 credit hours.

64. 769 hundred-thousands is 76,900,000 in standard form. 76,900,000 rounded to the nearest million is 77,000,000. 76,900,000 rounded to the nearest ten-million is 80,000,000.

66. 568 hundred-thousands is 56,800,000 in standard form. 56,800,000 rounded to the nearest million is 57,000,000. 56,800,000 rounded to the nearest ten-million is 60,000,000.

68. 5698, for example, rounded to the nearest ten is 5700.

70. The largest possible number that rounds to 1,500,000 when rounded to the nearest hundred-thousand is 1,549,999.

72. answers may vary

74.
$$\begin{array}{rcl} 5950 & \text{rounds to} & 6\ 000 \\ 7693 & \text{rounds to} & 7\ 700 \\ + 8203 & \text{rounds to} & + 8\ 200 \\ \hline & & 21,900 \end{array}$$

The perimeter is approximately 21,900 miles.

6.
$$\begin{aligned} \text{Area} &= \text{length} \cdot \text{width} \\ &= (360 \text{ miles})(280 \text{ miles}) \\ &= 100,800 \text{ square miles} \end{aligned}$$

The area of Wyoming is 100,800 square miles.

7.
$$\begin{array}{r} 16 \\ \times 45 \\ \hline 80 \\ 640 \\ \hline 720 \end{array}$$

The printer can print 720 pages in 45 minutes.

Section 1.5 Practice Exercises

1. a. $6 \times 0 = 0$
b. $(1)8 = 8$
c. $(50)(0) = 0$
d. $75 \cdot 1 = 75$
2. a. $6(4 + 5) = 6 \cdot 4 + 6 \cdot 5$
b. $30(2 + 3) = 30 \cdot 2 + 30 \cdot 3$
c. $7(2 + 8) = 7 \cdot 2 + 7 \cdot 8$

3. a.
$$\begin{array}{r} 5 \\ 29 \\ \times 6 \\ \hline 174 \end{array}$$

b.
$$\begin{array}{r} 44 \\ 648 \\ \times 5 \\ \hline 3240 \end{array}$$

4.
$$\begin{array}{r} 306 \\ \times 81 \\ \hline 306 \\ 24\ 480 \\ \hline 24,786 \end{array}$$

5.
$$\begin{array}{r} 726 \\ \times 142 \\ \hline 1\ 452 \\ 29\ 040 \\ 72\ 600 \\ \hline 103,092 \end{array}$$

8.
$$\begin{array}{r} 8 \times 11 = 88 \\ 5 \times 9 = 45 \\ \hline 133 \end{array}$$

The total cost is \$133.

9.
$$\begin{array}{rcl} 163 & \text{rounds to} & 200 \\ \times 391 & \text{rounds to} & \times 400 \\ \hline & & 80,000 \end{array}$$

There are approximately 80,000 words on 391 pages.

Calculator Explorations

1. $72 \times 48 = 3456$
2. $81 \times 92 = 7452$
3. $163 \cdot 94 = 15,322$
4. $285 \cdot 144 = 41,040$
5. $983(277) = 272,291$
6. $1562(843) = 1,316,766$

Vocabulary, Readiness & Video Check 1.5

1. The product of 0 and any number is 0.
2. The product of 1 and any number is the number.
3. In $8 \cdot 12 = 96$, the 96 is called the product and 8 and 12 are each called a factor.
4. Since $9 \cdot 10 = 10 \cdot 9$, we say that changing the order in multiplication does not change the product. This property is called the commutative property of multiplication.

5. Since $(3 \cdot 4) \cdot 6 = 3 \cdot (4 \cdot 6)$, we say that changing the grouping in multiplication does not change the product. This property is called the associative property of multiplication.
6. Area measures the amount of surface of a region.
7. Area of a rectangle = length $\cdot$ width.
8. We know $9(10 + 8) = 9 \cdot 10 + 9 \cdot 8$ by the distributive property.
9. distributive
10. To show that 8649 is actually multiplied by 70 and not by just 7.
11. Area is measured in square units, and here we have meters by meters, or square meters; the answer is 63 *square* meters, or the correct units are square meters.
12. Multiplication is also an application of addition since it is addition of the same addend.

Exercise Set 1.5

2. $55 \cdot 1 = 55$
4. $27 \cdot 0 = 0$
6. $7 \cdot 6 \cdot 0 = 0$
8. $1 \cdot 41 = 41$
10. $5(8 + 2) = 5 \cdot 8 + 5 \cdot 2$
12. $6(1 + 4) = 6 \cdot 1 + 6 \cdot 4$
14. $12(12 + 3) = 12 \cdot 12 + 12 \cdot 3$

$$\begin{array}{r} 16. \quad 79 \\ \times 3 \\ \hline 237 \end{array}$$

$$\begin{array}{r} 18. \quad 638 \\ \times 5 \\ \hline 3190 \end{array}$$

$$\begin{array}{r} 20. \quad 882 \\ \times 2 \\ \hline 1764 \end{array}$$

$$\begin{array}{r} 22. \quad 9021 \\ \times 3 \\ \hline 27,063 \end{array}$$

$$\begin{array}{r} 24. \quad 91 \\ \times 72 \\ \hline 182 \\ \hline 6370 \\ \hline 6552 \end{array}$$

$$\begin{array}{r} 26. \quad 526 \\ \times 23 \\ \hline 1578 \\ \hline 10520 \\ \hline 12,098 \end{array}$$

$$\begin{array}{r} 28. \quad 708 \\ \times 21 \\ \hline 708 \\ \hline 14160 \\ \hline 14,868 \end{array}$$

$$\begin{array}{r} 30. \quad 720 \\ \times 80 \\ \hline 57,600 \end{array}$$

$$32. (593)(47)(0) = 0$$

$$34. (240)(1)(20) = (240)(20) = 4800$$

$$\begin{array}{r} 36. \quad 1357 \\ \times 79 \\ \hline 12213 \\ \hline 94990 \\ \hline 107,203 \end{array}$$

$$\begin{array}{r} 38. \quad 807 \\ \times 127 \\ \hline 5649 \\ \hline 16140 \\ \hline 80700 \\ \hline 102,489 \end{array}$$

$$\begin{array}{r} 40. \quad 1234 \\ \times 567 \\ \hline 8638 \\ \hline 74040 \\ \hline 617000 \\ \hline 699,678 \end{array}$$

$$\begin{array}{r}
 42. \quad 426 \\
 \times 110 \\
 \hline
 4260 \\
 42600 \\
 \hline
 46,860
 \end{array}$$

$$\begin{array}{r}
 44. \quad 1876 \\
 \times 1407 \\
 \hline
 13132 \\
 750400 \\
 1876000 \\
 \hline
 2,639,532
 \end{array}$$

46. Area = (length)(width)
 = (13 inches)(3 inches)
 = 39 square inches

Perimeter = length + width + length + width
 = 13 + 3 + 13 + 3
 = 32 inches

48. Area = (length)(width)
 = (25 centimeters)(20 centimeters)
 = 500 square centimeters

Perimeter = length + width + length + width
 = 25 + 20 + 25 + 20
 = 90 centimeters

$$\begin{array}{rcl}
 50. & 982 & \text{rounds to} & 1000 \\
 & \times 650 & \text{rounds to} & \times 700 \\
 & & & \hline
 & & & 700,000
 \end{array}$$

$$\begin{array}{rcl}
 52. & 111 & \text{rounds to} & 100 \\
 & \times 999 & \text{rounds to} & \times 1000 \\
 & & & \hline
 & & & 100,000
 \end{array}$$

54. 2872×12 is approximately 2872×10 , which is 28,720.
 The best estimate is b.

56. 706×409 is approximately 700×400 , which is 280,000.
 The best estimate is d.

58. $70 \times 12 = (7 \times 10) \times 12$
 = $7 \times (10 \times 12)$
 = 7×120
 = 840

60. $9 \times 900 = 8100$

$$\begin{array}{r}
 62. \quad 3310 \\
 \times 3 \\
 \hline
 9930
 \end{array}$$

$$\begin{array}{r}
 64. \quad 14 \\
 \times 8 \\
 \hline
 112
 \end{array}$$

There are 112 grams of fat in 8 ounces of hulled sunflower seeds.

$$\begin{array}{r}
 66. \quad 34 \\
 \times 14 \\
 \hline
 136 \\
 340 \\
 \hline
 476
 \end{array}$$

There are 476 seats in the room.

68. a. $5 \times 4 = 20$
 There are 20 apartments on one floor.

b.
$$\begin{array}{r}
 20 \\
 \times 3 \\
 \hline
 60
 \end{array}$$
 There are 60 apartments in the building.

70. Area = (length)(width)
 = (60 feet)(45 feet)
 = 2700 square feet
 The area is 2700 square feet.

72. Area = (length)(width)
 = (776 meters)(639 meters)
 = 495,864 square meters
 The area is 495,864 square meters.

$$\begin{array}{r}
 74. \quad 700 \\
 \times 17 \\
 \hline
 4900 \\
 7000 \\
 \hline
 11,900
 \end{array}$$

The 17 discs hold 11,900 MB.

$$\begin{array}{r}
 76. \quad 365 \\
 \times 3 \\
 \hline
 1095
 \end{array}$$

A cow eats 1095 pounds of grain each year.

$$\begin{array}{r} 78. \quad 13 \\ \times 16 \\ \hline 78 \\ 130 \\ \hline 208 \end{array}$$

There are 208 grams of fat in 16 ounces.

80.

Person	Number of persons	Cost per person	Cost per Category
Student	24	\$5	\$120
Nonstudent	4	\$7	\$28
Children under 12	5	\$2	\$10
Total Cost			\$158

82. $3 \times 18 = 54$
There are projected to be 54 million “older” Americans in 2020.

$$\begin{array}{r} 84. \quad 126 \\ - 8 \\ \hline 118 \end{array}$$

86. $47 + 26 + 10 + 231 + 50 = 364$

$$\begin{array}{r} 88. \quad 19 \\ \times 4 \\ \hline 76 \end{array}$$

The product of 19 and 4 is 76.

$$\begin{array}{r} 90. \quad 14 \\ + 9 \\ \hline 23 \end{array}$$

The total of 14 and 9 is 23.

92. $11 + 11 + 11 + 11 + 11 + 11 = 6 \cdot 11$ or $11 \cdot 6$

94. a. $4 \cdot 5 = 5 + 5 + 5 + 5$ or $4 + 4 + 4 + 4 + 4$

b. answers may vary

$$\begin{array}{r} 96. \quad 31 \\ \times 50 \\ \hline 1550 \end{array}$$

98. $57 \times 3 = 171$
 $57 \times 6 = 342$
The problem is $\begin{array}{r} 57 \\ \times 63 \\ \hline \end{array}$

100. answers may vary

102. $3 \times 149 = 447$
 $2 \times 708 = 1416$
 $447 + 1416 + 388 = 2251$
LeBron James scored 2251 points during the 2017–2018 regular season.

Section 1.6 Practice Exercises

1. a. $9 \overline{)72}^8$ because $8 \cdot 9 = 72$.

b. $40 \div 5 = 8$ because $8 \cdot 5 = 40$.

c. $\frac{24}{6} = 4$ because $4 \cdot 6 = 24$.

2. a. $\frac{7}{7} = 1$ because $1 \cdot 7 = 7$.

b. $5 \div 1 = 5$ because $5 \cdot 1 = 5$.

c. $1 \overline{)11}^{11}$ because $11 \cdot 1 = 11$.

d. $4 \div 1 = 4$ because $4 \cdot 1 = 4$.

e. $\frac{10}{1} = 10$ because $10 \cdot 1 = 10$.

f. $21 \div 21 = 1$ because $1 \cdot 21 = 21$.

3. a. $\frac{0}{7} = 0$ because $0 \cdot 7 = 0$.

b. $8 \overline{)0}^0$ because $0 \cdot 8 = 0$.

c. $7 \div 0$ is undefined because if $7 \div 0$ is a number, then the number times 0 would be 7.

d. $0 \div 14 = 0$ because $0 \cdot 14 = 0$.

$$\begin{array}{r}
 818 \\
 6 \overline{) 4908} \\
 \underline{-48} \\
 10 \\
 \underline{-6} \\
 48 \\
 \underline{-48} \\
 0
 \end{array}$$

$$\begin{array}{r}
 \text{Check: } 818 \\
 \times 6 \\
 \hline
 4908
 \end{array}$$

$$\begin{array}{r}
 553 \\
 4 \overline{) 2212} \\
 \underline{-20} \\
 21 \\
 \underline{-20} \\
 12 \\
 \underline{-12} \\
 0
 \end{array}$$

$$\begin{array}{r}
 \text{Check: } 553 \\
 \times 4 \\
 \hline
 2212
 \end{array}$$

$$\begin{array}{r}
 251 \\
 3 \overline{) 753} \\
 \underline{-6} \\
 15 \\
 \underline{-15} \\
 03 \\
 \underline{-3} \\
 0
 \end{array}$$

$$\begin{array}{r}
 \text{Check: } 251 \\
 \times 3 \\
 \hline
 753
 \end{array}$$

$$\begin{array}{r}
 304 \\
 7 \overline{) 2128} \\
 \underline{-21} \\
 02 \\
 \underline{-0} \\
 28 \\
 \underline{-28} \\
 0
 \end{array}$$

$$\text{Check: } 304 \times 7 = 2128$$

$$\begin{array}{r}
 5100 \\
 9 \overline{) 45,900} \\
 \underline{-45} \\
 09 \\
 \underline{-9} \\
 000
 \end{array}$$

$$\text{Check: } 5100 \times 9 = 45,900$$

$$\begin{array}{r}
 234 \text{ R } 3 \\
 4 \overline{) 939} \\
 \underline{-8} \\
 13 \\
 \underline{-12} \\
 19 \\
 \underline{-16} \\
 3
 \end{array}$$

$$\text{Check: } 234 \cdot 4 + 3 = 939$$

$$\begin{array}{r}
 657 \text{ R } 2 \\
 5 \overline{) 3287} \\
 \underline{-30} \\
 28 \\
 \underline{-25} \\
 37 \\
 \underline{-35} \\
 2
 \end{array}$$

$$\text{Check: } 657 \cdot 5 + 2 = 3287$$

$$\begin{array}{r}
 9067 \text{ R } 2 \\
 9 \overline{) 81,605} \\
 \underline{-81} \\
 06 \\
 \underline{-0} \\
 60 \\
 \underline{-54} \\
 65 \\
 \underline{-63} \\
 2
 \end{array}$$

$$\text{Check: } 9067 \cdot 9 + 2 = 81,605$$

$$\begin{array}{r} \text{b. } 4 \overline{) 23,310} \text{ R } 2 \\ \underline{-20} \\ 33 \\ \underline{-32} \\ 11 \\ \underline{-8} \\ 30 \\ \underline{-28} \\ 2 \end{array}$$

Check: $5827 \cdot 4 + 2 = 23,310$

$$\begin{array}{r} \text{8. } 17 \overline{) 8920} \text{ R } 12 \\ \underline{-85} \\ 42 \\ \underline{-34} \\ 80 \\ \underline{-68} \\ 12 \end{array}$$

$$\begin{array}{r} \text{9. } 678 \overline{) 33,282} \text{ R } 60 \\ \underline{-2712} \\ 6162 \\ \underline{-6102} \\ 60 \end{array}$$

$$\begin{array}{r} \text{10. } 3 \overline{) 171} \\ \underline{-15} \\ 21 \\ \underline{-21} \\ 0 \end{array}$$

Each student got 57 CDs.

$$\begin{array}{r} \text{11. } 12 \overline{) 532} \\ \underline{-48} \\ 52 \\ \underline{-48} \\ 4 \end{array}$$

There will be 44 full boxes and 4 printers left over.

12. Find the sum and divide by 7.

$$\begin{array}{r} 4 \\ 7 \\ 35 \\ 16 \\ 9 \\ 3 \\ + 52 \\ \hline 126 \end{array}$$

The average time is 18 minutes.

Calculator Explorations

1. $848 \div 16 = 53$

2. $564 \div 12 = 47$

3. $5890 \div 95 = 62$

4. $1053 \div 27 = 39$

5. $\frac{32,886}{126} = 261$

6. $\frac{143,088}{264} = 542$

7. $0 \div 315 = 0$

8. $315 \div 0$ is an error.

Vocabulary, Readiness & Video Check 1.6

1. In $90 \div 2 = 45$, the answer 45 is called the quotient, 90 is called the dividend, and 2 is called the divisor.

2. The quotient of any number and 1 is the same number.

3. The quotient of any number (except 0) and the same number is 1.

4. The quotient of 0 and any number (except 0) is 0.

5. The quotient of any number and 0 is undefined.

6. The average of a list of numbers is the sum of the numbers divided by the number of numbers.

7. 0

8. zero; this zero becomes a placeholder in the quotient.
9. $202 \cdot 102 + 15 = 20,619$
10. This tells us we have a division problem since division may be used to separate a quantity into equal parts.
11. addition and division

Exercise Set 1.6

2. $72 \div 9 = 8$
4. $24 \div 3 = 8$
6. $0 \div 4 = 0$
8. $38 \div 1 = 38$
10. $\frac{49}{49} = 1$
12. $\frac{45}{9} = 5$
14. $\frac{12}{0}$ is undefined
16. $6 \div 6 = 1$
18. $7 \div 0$ is undefined
20. $18 \div 3 = 6$

$$\begin{array}{r} 17 \\ 5 \overline{) 85} \\ \underline{-5} \\ 35 \\ \underline{-35} \\ 0 \end{array}$$

Check: $17 \cdot 5 = 85$

$$\begin{array}{r} 80 \\ 8 \overline{) 640} \\ \underline{-64} \\ 00 \end{array}$$

Check: $80 \cdot 8 = 640$

$$\begin{array}{r} 526 \\ 4 \overline{) 2104} \\ \underline{-20} \\ 10 \\ \underline{-8} \\ 24 \\ \underline{-24} \\ 0 \end{array}$$

Check: $526 \cdot 4 = 2104$

$$28. \frac{0}{30} = 0$$

Check: $0 \cdot 30 = 0$

$$30. \begin{array}{r} 7 \\ 8 \overline{) 56} \\ \underline{-56} \\ 0 \end{array}$$

Check: $7 \cdot 8 = 56$

$$32. \begin{array}{r} 11 \\ 11 \overline{) 121} \\ \underline{-11} \\ 11 \\ \underline{-11} \\ 0 \end{array}$$

Check: $11 \cdot 11 = 121$

$$34. \begin{array}{r} 60 \text{ R } 6 \\ 7 \overline{) 426} \\ \underline{-42} \\ 06 \end{array}$$

Check: $60 \cdot 7 + 6 = 426$

$$36. \begin{array}{r} 413 \text{ R } 1 \\ 3 \overline{) 1240} \\ \underline{-12} \\ 04 \\ \underline{-3} \\ 10 \\ \underline{-9} \\ 1 \end{array}$$

Check: $413 \cdot 3 + 1 = 1240$

$$\begin{array}{r}
 55 \text{ R } 2 \\
 3 \overline{) 167} \\
 \underline{-15} \\
 17 \\
 \underline{-15} \\
 2
 \end{array}$$

Check: $55 \cdot 3 + 2 = 167$

$$\begin{array}{r}
 833 \text{ R } 1 \\
 4 \overline{) 3333} \\
 \underline{-32} \\
 13 \\
 \underline{-12} \\
 13 \\
 \underline{-12} \\
 1
 \end{array}$$

Check: $833 \cdot 4 + 1 = 3333$

$$\begin{array}{r}
 32 \\
 23 \overline{) 736} \\
 \underline{-69} \\
 46 \\
 \underline{-46} \\
 0
 \end{array}$$

Check: $32 \cdot 23 = 736$

$$\begin{array}{r}
 48 \\
 42 \overline{) 2016} \\
 \underline{-168} \\
 336 \\
 \underline{-336} \\
 0
 \end{array}$$

Check: $48 \cdot 42 = 2016$

$$\begin{array}{r}
 44 \text{ R } 2 \\
 44 \overline{) 1938} \\
 \underline{-176} \\
 178 \\
 \underline{-176} \\
 2
 \end{array}$$

Check: $44 \cdot 44 + 2 = 1938$

$$\begin{array}{r}
 612 \text{ R } 10 \\
 12 \overline{) 7354} \\
 \underline{-72} \\
 15 \\
 \underline{-12} \\
 34 \\
 \underline{-24} \\
 10
 \end{array}$$

Check: $612 \cdot 12 + 10 = 7354$

$$\begin{array}{r}
 405 \\
 14 \overline{) 5670} \\
 \underline{-56} \\
 07 \\
 \underline{-0} \\
 70 \\
 \underline{-70} \\
 0
 \end{array}$$

Check: $405 \cdot 14 = 5670$

$$\begin{array}{r}
 39 \text{ R } 9 \\
 64 \overline{) 2505} \\
 \underline{-192} \\
 585 \\
 \underline{-576} \\
 9
 \end{array}$$

Check: $39 \cdot 64 + 9 = 2505$

$$\begin{array}{r}
 47 \\
 123 \overline{) 5781} \\
 \underline{-492} \\
 861 \\
 \underline{-861} \\
 0
 \end{array}$$

Check: $47 \cdot 123 = 5781$

$$\begin{array}{r}
 96 \text{ R } 52 \\
 240 \overline{) 23,092} \\
 \underline{-21,60} \\
 1,492 \\
 \underline{-1,440} \\
 52
 \end{array}$$

Check: $96 \cdot 240 + 52 = 23,092$

$$\begin{array}{r}
 201 \text{ R } 50 \\
 58. \quad 203 \overline{) 40,853} \\
 \underline{-406} \\
 25 \\
 \underline{-0} \\
 253 \\
 \underline{-203} \\
 50
 \end{array}$$

Check: $201 \cdot 203 + 50 = 40,853$

$$\begin{array}{r}
 303 \text{ R } 63 \\
 60. \quad 543 \overline{) 164,592} \\
 \underline{-1629} \\
 169 \\
 \underline{-0} \\
 1692 \\
 \underline{-1629} \\
 63
 \end{array}$$

Check: $303 \cdot 543 + 63 = 164,592$

$$\begin{array}{r}
 13 \\
 62. \quad 8 \overline{) 104} \\
 \underline{-8} \\
 24 \\
 \underline{-24} \\
 0
 \end{array}$$

$$\begin{array}{r}
 603 \text{ R } 2 \\
 64. \quad 5 \overline{) 3017} \\
 \underline{-30} \\
 01 \\
 \underline{-0} \\
 17 \\
 \underline{-15} \\
 2
 \end{array}$$

$$\begin{array}{r}
 1714 \text{ R } 47 \\
 66. \quad 50 \overline{) 85,747} \\
 \underline{-50} \\
 357 \\
 \underline{-350} \\
 74 \\
 \underline{-50} \\
 247 \\
 \underline{-200} \\
 47
 \end{array}$$

$$\begin{array}{r}
 3040 \\
 68. \quad 214 \overline{) 650,560} \\
 \underline{-642} \\
 85 \\
 \underline{-0} \\
 856 \\
 \underline{-856} \\
 00 \\
 \underline{-0} \\
 0
 \end{array}$$

$$\begin{array}{r}
 13 \text{ R } 3 \\
 70. \quad 7 \overline{) 94} \\
 \underline{-7} \\
 24 \\
 \underline{-21} \\
 3
 \end{array}$$

The quotient is 13 R 3.

$$\begin{array}{r}
 3 \text{ R } 20 \\
 72. \quad 32 \overline{) 116} \\
 \underline{-96} \\
 20
 \end{array}$$

116 divided by 32 is 3 R 20.

$$\begin{array}{r}
 15 \text{ R } 3 \\
 74. \quad 5 \overline{) 78} \\
 \underline{-5} \\
 28 \\
 \underline{-25} \\
 3
 \end{array}$$

The quotient is 15 R 3.

$$\begin{array}{r}
 58 \\
 76. \quad 85 \overline{) 4930} \\
 \underline{-425} \\
 680 \\
 \underline{-680} \\
 0
 \end{array}$$

There are 58 students in the group.

$$\begin{array}{r}
 252000 \\
 78. \quad 21 \overline{) 5292000} \\
 \underline{-42} \\
 109 \\
 \underline{-105} \\
 42 \\
 \underline{-42} \\
 0
 \end{array}$$

Each person received \$252,000.

$$\begin{array}{r}
 412 \\
 80. \quad 14 \overline{) 5768} \\
 \underline{-56} \\
 16 \\
 \underline{-14} \\
 28 \\
 \underline{-28} \\
 0
 \end{array}$$

The truck hauls 412 bushels on each trip.

$$82. \text{ Lane divider} = 25 + 25 = 50$$

$$\begin{array}{r}
 105 \\
 50 \overline{) 5280} \\
 \underline{-50} \\
 28 \\
 \underline{-0} \\
 280 \\
 \underline{-250} \\
 30
 \end{array}$$

There are 105 whole lane dividers.

$$\begin{array}{r}
 23 \text{ R } 1 \\
 84. \quad 8 \overline{) 185} \\
 \underline{-16} \\
 25 \\
 \underline{-24} \\
 1
 \end{array}$$

Yes, there is enough for a 22-student class.

There is one 8-foot length and 1 additional foot of rope left over. That is, she has 9 feet of extra rope.

$$\begin{array}{r}
 14 \\
 86. \quad 6 \overline{) 84} \\
 \underline{-6} \\
 24 \\
 \underline{-24} \\
 0
 \end{array}$$

The players each scored 14 touchdowns.

$$\begin{array}{r}
 16 \\
 88. \quad 320 \overline{) 5280} \\
 \underline{-320} \\
 2080 \\
 \underline{-1920} \\
 160
 \end{array}$$

There are 16 whole feet in 1 rod.

$$\begin{array}{r}
 3 \\
 90. \quad 37 \quad 6 \overline{) 180} \\
 26 \quad \underline{-18} \\
 15 \quad 00 \\
 29 \\
 51 \\
 + 22 \\
 \hline 180
 \end{array}$$

$$\text{Average} = \frac{180}{6} = 30$$

$$\begin{array}{r}
 21 \\
 92. \quad 121 \quad 5 \overline{) 845} \\
 200 \quad \underline{-5} \\
 185 \quad 34 \\
 176 \quad \underline{-30} \\
 + 163 \quad 45 \\
 \hline 845 \quad \underline{-45} \\
 \quad 0
 \end{array}$$

$$\text{Average} = \frac{845}{5} = 169$$

$$\begin{array}{r}
 2 \\
 94. \quad 92 \quad 6 \overline{) 534} \\
 96 \quad \underline{-48} \\
 90 \quad 54 \\
 85 \quad \underline{-54} \\
 92 \quad 0 \\
 + 79 \\
 \hline 534
 \end{array}$$

$$\text{Average} = \frac{534}{6} = 89$$

$$\begin{array}{r}
 41 \\
 96. \quad 53 \quad 3 \overline{) 123} \\
 40 \quad \underline{-12} \\
 + 30 \quad 03 \\
 \hline 123 \quad \underline{-3} \\
 \quad 0
 \end{array}$$

The average temperature is 41° .

$$\begin{array}{r}
 11 \\
 98. \quad 23 \\
 407 \\
 92 \\
 + 7011 \\
 \hline
 7533
 \end{array}$$

$$\begin{array}{r}
 100. \quad 712 \\
 \times 54 \\
 \hline
 2848 \\
 35600 \\
 \hline
 38,448
 \end{array}$$

$$\begin{array}{r}
 102. \quad 712 \\
 - 54 \\
 \hline
 658
 \end{array}$$

$$104. \quad \frac{0}{23} = 0 \text{ because } 0 \cdot 23 = 0$$

$$\begin{array}{r}
 106. \quad 31 \overline{) 304} \quad 9 \text{ R } 25 \\
 \underline{-279} \\
 25
 \end{array}$$

108. The quotient of 200 and 20 is $200 \div 20$, which is choice b.

110. 40 divided by 8 is $40 \div 8$, which is choice c.

$$\begin{array}{r}
 112. \quad 3,500,000,000 \\
 2,680,000,000 \\
 2,250,000,000 \\
 + 1,800,000,000 \\
 \hline
 10,230,000,000
 \end{array}$$

$$\begin{array}{r}
 2,557,500,000 \\
 4 \overline{) 10,230,000,000} \\
 \underline{-8} \\
 22 \\
 \underline{-20} \\
 20 \\
 \underline{-20} \\
 0 \\
 23 \\
 \underline{-20} \\
 30 \\
 \underline{-28} \\
 20 \\
 \underline{-20} \\
 0 \\
 000000
 \end{array}$$

The top four advertisers spent an average of \$2,557,500,000.

114. The average will decrease; answers may vary.

116. No; answers may vary
Possible answer: The average cannot be less than each of the four numbers.

$$118. \quad 84 \div 21 = 4$$

The width is 4 inches.

120. answers may vary
Possible answer: 2 and 2

$$\begin{array}{r}
 122. \quad 86 \qquad \qquad 46 \\
 - 10 \qquad \qquad - 10 \\
 \hline
 76 \qquad \qquad 36 \\
 - 10 \qquad \qquad - 10 \\
 \hline
 66 \qquad \qquad 26 \\
 - 10 \qquad \qquad - 10 \\
 \hline
 56 \qquad \qquad 16 \\
 - 10 \qquad \qquad - 10 \\
 \hline
 46 \qquad \qquad 6
 \end{array}$$

Therefore, $86 \div 10 = 8 \text{ R } 6$.

Integrated Review

$$\begin{array}{r}
 1. \quad 42 \\
 63 \\
 + 89 \\
 \hline
 194
 \end{array}$$

$$\begin{array}{r}
 2. \quad 7006 \\
 - 451 \\
 \hline
 6555
 \end{array}$$

$$\begin{array}{r}
 3. \quad 87 \\
 \times 52 \\
 \hline
 174 \\
 4350 \\
 \hline
 4524
 \end{array}$$

$$\begin{array}{r}
 4. \quad 8 \overline{) 4496} \quad 562 \\
 \underline{-40} \\
 49 \\
 \underline{-48} \\
 16 \\
 \underline{-16} \\
 0
 \end{array}$$

$$5. \quad 1 \cdot 67 = 67$$

$$6. \quad \frac{36}{0} \text{ is undefined.}$$

$$7. \quad 16 \div 16 = 1$$

8. $5 \div 1 = 5$

9. $0 \cdot 21 = 0$

10. $7 \cdot 0 \cdot 8 = 0$

11. $0 \div 7 = 0$

12. $12 \div 4 = 3$

13. $9 \cdot 7 = 63$

14. $45 \div 5 = 9$

$$\begin{array}{r} 15. \quad 207 \\ - 69 \\ \hline 138 \end{array}$$

$$\begin{array}{r} 16. \quad 207 \\ + 69 \\ \hline 276 \end{array}$$

$$\begin{array}{r} 17. \quad 3718 \\ - 2549 \\ \hline 1169 \end{array}$$

$$\begin{array}{r} 18. \quad 1861 \\ + 7965 \\ \hline 9826 \end{array}$$

$$\begin{array}{r} 19. \quad 7 \overline{)1278} \text{ R } 4 \\ \underline{-7} \\ 57 \\ \underline{-56} \\ 18 \\ \underline{-14} \\ 4 \end{array}$$

$$\begin{array}{r} 20. \quad 1259 \\ \times 63 \\ \hline 3777 \\ 75540 \\ \hline 79,317 \end{array}$$

$$\begin{array}{r} 21. \quad 7 \overline{)7695} \text{ R } 2 \\ \underline{-7} \\ 06 \\ \underline{-0} \\ 69 \\ \underline{-63} \\ 65 \\ \underline{-63} \\ 2 \end{array}$$

$$\begin{array}{r} 22. \quad 9 \overline{)1000} \text{ R } 1 \\ \underline{-9} \\ 10 \\ \underline{-9} \\ 10 \\ \underline{-9} \\ 1 \end{array}$$

$$\begin{array}{r} 23. \quad 32 \overline{)21,240} \text{ R } 24 \\ \underline{-192} \\ 204 \\ \underline{-192} \\ 120 \\ \underline{-96} \\ 24 \end{array}$$

$$\begin{array}{r} 24. \quad 65 \overline{)70,000} \text{ R } 60 \\ \underline{-65} \\ 50 \\ \underline{-0} \\ 500 \\ \underline{-455} \\ 450 \\ \underline{-390} \\ 60 \end{array}$$

$$\begin{array}{r} 25. \quad 4000 \\ - 2963 \\ \hline 1037 \end{array}$$

$$\begin{array}{r} 26. \quad 10,000 \\ - 101 \\ \hline 9,899 \end{array}$$

$$\begin{array}{r}
 27. \quad 303 \\
 \times 101 \\
 \hline
 303 \\
 30300 \\
 \hline
 30,603
 \end{array}$$

$$28. (475)(100) = 47,500$$

$$\begin{array}{r}
 29. \quad 62 \\
 + 9 \\
 \hline
 71
 \end{array}$$

The total of 62 and 9 is 71.

$$\begin{array}{r}
 30. \quad 62 \\
 \times 9 \\
 \hline
 558
 \end{array}$$

The product of 62 and 9 is 558.

$$\begin{array}{r}
 31. \quad 6 \text{ R } 8 \\
 9 \overline{) 62} \\
 \underline{-54} \\
 8
 \end{array}$$

The quotient of 62 and 9 is 6 R 8.

$$\begin{array}{r}
 32. \quad 62 \\
 - 9 \\
 \hline
 53
 \end{array}$$

The difference of 62 and 9 is 53.

$$\begin{array}{r}
 33. \quad 200 \\
 - 17 \\
 \hline
 183
 \end{array}$$

17 subtracted from 200 is 183.

$$\begin{array}{r}
 34. \quad 432 \\
 - 201 \\
 \hline
 231
 \end{array}$$

The difference of 432 and 201 is 231.

$$\begin{array}{l}
 35. \quad 9735 \text{ rounded to the nearest ten is } 9740. \\
 9735 \text{ rounded to the nearest hundred is } 9700. \\
 9735 \text{ rounded to the nearest thousand is } 10,000.
 \end{array}$$

$$\begin{array}{l}
 36. \quad 1429 \text{ rounded to the nearest ten is } 1430. \\
 1429 \text{ rounded to the nearest hundred is } 1400. \\
 1429 \text{ rounded to the nearest thousand is } 1000.
 \end{array}$$

$$\begin{array}{l}
 37. \quad 20,801 \text{ rounded to the nearest ten is } 20,800. \\
 20,801 \text{ rounded to the nearest hundred is } 20,800. \\
 20,801 \text{ rounded to the nearest thousand is } 21,000.
 \end{array}$$

$$\begin{array}{l}
 38. \quad 432,198 \text{ rounded to the nearest ten is } 432,200. \\
 432,198 \text{ rounded to the nearest hundred is } 432,200. \\
 432,198 \text{ rounded to the nearest thousand is } 432,000.
 \end{array}$$

$$\begin{array}{l}
 39. \quad 6 + 6 + 6 + 6 = 24 \\
 6 \times 6 = 36 \\
 \text{The perimeter is 24 feet and the area is 36 square feet.}
 \end{array}$$

$$\begin{array}{l}
 40. \quad 14 + 7 + 14 + 7 = 42 \\
 14 \\
 \times 7 \\
 \hline
 98
 \end{array}$$

The perimeter is 42 inches and the area is 98 square inches.

$$\begin{array}{r}
 41. \quad 13 \\
 9 \\
 + 6 \\
 \hline
 28
 \end{array}$$

The perimeter is 28 miles.

$$\begin{array}{l}
 42. \quad \text{The unknown vertical side has length } 4 + 3 = 7 \text{ meters. The unknown horizontal side has length } 3 + 3 = 6 \text{ meters.}
 \end{array}$$

$$\begin{array}{r}
 3 \\
 4 \\
 3 \\
 7 \\
 6 \\
 + 3 \\
 \hline
 26
 \end{array}$$

The perimeter is 26 meters.

$$\begin{array}{r}
 43. \quad \begin{array}{r} 3 \\ 19 \\ 15 \\ 25 \\ 37 \\ + 24 \\ \hline 120 \end{array} \qquad \begin{array}{r} 24 \\ 5 \overline{) 120} \\ \underline{-10} \\ 20 \\ \underline{-20} \\ 0 \end{array}
 \end{array}$$

$$\text{Average} = \frac{120}{5} = 24$$

$$\begin{array}{r}
 12 \\
 44. \quad 108 \\
 \quad 131 \\
 \quad \quad 98 \\
 + 159 \\
 \hline
 496
 \end{array}
 \qquad
 \begin{array}{r}
 124 \\
 4 \overline{) 496} \\
 \underline{-4} \\
 09 \\
 \underline{-8} \\
 16 \\
 \underline{-16} \\
 0
 \end{array}$$

$$\text{Average} = \frac{496}{4} = 124$$

$$\begin{array}{r}
 45. \quad 28,547 \\
 - 26,372 \\
 \hline
 2,175
 \end{array}$$

The Lake Pontchartrain Bridge is longer by 2175 feet.

$$\begin{array}{r}
 46. \quad 309 \\
 \times 18 \\
 \hline
 2472 \\
 \underline{3090} \\
 5562
 \end{array}$$

The amount spent on toys is \$5562.

Section 1.7 Practice Exercises

- $8 \cdot 8 \cdot 8 \cdot 8 = 8^4$
- $3 \cdot 3 \cdot 3 = 3^3$
- $10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 10^5$
- $5 \cdot 5 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 5^2 \cdot 4^6$
- $4^2 = 4 \cdot 4 = 16$
- $7^3 = 7 \cdot 7 \cdot 7 = 343$
- $11^1 = 11$
- $2 \cdot 3^2 = 2 \cdot 3 \cdot 3 = 18$
- $9 \cdot 3 - 8 \div 4 = 27 - 8 \div 4 = 27 - 2 = 25$
- $48 \div 3 \cdot 2^2 = 48 \div 3 \cdot 4 = 16 \cdot 4 = 64$

$$\begin{aligned}
 11. \quad (10-7)^4 + 2 \cdot 3^2 &= 3^4 + 2 \cdot 3^2 \\
 &= 81 + 2 \cdot 9 \\
 &= 81 + 18 \\
 &= 99
 \end{aligned}$$

$$\begin{aligned}
 12. \quad 36 \div [20 - (4 \cdot 2)] + 4^3 - 6 &= 36 \div [20 - 8] + 4^3 - 6 \\
 &= 36 \div 12 + 4^3 - 6 \\
 &= 36 \div 12 + 64 - 6 \\
 &= 3 + 64 - 6 \\
 &= 61
 \end{aligned}$$

$$\begin{aligned}
 13. \quad \frac{25 + 8 \cdot 2 - 3^3}{2(3-2)} &= \frac{25 + 8 \cdot 2 - 27}{2(1)} \\
 &= \frac{25 + 16 - 27}{2} \\
 &= \frac{14}{2} \\
 &= 7
 \end{aligned}$$

$$14. \quad 36 \div 6 \cdot 3 + 5 = 6 \cdot 3 + 5 = 18 + 5 = 23$$

$$\begin{aligned}
 15. \quad \text{Area} &= (\text{side})^2 \\
 &= (12 \text{ centimeters})^2 \\
 &= 144 \text{ square centimeters}
 \end{aligned}$$

The area of the square is 144 square centimeters.

Calculator Explorations

- $4^6 = 4096$
- $5^6 = 15,625$
- $5^5 = 3125$
- $7^6 = 117,649$
- $2^{11} = 2048$
- $6^8 = 1,679,616$
- $7^4 + 5^3 = 2526$
- $12^4 - 8^4 = 16,640$
- $63 \cdot 75 - 43 \cdot 10 = 4295$
- $8 \cdot 22 + 7 \cdot 16 = 288$
- $4(15 \div 3 + 2) - 10 \cdot 2 = 8$

12. $155 - 2(17 + 3) + 185 = 300$

Vocabulary, Readiness & Video Check 1.7

1. In $2^5 = 32$, the 2 is called the base and the 5 is called the exponent.
2. To simplify $8 + 2 \cdot 6$, which operation should be performed first? multiplication
3. To simplify $(8 + 2) \cdot 6$, which operation should be performed first? addition
4. To simplify $9(3 - 2) \div 3 + 6$, which operation should be performed first? subtraction
5. To simplify $8 \div 2 \cdot 6$, which operation should be performed first? division
6. exponent; base
7. 1
8. division, multiplication, addition
9. The area of a rectangle is length $\cdot$ width. A square is a special rectangle where length = width. Thus, the area of a square is side $\cdot$ side or $(\text{side})^2$.

Exercise Set 1.7

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

4. $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 = 6^7$

6. $10 \cdot 10 \cdot 10 = 10^3$

8. $4 \cdot 4 \cdot 3 \cdot 3 \cdot 3 = 4^2 \cdot 3^3$

10. $7 \cdot 4 \cdot 4 \cdot 4 = 7 \cdot 4^3$

12. $4 \cdot 6 \cdot 6 \cdot 6 \cdot 6 = 4 \cdot 6^4$

14. $6 \cdot 6 \cdot 2 \cdot 9 \cdot 9 \cdot 9 \cdot 9 = 6^2 \cdot 2 \cdot 9^4$

16. $6^2 = 6 \cdot 6 = 36$

18. $6^3 = 6 \cdot 6 \cdot 6 = 216$

20. $3^5 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 243$

22. $1^{12} = 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 = 1$

24. $8^1 = 8$

26. $5^4 = 5 \cdot 5 \cdot 5 \cdot 5 = 625$

28. $3^3 = 3 \cdot 3 \cdot 3 = 27$

30. $4^3 = 4 \cdot 4 \cdot 4 = 64$

32. $8^3 = 8 \cdot 8 \cdot 8 = 512$

34. $11^2 = 11 \cdot 11 = 121$

36. $10^3 = 10 \cdot 10 \cdot 10 = 1000$

38. $14^1 = 14$

40. $4^5 = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 1024$

42. $5 \cdot 3^2 = 5 \cdot 3 \cdot 3 = 45$

44. $2 \cdot 7^2 = 2 \cdot 7 \cdot 7 = 98$

46. $24 + 6 \cdot 3 = 24 + 18 = 42$

48. $100 \div 10 \cdot 5 + 4 = 10 \cdot 5 + 4 = 50 + 4 = 54$

50. $42 \div 7 - 6 = 6 - 6 = 0$

52. $32 + \frac{8}{2} = 32 + 4 = 36$

54. $3 \cdot 4 + 9 \cdot 1 = 12 + 9 = 21$

56. $\frac{6+9 \div 3}{3^2} = \frac{6+3}{9} = \frac{9}{9} = 1$

58. $6^2 \cdot (10 - 8) = 6^2 \cdot 2 = 36 \cdot 2 = 72$

$$\begin{aligned}
 60. \quad 5^3 \div (10 + 15) + 9^2 + 3^3 &= 5^3 \div 25 + 9^2 + 3^3 \\
 &= 125 \div 25 + 81 + 27 \\
 &= 5 + 81 + 27 \\
 &= 113
 \end{aligned}$$

62. $\frac{40+8}{5^2-3^2} = \frac{48}{25-9} = \frac{48}{16} = 3$

64. $(9 - 7) \cdot (12 + 18) = 2 \cdot 30 = 60$

$$66. \frac{5(12-7)-4}{5^2-18} = \frac{5(5)-4}{25-18} = \frac{25-4}{25-18} = \frac{21}{7} = 3$$

$$68. 18 - 7 \div 0 = \text{undefined}$$

$$70. \begin{aligned} 2^3 \cdot 3 - (100 \div 10) &= 2^3 \cdot 3 - 10 \\ &= 8 \cdot 3 - 10 \\ &= 24 - 10 \\ &= 14 \end{aligned}$$

$$72. \begin{aligned} [40 - (8 - 2)] - 2^5 &= [40 - 6] - 2^5 \\ &= 34 - 2^5 \\ &= 34 - 32 \\ &= 2 \end{aligned}$$

$$74. \begin{aligned} (18 \div 6) + [(3 + 5) \cdot 2] &= (18 \div 6) + (8 \cdot 2) \\ &= 3 + (8 \cdot 2) \\ &= 3 + 16 \\ &= 19 \end{aligned}$$

$$76. \begin{aligned} 35 \div [3^2 + (9 - 7) - 2^2] + 10 \cdot 3 \\ &= 35 \div [3^2 + 2 - 2^2] + 10 \cdot 3 \\ &= 35 \div [9 + 2 - 4] + 10 \cdot 3 \\ &= 35 \div 7 + 10 \cdot 3 \\ &= 5 + 10 \cdot 3 \\ &= 5 + 30 \\ &= 35 \end{aligned}$$

$$78. \frac{5^2 - 2^3 + 1^4}{10 \div 5 \cdot 4 \cdot 1 \div 4} = \frac{25 - 8 + 1}{2 \cdot 4 \cdot 1 \div 4} = \frac{18}{8 \div 4} = \frac{18}{2} = 9$$

$$80. \begin{aligned} \frac{3 + 9^2}{3(10 - 6) - 2^2 - 1} &= \frac{3 + 81}{3(4) - 2^2 - 1} \\ &= \frac{84}{3(4) - 4 - 1} \\ &= \frac{84}{12 - 4 - 1} \\ &= \frac{84}{8 - 1} \\ &= \frac{84}{7} \\ &= 12 \end{aligned}$$

$$82. \begin{aligned} 10 \div 2 + 3^3 \cdot 2 - 20 &= 10 \div 2 + 27 \cdot 2 - 20 \\ &= 5 + 27 \cdot 2 - 20 \\ &= 5 + 54 - 20 \\ &= 39 \end{aligned}$$

$$84. \begin{aligned} [15 \div (11 - 6) + 2^2] + (5 - 1)^2 &= [15 \div 5 + 2^2] + 4^2 \\ &= [15 \div 5 + 4] + 4^2 \\ &= [3 + 4] + 4^2 \\ &= 7 + 4^2 \\ &= 7 + 16 \\ &= 23 \end{aligned}$$

$$86. \begin{aligned} 29 - \{5 + 3[8 \cdot (10 - 8)] - 50\} \\ &= 29 - \{5 + 3[8 \cdot 2] - 50\} \\ &= 29 - \{5 + 3(16) - 50\} \\ &= 29 - \{5 + 48 - 50\} \\ &= 29 - 3 \\ &= 26 \end{aligned}$$

$$88. \begin{aligned} \text{Area of a square} &= (\text{side})^2 \\ &= (9 \text{ centimeters})^2 \\ &= 81 \text{ square centimeters} \\ \text{Perimeter} &= 4(\text{side}) \\ &= 4(9 \text{ centimeters}) \\ &= 36 \text{ centimeters} \end{aligned}$$

$$90. \begin{aligned} \text{Area of a square} &= (\text{side})^2 \\ &= (41 \text{ feet})^2 \\ &= 1681 \text{ square feet} \\ \text{Perimeter} &= 4(\text{side}) = 4(41 \text{ feet}) = 164 \text{ feet} \end{aligned}$$

$$92. \text{The statement is true.}$$

$$94. \begin{aligned} 4^9 &= 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \\ \text{The statement is false.} \end{aligned}$$

$$96. (2 + 3) \cdot (6 - 2) = (5) \cdot (4) = 20$$

$$98. \begin{aligned} 24 \div (3 \cdot 2 + 2) \cdot 5 &= 24 \div (6 + 2) \cdot 5 \\ &= 24 \div 8 \cdot 5 \\ &= 3 \cdot 5 \\ &= 15 \end{aligned}$$

$$100. \begin{aligned} \text{The total perimeter is 1260 feet.} \\ 4 \times 1260 &= 5040 \\ \text{The total charge is \$5040.} \end{aligned}$$

$$102. \begin{aligned} 25^3 \cdot (45 - 7 \cdot 5) \cdot 5 &= 25^3 \cdot (45 - 35) \cdot 5 \\ &= 25^3 \cdot (10) \cdot 5 \\ &= 15,625 \cdot 10 \cdot 5 \\ &= 156,250 \cdot 5 \\ &= 781,250 \end{aligned}$$

$$104. \text{answers may vary}$$

Section 1.8 Practice Exercises

1. $x - 2 = 7 - 2 = 5$
2. $y(x - 3) = 4(8 - 3) = 4(5) = 20$
3. $\frac{y+6}{x} = \frac{18+6}{6} = \frac{24}{6} = 4$
4. $25 - z^3 + x = 25 - 2^3 + 1 = 25 - 8 + 1 = 18$
5. $\frac{5(F-32)}{9} = \frac{5(41-32)}{9} = \frac{5(9)}{9} = \frac{45}{9} = 5$
6. $3(y-6) = 6$
 $3(8-6) \stackrel{?}{=} 6$
 $3(2) \stackrel{?}{=} 6$
 $6 = 6$ True
 Yes, 8 is a solution.
7. $5n + 4 = 34$
 Let n be 10.
 $5(10) + 4 \stackrel{?}{=} 34$
 $50 + 4 \stackrel{?}{=} 34$
 $54 = 34$ False
 No, 10 is not a solution.
 Let n be 6.
 $5(6) + 4 \stackrel{?}{=} 34$
 $30 + 4 \stackrel{?}{=} 34$
 $34 = 34$ True
 Yes, 6 is a solution.
 Let n be 8.
 $5(8) + 4 \stackrel{?}{=} 34$
 $40 + 4 \stackrel{?}{=} 34$
 $44 = 34$ False
 No, 8 is not a solution.
8. a. Twice a number is $2x$.
 b. 8 increased by a number is $8 + x$ or $x + 8$.
 c. 10 minus a number is $10 - x$.
 d. 10 subtracted from a number is $x - 10$.
 e. The quotient of 6 and a number is $6 \div x$ or $\frac{6}{x}$.

Vocabulary, Readiness & Video Check 1.8

1. A combination of operations on letters (variables) and numbers is an expression.
2. A letter that represents a number is a variable.

3. $3x - 2y$ is called an expression and the letters x and y are variables.
4. Replacing a variable in an expression by a number and then finding the value of the expression is called evaluating the expression.
5. A statement of the form “expression = expression” is called an equation.
6. A value for the variable that makes an equation a true statement is called a solution.
7. When a letter and a variable are next to each other, the operation is an understood multiplication.
8. When first replacing f with 8, we don’t know if the statement is true or false.
9. decreased by

Exercise Set 1.8

2.	a	b	$a + b$	$a - b$	$a \cdot b$	$a \div b$
	24	6	$24 + 6 = 30$	$24 - 6 = 18$	$24 \cdot 6 = 144$	$24 \div 6 = 4$

4.	a	b	$a + b$	$a - b$	$a \cdot b$	$a \div b$
	298	0	$298 + 0 = 298$	$298 - 0 = 298$	$298 \cdot 0 = 0$	$298 \div 0$ is undefined.

6.	a	b	$a + b$	$a - b$	$a \cdot b$	$a \div b$
	82	1	$82 + 1 = 83$	$82 - 1 = 81$	$82 \cdot 1 = 82$	$82 \div 1 = 82$

8. $7 + 3z = 7 + 3(3) = 7 + 9 = 16$
10. $4yz + 2x = 4(5)(3) + 2(2) = 60 + 4 = 64$
12. $x + 5y - z = 2 + 5(5) - 3 = 2 + 25 - 3 = 24$
14. $2y + 5z = 2(5) + 5(3) = 10 + 15 = 25$
16. $y^3 - z = 5^3 - 3 = 125 - 3 = 122$
18. $3yz^2 + 1 = 3(5)(3)^2 + 1$
 $= 3 \cdot 5 \cdot 9 + 1$
 $= 135 + 1$
 $= 136$
20. $3 + (2y - 4) = 3 + (2 \cdot 5 - 4)$
 $= 3 + (10 - 4)$
 $= 3 + 6$
 $= 9$
22. $x^4 - (y - z) = 2^4 - (5 - 3) = 2^4 - 2 = 16 - 2 = 14$
24. $\frac{8yz}{15} = \frac{8 \cdot 5 \cdot 3}{15} = \frac{120}{15} = 8$

$$26. \frac{6+3x}{z} = \frac{6+3(2)}{3} = \frac{6+6}{3} = \frac{12}{3} = 4$$

$$28. \frac{2z+6}{3} = \frac{2 \cdot 3+6}{3} = \frac{6+6}{3} = \frac{12}{3} = 4$$

$$30. \frac{70}{2y} - \frac{15}{z} = \frac{70}{2 \cdot 5} - \frac{15}{3} = \frac{70}{10} - \frac{15}{3} = 7 - 5 = 2$$

$$\begin{aligned} 32. \quad 3x^2 + 2x - 5 &= 3 \cdot 2^2 + 2 \cdot 2 - 5 \\ &= 3 \cdot 4 + 2 \cdot 2 - 5 \\ &= 12 + 4 - 5 \\ &= 11 \end{aligned}$$

$$\begin{aligned} 34. \quad (4y+3z)^2 &= (4 \cdot 5 + 3 \cdot 3)^2 \\ &= (20+9)^2 \\ &= 29^2 \\ &= 841 \end{aligned}$$

$$36. \quad (xz-5)^4 = (2 \cdot 3 - 5)^4 = (6-5)^4 = 1^4 = 1$$

$$38. \quad 3x(y+z) = 3 \cdot 2(5+3) = 3 \cdot 2(8) = 6(8) = 48$$

$$\begin{aligned} 40. \quad xz(2y+x-z) &= 2 \cdot 3(2 \cdot 5 + 2 - 3) \\ &= 2 \cdot 3(10 + 2 - 3) \\ &= 2 \cdot 3(9) \\ &= 6(9) \\ &= 54 \end{aligned}$$

$$\begin{aligned} 42. \quad \frac{6z+2y}{4} &= \frac{6 \cdot 3 + 2 \cdot 5}{4} \\ &= \frac{18+10}{4} \\ &= \frac{28}{4} \\ &= 7 \end{aligned}$$

44.	F	50	59	68	77
	$\frac{5(F-32)}{9}$	$\frac{5(50-32)}{9} = \frac{5(18)}{9} = 10$	$\frac{5(59-32)}{9} = \frac{5(27)}{9} = 15$	$\frac{5(68-32)}{9} = \frac{5(36)}{9} = 20$	$\frac{5(77-32)}{9} = \frac{5(45)}{9} = 25$

$$\begin{aligned} 46. \quad &\text{Let } n \text{ be 9.} \\ &n - 2 = 7 \\ &9 - 2 \stackrel{?}{=} 7 \\ &7 = 7 \quad \text{True} \\ &\text{Yes, 9 is a solution.} \end{aligned}$$

48. Let
- n
- be 50.

$$250 = 5n$$

$$250 \stackrel{?}{=} 5(50)$$

$$250 = 250 \quad \text{True}$$

Yes, 50 is a solution.

50. Let
- n
- be 8.

$$11n + 3 = 91$$

$$11(8) + 3 \stackrel{?}{=} 91$$

$$88 + 3 \stackrel{?}{=} 91$$

$$91 = 91 \quad \text{True}$$

Yes, 8 is a solution.

52. Let
- n
- be 0.

$$5(n + 9) = 40$$

$$5(0 + 9) \stackrel{?}{=} 40$$

$$5(9) \stackrel{?}{=} 40$$

$$45 = 40 \quad \text{False}$$

No, 0 is not a solution.

54. Let
- x
- be 2.

$$3x - 6 = 5x - 10$$

$$3(2) - 6 \stackrel{?}{=} 5(2) - 10$$

$$6 - 6 \stackrel{?}{=} 10 - 10$$

$$0 = 0 \quad \text{True}$$

Yes, 2 is a solution.

56. Let
- x
- be 5.

$$8x - 30 = 2x$$

$$8(5) - 30 \stackrel{?}{=} 2(5)$$

$$40 - 30 \stackrel{?}{=} 10$$

$$10 = 10 \quad \text{True}$$

Yes, 5 is a solution.

- 58.
- $n + 3 = 16$

Let n be 9.

$$9 + 3 \stackrel{?}{=} 16$$

$$12 = 16 \quad \text{False}$$

Let n be 11.

$$11 + 3 \stackrel{?}{=} 16$$

$$14 = 16 \quad \text{False}$$

Let n be 13.

$$13 + 3 \stackrel{?}{=} 16$$

$$16 = 16 \quad \text{True}$$

13 is a solution.

- 60.
- $3n = 45$

Let n be 15.

$$3 \cdot 15 \stackrel{?}{=} 45$$

$$45 = 45 \quad \text{True}$$

Let n be 30.

$$3 \cdot 30 \stackrel{?}{=} 45$$

$$90 = 45 \quad \text{False}$$

Let n be 45.

$$3 \cdot 45 \stackrel{?}{=} 45$$

$$135 = 45 \quad \text{False}$$

15 is a solution.

- 62.
- $4n + 6 = 26$

Let n be 0.

$$4 \cdot 0 + 6 \stackrel{?}{=} 26$$

$$0 + 6 \stackrel{?}{=} 26$$

$$6 = 26 \quad \text{False}$$

Let n be 5.

$$4 \cdot 5 + 6 \stackrel{?}{=} 26$$

$$20 + 6 \stackrel{?}{=} 26$$

$$26 = 26 \quad \text{True}$$

Let n be 10.

$$4 \cdot 10 + 6 \stackrel{?}{=} 26$$

$$40 + 6 \stackrel{?}{=} 26$$

$$46 = 26 \quad \text{False}$$

5 is a solution.

- 64.
- $6(n + 2) = 23$

Let n be 1.

$$6(1 + 2) \stackrel{?}{=} 23$$

$$6(3) \stackrel{?}{=} 23$$

$$18 = 23 \quad \text{False}$$

Let n be 3.

$$6(3 + 2) \stackrel{?}{=} 23$$

$$6(5) \stackrel{?}{=} 23$$

$$30 = 23 \quad \text{False}$$

Let n be 5.

$$6(5 + 2) \stackrel{?}{=} 23$$

$$6(7) \stackrel{?}{=} 23$$

$$42 = 23 \quad \text{False}$$

None are solutions.

- 66.
- $9x - 15 = 5x + 1$

Let x be 2.

$$9 \cdot 2 - 15 \stackrel{?}{=} 5 \cdot 2 + 1$$

$$18 - 15 \stackrel{?}{=} 10 + 1$$

$$3 = 11 \quad \text{False}$$

Let x be 4.

$$9 \cdot 4 - 15 \stackrel{?}{=} 5 \cdot 4 + 1$$

$$36 - 15 \stackrel{?}{=} 20 + 1$$

$$21 = 21 \quad \text{True}$$

Let x be 11.

$$9 \cdot 11 - 15 \stackrel{?}{=} 5 \cdot 11 + 1$$

$$99 - 15 \stackrel{?}{=} 55 + 1$$

$$84 = 56 \quad \text{False}$$

4 is a solution.

68. The sum of three and a number is
- $3 + x$
- .

70. The difference of a number and five hundred is $x - 500$.
72. A number less thirty is $x - 30$.
74. A number times twenty is $20x$.
76. A number divided by 11 is $x \div 11$ or $\frac{x}{11}$.
78. The quotient of twenty and a number, decreased by three is $\frac{20}{x} - 3$.
80. The difference of twice a number, and four is $2x - 4$.
82. Twelve subtracted from a number is $x - 12$.
84. The sum of a number and 7 is $x + 7$.
86. The product of a number and 7 is $7x$.
88. Twenty decreased by twice a number is $20 - 2x$.
90. $2(x + y)^2 = 2(23 + 72)^2$
 $= 2(95)^2$
 $= 2(9025)$
 $= 18,050$
92. $16y - 20x + x^3 = 16 \cdot 72 - 20 \cdot 23 + 23^3$
 $= 1152 - 460 + 12,167$
 $= 12,859$
94. $\frac{x}{3}$ is the smallest; answers may vary.
96. As F gets larger, $\frac{5(F-32)}{9}$ gets larger.
5. To find the area of a rectangle, multiply length times width.
6. The digits used to write numbers are 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9.
7. A letter used to represent a number is called a variable.
8. An equation can be written in the form "expression = expression."
9. A combination of operations on variables and numbers is called an expression.
10. A solution of an equation is a value of the variable that makes the equation a true statement.
11. A collection of numbers (or objects) enclosed by braces is called a set.
12. The 21 above is called the sum.
13. The 5 above is called the divisor.
14. The 35 above is called the dividend.
15. The 7 above is called the quotient.
16. The 3 above is called a factor.
17. The 6 above is called the product.
18. The 20 above is called the minuend.
19. The 9 above is called the subtrahend.
20. The 11 above is called the difference.
21. The 4 above is called an addend.

Chapter 1 Review

Chapter 1 Vocabulary Check

- The whole numbers are 0, 1, 2, 3, ...
- The perimeter of a polygon is its distance around or the sum of the lengths of its sides.
- The position of each digit in a number determines its place value.
- An exponent is a shorthand notation for repeated multiplication of the same factor.
- The place value of 4 in 7640 is tens.
- The place value of 4 in 46,200,120 is ten-millions.
- 7640 is written as seven thousand, six hundred forty.
- 46,200,120 is written as forty-six million, two hundred thousand, one hundred twenty.
- $3158 = 3000 + 100 + 50 + 8$

6. $403,225,000 = 400,000,000 + 3,000,000$
 $+ 200,000 + 20,000 + 5000$

7. Eighty-one thousand, nine hundred in standard form is 81,900.

8. Six billion, three hundred four million in standard form is 6,304,000,000.

9. Locate Europe in the first column and read across to the number in the 2016 column. There were 615,000,000 Internet users in Europe in 2016.

10. Locate Oceania/Australia in the first column and read across to the number in the 2016 column. There were 28,000,000 Internet users in Oceania/Australia in 2016.

11. Locate the smallest number in the 2013 column. Oceania/Australia had the fewest Internet users in 2013.

12. Locate the largest number in the 2008 column. Asia had the greatest number of Internet users in 2008.

13.
$$\begin{array}{r} 1 \\ 18 \\ + 49 \\ \hline 67 \end{array}$$

14.
$$\begin{array}{r} 1 \\ 28 \\ + 39 \\ \hline 67 \end{array}$$

15.
$$\begin{array}{r} 462 \\ - 397 \\ \hline 65 \end{array}$$

16.
$$\begin{array}{r} 583 \\ - 279 \\ \hline 304 \end{array}$$

17.
$$\begin{array}{r} 428 \\ + 21 \\ \hline 449 \end{array}$$

18.
$$\begin{array}{r} 1 \\ 819 \\ + 21 \\ \hline 840 \end{array}$$

19.
$$\begin{array}{r} 4000 \\ - 86 \\ \hline 3914 \end{array}$$

20.
$$\begin{array}{r} 8000 \\ - 92 \\ \hline 7908 \end{array}$$

21.
$$\begin{array}{r} 121 \\ 91 \\ 3623 \\ + 497 \\ \hline 4211 \end{array}$$

22.
$$\begin{array}{r} 11 \\ 82 \\ 1647 \\ + 238 \\ \hline 1967 \end{array}$$

23.
$$\begin{array}{r} 11 \\ 74 \\ 342 \\ + 918 \\ \hline 1334 \end{array}$$

The sum of 74, 342, and 918 is 1334.

24.
$$\begin{array}{r} 2 \\ 49 \\ 529 \\ + 308 \\ \hline 886 \end{array}$$

The sum of 49, 529, and 308 is 886.

25.
$$\begin{array}{r} 25,862 \\ - 7,965 \\ \hline 17,897 \end{array}$$

7965 subtracted from 25,862 is 17,897.

26.
$$\begin{array}{r} 39,007 \\ - 4,349 \\ \hline 34,658 \end{array}$$

4349 subtracted from 39,007 is 34,658.

27.
$$\begin{array}{r} 1 \\ 205 \\ + 7318 \\ \hline 7523 \end{array}$$

The total distance is 7523 miles.

$$\begin{array}{r}
 111 \\
 28. \quad 62,589 \\
 \quad 65,340 \\
 + 69,770 \\
 \hline
 197,699
 \end{array}$$

Her total earnings were \$197,699.

29. $40 + 52 + 52 + 72 = 216$

The perimeter is 216 feet.

30. $11 + 20 + 35 = 66$

The perimeter is 66 kilometers.

$$\begin{array}{r}
 31. \quad 467 \\
 \quad - 385 \\
 \hline
 \quad 82
 \end{array}$$

The number of Internet users in Europe increased by 82 million or 82,000,000.

$$\begin{array}{r}
 32. \quad 141 \\
 \quad - 28 \\
 \hline
 \quad 113
 \end{array}$$

There were 113 million or 113,000,000 more Internet users in the Middle East than in Oceania/Australia in 2016.

33. Find the shortest bar. The balance was the least in May.

34. Find the tallest bar. The balance was the greatest in August.

$$\begin{array}{r}
 35. \quad 280 \\
 \quad - 170 \\
 \hline
 \quad 110
 \end{array}$$

The balance decreased by \$110 from February to April.

$$\begin{array}{r}
 36. \quad 490 \\
 \quad - 250 \\
 \hline
 \quad 240
 \end{array}$$

The balance increased by \$240 from June to August.

37. To round 43 to the nearest ten, observe that the digit in the ones place is 3. Since this digit is less than 5, we do not add 1 to the digit in the tens place. The number 43 rounded to the nearest ten is 40.

38. To round 45 to the nearest ten, observe that the digit in the ones place is 5. Since this digit is at least 5, we add 1 to the digit in the tens place. The number 45 rounded to the nearest ten is 50.

39. To round 876 to the nearest ten, observe that the digit in the ones place is 6. Since this digit is at least 5, we add 1 to the digit in the tens place. The number 876 rounded to the nearest ten is 880.

40. To round 493 to the nearest hundred, observe that the digit in the tens place is 9. Since this digit is at least 5, we add 1 to the digit in the hundreds place. The number 493 rounded to the nearest hundred is 500.

41. To round 3829 to the nearest hundred, observe that the digit in the tens place is 2. Since this digit is less than 5, we do not add 1 to the digit in the hundreds place. The number 3829 rounded to the nearest hundred is 3800.

42. To round 57,534 to the nearest thousand, observe that the digit in the hundreds place is 5. Since this digit is at least 5, we add 1 to the digit in the thousands place. The number 57,534 rounded to the nearest thousand is 58,000.

43. To round 39,583,819 to the nearest million, observe that the digit in the hundred-thousands place is 5. Since this digit is at least 5, we add 1 to the digit in the millions place. The number 39,583,819 rounded to the nearest million is 40,000,000.

44. To round 768,542 to the nearest hundred-thousand, observe that the digit in the ten-thousands place is 6. Since this digit is at least 5, we add 1 to the digit in the hundred-thousands place. The number 768,542 rounded to the nearest hundred-thousand is 800,000.

$$\begin{array}{rcl}
 45. \quad 3785 & \text{rounds to} & 2 \\
 \quad 648 & \text{rounds to} & 3800 \\
 + 2866 & \text{rounds to} & 600 \\
 & & + 2900 \\
 & & \hline
 & & 7300
 \end{array}$$

$$\begin{array}{rcl}
 46. \quad 5925 & \text{rounds to} & 5900 \\
 - 1787 & \text{rounds to} & - 1800 \\
 & & \hline
 & & 4100
 \end{array}$$

47. 630 rounds to 600
 192 rounds to 200
 271 rounds to 300
 56 rounds to 100
 703 rounds to 700
 454 rounds to 500
 + 329 rounds to + 300
 2700

They traveled approximately 2700 miles.

48. 832,073,224 rounds to 832,000,000
 - 626,119,788 rounds to - 626,000,000
 206,000,000

The population of Europe was approximately 832,000,000 and the population of Latin America/Caribbean was approximately 626,000,000. The difference in population was about 206,000,000.

49. 276
 × 8
 2208

50. 349
 × 4
 1396

51. 57
 × 40
 2280

52. 69
 × 42
 138
 2760
 2898

53. $20(7)(4) = 140(4) = 560$

54. $25(9)(4) = 225(4) = 900$
 or
 $25(4)(9) = 100(9) = 900$

55. $26 \cdot 34 \cdot 0 = 0$

56. $62 \cdot 88 \cdot 0 = 0$

57. 586
 × 29
 5 274
 11 720
 16,994

58. 242
 × 37
 1694
 7260
 8954

59. 642
 × 177
 4 494
 44 940
 64 200
 113,634

60. 347
 × 129
 3 123
 6 940
 34 700
 44,763

61. 1026
 × 401
 1 026
 410 400
 411,426

62. 2107
 × 302
 4 214
 632 100
 636,314

63. “Product” indicates multiplication.
 250

× 6
 1500

The product of 6 and 250 is 1500.

64. “Product” indicates multiplication.
 820

× 6
 4920

The product of 6 and 820 is 4920.

$$\begin{array}{r}
 65. \quad 32 \\
 \times 15 \\
 \hline
 160 \\
 320 \\
 \hline
 480
 \end{array}
 \qquad
 \begin{array}{r}
 38 \\
 \times 11 \\
 \hline
 38 \\
 380 \\
 \hline
 418
 \end{array}$$

$$\begin{array}{r}
 480 \\
 + 418 \\
 \hline
 898
 \end{array}$$

The total cost is \$898.

$$\begin{array}{r}
 66. \quad 20,199 \\
 \times 20 \\
 \hline
 403,980
 \end{array}$$

The total cost for 20 students is \$403,980.

$$\begin{aligned}
 67. \quad \text{Area} &= (\text{length})(\text{width}) \\
 &= (13 \text{ miles})(7 \text{ miles}) \\
 &= 91 \text{ square miles}
 \end{aligned}$$

$$\begin{aligned}
 68. \quad \text{Area} &= (\text{length})(\text{width}) \\
 &= (25 \text{ centimeters})(20 \text{ centimeters}) \\
 &= 500 \text{ square centimeters}
 \end{aligned}$$

$$\begin{array}{rcl}
 69. \quad \frac{49}{7} = 7 & \text{Check:} & \begin{array}{r} 7 \\ \times 7 \\ \hline 49 \end{array}
 \end{array}$$

$$\begin{array}{rcl}
 70. \quad \frac{36}{9} = 4 & \text{Check:} & \begin{array}{r} 9 \\ \times 4 \\ \hline 36 \end{array}
 \end{array}$$

$$\begin{array}{r}
 71. \quad \begin{array}{r} 5 \text{ R } 2 \\ 5 \overline{) 27} \\ \underline{-25} \\ 2 \end{array}
 \end{array}$$

Check: $5 \times 5 + 2 = 27$

$$\begin{array}{r}
 72. \quad \begin{array}{r} 4 \text{ R } 2 \\ 4 \overline{) 18} \\ \underline{-16} \\ 2 \end{array}
 \end{array}$$

Check: $4 \times 4 + 2 = 18$

$$73. \quad 918 \div 0 \text{ is undefined.}$$

$$74. \quad 0 \div 668 = 0 \qquad \text{Check: } 0 \cdot 668 = 0$$

$$\begin{array}{r}
 75. \quad \begin{array}{r} 33 \text{ R } 2 \\ 5 \overline{) 167} \\ \underline{-15} \\ 17 \\ \underline{-15} \\ 2 \end{array}
 \end{array}$$

Check: $33 \times 5 + 2 = 167$

$$\begin{array}{r}
 76. \quad \begin{array}{r} 19 \text{ R } 7 \\ 8 \overline{) 159} \\ \underline{-8} \\ 79 \\ \underline{-72} \\ 7 \end{array}
 \end{array}$$

Check: $19 \times 8 + 7 = 159$

$$\begin{array}{r}
 77. \quad \begin{array}{r} 24 \text{ R } 2 \\ 26 \overline{) 626} \\ \underline{-52} \\ 106 \\ \underline{-104} \\ 2 \end{array}
 \end{array}$$

Check: $24 \times 26 + 2 = 626$

$$\begin{array}{r}
 78. \quad \begin{array}{r} 35 \text{ R } 15 \\ 19 \overline{) 680} \\ \underline{-57} \\ 110 \\ \underline{-95} \\ 15 \end{array}
 \end{array}$$

Check: $35 \times 19 + 15 = 680$

$$\begin{array}{r}
 79. \quad \begin{array}{r} 506 \text{ R } 10 \\ 47 \overline{) 23,792} \\ \underline{-235} \\ 29 \\ \underline{-0} \\ 292 \\ \underline{-282} \\ 10 \end{array}
 \end{array}$$

Check: $506 \times 47 + 10 = 23,792$

$$\begin{array}{r}
 907 \text{ R } 40 \\
 80. \quad 53 \overline{) 48,111} \\
 \underline{-47 \ 7} \\
 41 \\
 \underline{-0} \\
 411 \\
 \underline{-371} \\
 40
 \end{array}$$

Check: $907 \times 53 + 40 = 48,111$

$$\begin{array}{r}
 2793 \text{ R } 140 \\
 81. \quad 207 \overline{) 578,291} \\
 \underline{-414} \\
 164 \ 2 \\
 \underline{-144 \ 9} \\
 19 \ 39 \\
 \underline{-18 \ 63} \\
 761 \\
 \underline{-621} \\
 140
 \end{array}$$

Check: $2793 \times 207 + 140 = 578,291$

$$\begin{array}{r}
 2012 \text{ R } 60 \\
 82. \quad 306 \overline{) 615,732} \\
 \underline{-612} \\
 3 \ 7 \\
 \underline{-0} \\
 3 \ 73 \\
 \underline{-3 \ 06} \\
 672 \\
 \underline{-612} \\
 60
 \end{array}$$

Check: $2012 \times 306 + 60 = 615,732$

$$\begin{array}{r}
 18 \text{ R } 2 \\
 83. \quad 5 \overline{) 92} \\
 \underline{-5} \\
 42 \\
 \underline{-40} \\
 2
 \end{array}$$

The quotient of 92 and 5 is 18 R 2.

$$\begin{array}{r}
 21 \text{ R } 2 \\
 84. \quad 4 \overline{) 86} \\
 \underline{-8} \\
 06 \\
 \underline{-4} \\
 2
 \end{array}$$

The quotient of 86 and 4 is 21 R 2.

$$\begin{array}{r}
 27 \\
 85. \quad 24 \overline{) 648} \\
 \underline{-48} \\
 168 \\
 \underline{-168} \\
 0
 \end{array}$$

27 boxes can be filled with cans of corn.

$$\begin{array}{r}
 13 \\
 86. \quad 1760 \overline{) 22,880} \\
 \underline{-17 \ 60} \\
 5 \ 280 \\
 \underline{-5 \ 280} \\
 0
 \end{array}$$

There are 13 miles in 22,880 yards.

87. Divide the sum by 4.

$$\begin{array}{r}
 76 \\
 49 \\
 32 \\
 + 47 \\
 \hline
 204
 \end{array}
 \qquad
 \begin{array}{r}
 51 \\
 4 \overline{) 204} \\
 \underline{-20} \\
 04 \\
 \underline{-4} \\
 0
 \end{array}$$

The average is 51.

88. Divide the sum by 4.

$$\begin{array}{r}
 23 \\
 85 \\
 62 \\
 + 66 \\
 \hline
 236
 \end{array}
 \qquad
 \begin{array}{r}
 59 \\
 4 \overline{) 236} \\
 \underline{-20} \\
 36 \\
 \underline{-36} \\
 0
 \end{array}$$

The average is 59.

$$89. \quad 8^2 = 8 \cdot 8 = 64$$

$$90. \quad 5^3 = 5 \cdot 5 \cdot 5 = 125$$

$$91. \quad 5 \cdot 9^2 = 5 \cdot 9 \cdot 9 = 405$$

$$92. \quad 4 \cdot 10^2 = 4 \cdot 10 \cdot 10 = 400$$

$$93. 18 \div 2 + 7 = 9 + 7 = 16$$

$$94. 12 - 8 \div 4 = 12 - 2 = 10$$

$$95. \frac{5(6^2 - 3)}{3^2 + 2} = \frac{5(36 - 3)}{9 + 2} = \frac{5(33)}{11} = \frac{165}{11} = 15$$

$$96. \frac{7(16 - 8)}{2^3} = \frac{7(8)}{8} = \frac{56}{8} = 7$$

$$97. 48 \div 8 \cdot 2 = 6 \cdot 2 = 12$$

$$98. 27 \div 9 \cdot 3 = 3 \cdot 3 = 9$$

$$\begin{aligned} 99. & 2 + 3[1^5 + (20 - 17) \cdot 3] + 5 \cdot 2 \\ &= 2 + 3[1^5 + 3 \cdot 3] + 5 \cdot 2 \\ &= 2 + 3[1 + 3 \cdot 3] + 5 \cdot 2 \\ &= 2 + 3[1 + 9] + 5 \cdot 2 \\ &= 2 + 3 \cdot 10 + 5 \cdot 2 \\ &= 2 + 30 + 10 \\ &= 42 \end{aligned}$$

$$\begin{aligned} 100. & 21 - [2^4 - (7 - 5) - 10] + 8 \cdot 2 \\ &= 21 - [2^4 - 2 - 10] + 8 \cdot 2 \\ &= 21 - [16 - 2 - 10] + 8 \cdot 2 \\ &= 21 - 4 + 8 \cdot 2 \\ &= 21 - 4 + 16 \\ &= 33 \end{aligned}$$

$$\begin{aligned} 101. & 19 - 2(3^2 - 2^2) = 19 - 2(9 - 4) \\ &= 19 - 2(5) \\ &= 19 - 10 \\ &= 9 \end{aligned}$$

$$\begin{aligned} 102. & 16 - 2(4^2 - 3^2) = 16 - 2(16 - 9) \\ &= 16 - 2(7) \\ &= 16 - 14 \\ &= 2 \end{aligned}$$

$$103. 4 \cdot 5 - 2 \cdot 7 = 20 - 14 = 6$$

$$104. 8 \cdot 7 - 3 \cdot 9 = 56 - 27 = 29$$

$$\begin{aligned} 105. & (6 - 4)^3 \cdot [10^2 \div (3 + 17)] = (6 - 4)^3 \cdot [10^2 \div 20] \\ &= (6 - 4)^3 \cdot [100 \div 20] \\ &= 2^3 \cdot 5 \\ &= 8 \cdot 5 \\ &= 40 \end{aligned}$$

$$\begin{aligned} 106. & (7 - 5)^3 \cdot [9^2 \div (2 + 7)] = (7 - 5)^3 \cdot [9^2 \div 9] \\ &= (7 - 5)^3 \cdot [81 \div 9] \\ &= 2^3 \cdot 9 \\ &= 8 \cdot 9 \\ &= 72 \end{aligned}$$

$$107. \frac{5 \cdot 7 - 3 \cdot 5}{2(11 - 3^2)} = \frac{35 - 15}{2(11 - 9)} = \frac{20}{2(2)} = \frac{20}{4} = 5$$

$$108. \frac{4 \cdot 8 - 1 \cdot 11}{3(9 - 2^3)} = \frac{32 - 11}{3(9 - 8)} = \frac{21}{3(1)} = \frac{21}{3} = 7$$

$$109. \text{Area} = (\text{side})^2 = (7 \text{ meters})^2 = 49 \text{ square meters}$$

$$110. \text{Area} = (\text{side})^2 = (3 \text{ inches})^2 = 9 \text{ square inches}$$

$$111. \frac{2x}{z} = \frac{2 \cdot 5}{2} = \frac{10}{2} = 5$$

$$112. 4x - 3 = 4 \cdot 5 - 3 = 20 - 3 = 17$$

$$113. \frac{x+7}{y} = \frac{5+7}{0} \text{ is undefined.}$$

$$114. \frac{y}{5x} = \frac{0}{5 \cdot 5} = \frac{0}{25} = 0$$

$$115. x^3 - 2z = 5^3 - 2 \cdot 2 = 125 - 2 \cdot 2 = 125 - 4 = 121$$

$$116. \frac{7+x}{3z} = \frac{7+5}{3 \cdot 2} = \frac{12}{6} = 2$$

$$117. (y+z)^2 = (0+2)^2 = 2^2 = 4$$

$$118. \frac{100}{x} + \frac{y}{3} = \frac{100}{5} + \frac{0}{3} = 20 + 0 = 20$$

$$119. \text{Five subtracted from a number is } x - 5.$$

$$120. \text{Seven more than a number is } x + 7.$$

$$121. \text{Ten divided by a number is } 10 \div x \text{ or } \frac{10}{x}.$$

$$122. \text{The product of 5 and a number is } 5x.$$

- 123.** Let n be 5.
 $n + 12 = 20 - 3$
 $5 + 12 \stackrel{?}{=} 20 - 3$
 $17 = 17$ True
 Yes, 5 is a solution.
- 124.** Let n be 23.
 $n - 8 = 10 + 6$
 $23 - 8 \stackrel{?}{=} 10 + 6$
 $15 = 16$ False
 No, 23 is not a solution.
- 125.** Let $n = 14$.
 $30 = 3(n - 3)$
 $30 \stackrel{?}{=} 3(14 - 3)$
 $30 \stackrel{?}{=} 3(11)$
 $30 = 33$ False
 No, 14 is not a solution.
- 126.** Let n be 20.
 $5(n - 7) = 65$
 $5(20 - 7) \stackrel{?}{=} 65$
 $5(13) \stackrel{?}{=} 65$
 $65 = 65$ True
 Yes, 20 is a solution.
- 127.** $7n = 77$
 Let n be 6.
 $7 \cdot 6 \stackrel{?}{=} 77$
 $42 = 77$ False
 Let n be 11.
 $7 \cdot 11 \stackrel{?}{=} 77$
 $77 = 77$ True
 Let n be 20.
 $7 \cdot 20 \stackrel{?}{=} 77$
 $140 = 77$ False
 11 is a solution.
- 128.** $n - 25 = 150$
 Let n be 125.
 $125 - 25 \stackrel{?}{=} 150$
 $100 = 150$ False
 Let n be 145.
 $145 - 25 \stackrel{?}{=} 150$
 $120 = 150$ False
 Let n be 175.
 $175 - 25 \stackrel{?}{=} 150$
 $150 = 150$ True
 175 is a solution.
- 129.** $5(n + 4) = 90$
 Let n be 14.
 $5(14 + 4) \stackrel{?}{=} 90$
 $5(18) \stackrel{?}{=} 90$
 $90 = 90$ True
 Let n be 16.
 $5(16 + 4) \stackrel{?}{=} 90$
 $5(20) \stackrel{?}{=} 90$
 $100 = 90$ False
 Let n be 26.
 $5(26 + 4) \stackrel{?}{=} 90$
 $5(30) \stackrel{?}{=} 90$
 $150 = 90$ False
 14 is a solution.
- 130.** $3n - 8 = 28$
 Let n be 3.
 $3(3) - 8 \stackrel{?}{=} 28$
 $9 - 8 \stackrel{?}{=} 28$
 $1 = 28$ False
 Let n be 7.
 $3(7) - 8 \stackrel{?}{=} 28$
 $21 - 8 \stackrel{?}{=} 28$
 $13 = 28$ False
 Let n be 15.
 $3(15) - 8 \stackrel{?}{=} 28$
 $45 - 8 \stackrel{?}{=} 28$
 $37 = 28$ False
 None are solutions.
- 131.**
$$\begin{array}{r} 485 \\ - 68 \\ \hline 417 \end{array}$$
- 132.**
$$\begin{array}{r} 729 \\ - 47 \\ \hline 682 \end{array}$$
- 133.**
$$\begin{array}{r} 732 \\ \times 3 \\ \hline 2196 \end{array}$$
- 134.**
$$\begin{array}{r} 629 \\ \times 4 \\ \hline 2516 \end{array}$$
- 135.**
$$\begin{array}{r} 22 \\ 374 \\ 29 \\ + 698 \\ \hline 1101 \end{array}$$

$$\begin{array}{r}
 21 \\
 136. \quad 593 \\
 \quad 52 \\
 + 766 \\
 \hline
 1411
 \end{array}$$

$$\begin{array}{r}
 458 \text{ R } 8 \\
 137. \quad 13 \overline{) 5962} \\
 \underline{-52} \\
 76 \\
 \underline{-65} \\
 112 \\
 \underline{-104} \\
 8
 \end{array}$$

$$\begin{array}{r}
 237 \text{ R } 1 \\
 138. \quad 18 \overline{) 4267} \\
 \underline{-36} \\
 66 \\
 \underline{-54} \\
 127 \\
 \underline{-126} \\
 1
 \end{array}$$

$$\begin{array}{r}
 139. \quad 1968 \\
 \times 36 \\
 \hline
 11808 \\
 59040 \\
 \hline
 70,848
 \end{array}$$

$$\begin{array}{r}
 140. \quad 5324 \\
 \times 18 \\
 \hline
 42592 \\
 53240 \\
 \hline
 95,832
 \end{array}$$

$$\begin{array}{r}
 141. \quad 2000 \\
 - 356 \\
 \hline
 1644
 \end{array}$$

$$\begin{array}{r}
 142. \quad 9000 \\
 - 519 \\
 \hline
 8481
 \end{array}$$

143. To round 842 to the nearest ten, observe that the digit in the ones place is 2. Since this digit is less than 5, we do not add 1 to the digit in the tens place. The number 842 rounded to the nearest ten is 840.

144. To round 258,371 to the nearest hundred-thousand, observe that the digit in the ten-thousands place is 5. Since this digit is at least 5, we add 1 to the digit in the hundred-thousands place. The number 258,371 rounded to the nearest hundred-thousand is 300,000.

145. $24 \div 4 \cdot 2 = 6 \cdot 2 = 12$

146. $\frac{(15+3) \cdot (8-5)}{2^3+1} = \frac{(18)(3)}{8+1} = \frac{54}{9} = 6$

147. Let n be 9.
 $5n - 6 = 40$
 $5 \cdot 9 - 6 \stackrel{?}{=} 40$
 $45 - 6 \stackrel{?}{=} 40$
 $39 = 40$ False
 No, 9 is not a solution.

148. Let n be 3.
 $2n - 6 = 5n - 15$
 $2(3) - 6 \stackrel{?}{=} 5(3) - 15$
 $6 - 6 \stackrel{?}{=} 15 - 15$
 $0 = 0$ True
 Yes, 3 is a solution.

$$\begin{array}{r}
 53 \\
 149. \quad 32 \overline{) 1714} \\
 \underline{-160} \\
 114 \\
 \underline{-96} \\
 18
 \end{array}$$

There are 53 full boxes with 18 left over.

$$\begin{array}{r}
 150. \quad 27 \qquad \qquad 8 \\
 \times 2 \qquad \qquad \times 4 \\
 \hline
 54 \qquad \qquad 32
 \end{array}$$

$$\begin{array}{r}
 54 \\
 + 32 \\
 \hline
 86
 \end{array}$$

The total bill before taxes is \$86.

Chapter 1 Getting Ready for the Test

1. In the number 28,690,357,004, the digit 5 is in the ten-thousands place; D.
2. In the number 28,690,357,004, the digit 8 is in the billions place; E.
3. In the number 28,690,357,004, the digit 6 is in the hundred-millions place; F.

4. In the number 28,690,357,004, the digit 0 to the far left is in the millions place; B.
5. To simplify $6 - 3 \cdot 2$, the first operation to perform is multiplying $3 \cdot 2$; C.
6. To simplify $(6 - 3) \cdot 2$, the first operation to perform is subtracting 3 from 6; B.
7. To simplify $6 \div 3 \cdot 2$, the first operation to perform is dividing 6 by 3; D.
8. To simplify $6 + 3 - 2$, the first operation to perform is adding 6 and 3; A.
9. $5 \cdot 2^3 = 5 \cdot 8 = 40$; C
10. Since $35 \div 5 = 7$, the expression is $a \div b$; B.
11. since $35 \cdot 5 = 175$, the expression is ab ; D.
12. Since $35 - 5 = 30$, the expression is $a - b$; A.
13. Since $35 + 5 = 40$, the expression is $a + b$; C.

Chapter 1 Test

1. 82,426 in words is eighty-two thousand, four hundred twenty-six.
2. Four hundred two thousand, five hundred fifty in standard form is 402,550.

$$\begin{array}{r} 1 \\ 3. \quad 59 \\ + 82 \\ \hline 141 \end{array}$$

$$\begin{array}{r} 4. \quad 600 \\ - 487 \\ \hline 113 \end{array}$$

$$\begin{array}{r} 5. \quad 496 \\ \times 30 \\ \hline 14,880 \end{array}$$

$$\begin{array}{r} 6. \quad \begin{array}{r} 766 \text{ R } 42 \\ 69 \overline{) 52,896} \\ \underline{-48 } \\ 4 \\ \underline{-4 } \\ 456 \\ \underline{-414} \\ 42 \end{array} \end{array}$$

$$7. \quad 2^3 \cdot 5^2 = 2 \cdot 2 \cdot 2 \cdot 5 \cdot 5 = 200$$

$$8. \quad 98 \div 1 = 98$$

$$9. \quad 0 \div 49 = 0$$

$$10. \quad 62 \div 0 \text{ is undefined.}$$

$$11. \quad (2^4 - 5) \cdot 3 = (16 - 5) \cdot 3 = 11 \cdot 3 = 33$$

$$\begin{aligned} 12. \quad 16 + 9 \div 3 \cdot 4 - 7 &= 16 + 3 \cdot 4 - 7 \\ &= 16 + 12 - 7 \\ &= 28 - 7 \\ &= 21 \end{aligned}$$

$$13. \quad 6^1 \cdot 2^3 = 6 \cdot 2 \cdot 2 \cdot 2 = 48$$

$$\begin{aligned} 14. \quad 2[(6-4)^2 + (22-19)^2] + 10 &= 2[2^2 + 3^2] + 10 \\ &= 2[4 + 9] + 10 \\ &= 2[13] + 10 \\ &= 26 + 10 \\ &= 36 \end{aligned}$$

$$15. \quad 5698 \cdot 1000 = 5,698,000$$

$$16. \quad \text{Divide the sum by 5.}$$

$$\begin{array}{r} 2 \qquad \qquad \qquad 82 \\ 62 \qquad \qquad \qquad 5 \overline{) 410} \\ 79 \qquad \qquad \qquad \underline{-40} \\ 84 \qquad \qquad \qquad 10 \\ 90 \qquad \qquad \qquad \underline{-10} \\ + 95 \qquad \qquad \qquad 0 \\ \hline 410 \end{array}$$

The average is 82.

17. To round 52,369 to the nearest thousand, observe that the digit in the hundreds place is 3. Since this digit is less than 5, we do not add 1 to the digit in the thousands place. The number 52,369 rounded to the nearest thousand is 52,000.

$$\begin{array}{rcl}
 18. & 6289 & \text{rounds to} & 6\,300 \\
 & 5403 & \text{rounds to} & 5\,400 \\
 & + 1957 & \text{rounds to} & + 2\,000 \\
 & \hline
 & & & 13,700
 \end{array}$$

$$\begin{array}{rcl}
 19. & 4267 & \text{rounds to} & 4300 \\
 & - 2738 & \text{rounds to} & - 2700 \\
 & \hline
 & & & 1600
 \end{array}$$

$$\begin{array}{r}
 20. \quad 107 \\
 - \quad 15 \\
 \hline
 92
 \end{array}$$

$$\begin{array}{r}
 21. \quad 15 \\
 + 107 \\
 \hline
 122
 \end{array}$$

$$\begin{array}{r}
 22. \quad 107 \\
 \times 15 \\
 \hline
 535 \\
 1070 \\
 \hline
 1605
 \end{array}$$

$$\begin{array}{r}
 23. \quad 15 \overline{) 107} \quad 7 \text{ R } 2 \\
 \underline{-105} \\
 2
 \end{array}$$

$$\begin{array}{r}
 24. \quad 29 \overline{) 493} \quad 17 \\
 \underline{-29} \\
 203 \\
 \underline{-203} \\
 0
 \end{array}$$

Each can cost \$17.

$$\begin{array}{r}
 25. \quad 725 \\
 - 599 \\
 \hline
 126
 \end{array}$$

The higher-priced one is \$126 more.

$$\begin{array}{r}
 26. \quad 45 \\
 \times 8 \\
 \hline
 360
 \end{array}$$

There are 360 calories in 8 tablespoons of white granulated sugar.

$$\begin{array}{r}
 27. \quad 430 \\
 \times 16 \\
 \hline
 2580 \\
 4300 \\
 \hline
 6880
 \end{array}$$

$$\begin{array}{r}
 6880 \\
 + 1025 \\
 \hline
 7905
 \end{array}$$

The total cost is \$7905.

$$\begin{array}{l}
 28. \text{ Perimeter} = (5 + 5 + 5 + 5) \text{ centimeters} \\
 = 20 \text{ centimeters}
 \end{array}$$

$$\begin{array}{l}
 \text{Area} = (\text{side})^2 \\
 = (5 \text{ centimeters})^2 \\
 = 25 \text{ square centimeters}
 \end{array}$$

$$29. \text{ Perimeter} = (20 + 10 + 20 + 10) \text{ yards} = 60 \text{ yards}$$

$$\begin{array}{l}
 \text{Area} = (\text{length})(\text{width}) \\
 = (20 \text{ yards})(10 \text{ yards}) \\
 = 200 \text{ square yards}
 \end{array}$$

$$30. \text{ Replace } x \text{ with } 2.$$

$$5(x^3 - 2) = 5(2^3 - 2) = 5(8 - 2) = 5(6) = 30$$

$$31. \text{ Replace } x \text{ with } 7 \text{ and } y \text{ with } 8.$$

$$\frac{3x-5}{2y} = \frac{3(7)-5}{2 \cdot 8} = \frac{21-5}{16} = \frac{16}{16} = 1$$

$$32. \text{ a. The quotient of a number and } 17 \text{ is } x \div 17 \text{ or } \frac{x}{17}.$$

$$\text{b. Twice a number, decreased by } 20 \text{ is } 2x - 20.$$

$$33. \text{ Replace } n \text{ with } 6.$$

$$5n - 11 = 19$$

$$5(6) - 11 \stackrel{?}{=} 19$$

$$30 - 11 \stackrel{?}{=} 19$$

$$19 = 19 \quad \text{True}$$

6 is a solution.

34. $n + 20 = 4n - 10$

Replace n with 0.

$$0 + 20 \stackrel{?}{=} 4 \cdot 0 - 10$$

$$20 \stackrel{?}{=} 0 - 10$$

$$20 = -10 \quad \text{False}$$

Replace n with 10.

$$10 + 20 \stackrel{?}{=} 4 \cdot 10 - 10$$

$$30 \stackrel{?}{=} 40 - 10$$

$$30 = 30 \quad \text{True}$$

Replace n with 20.

$$20 + 20 \stackrel{?}{=} 4 \cdot 20 - 10$$

$$40 \stackrel{?}{=} 80 - 10$$

$$40 = 70 \quad \text{False}$$

10 is a solution.