Chapter 1

Section 1.2 Practice

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. 67 is written as sixty-seven.

5. 395 is written as three hundred ninety-five.

6. 12,804 is written as twelve thousand, eight hundred four.

7. 321,670,200 is written as three hundred twenty-one million, six hundred seventy thousand, two hundred.

8. Twenty-nine in standard form is 29.

9. Seven hundred ten in standard form is 710.

10. Twenty-six thousand, seventy-one in standard form is 26,071.

11. Six million, five hundred seven in standard form is 6,000,507.

12. 1,047,608
= 1,000,000 + 40,000 + 7000 + 600 + 8

13. a. Find "France" in the left column. Then read from left to right until the "Literature" column is reached. We find that France has 14 Nobel Prize winners in Literature.

b. Look at the "Total" column. Three countries have more than 60 Nobel Prize winners. The United States has 320, the United Kingdom has 110, and Germany has 82.

Vocabulary and Readiness Check

1. The numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, ... are called whole numbers.

2. The number 1,286 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.

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. 13,382 is written as thirteen thousand, three hundred eighty-two.

22. 99,769 is written as ninety-nine thousand, seven hundred sixty-nine.

24. 350,000,000 is written as three hundred fifty 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. Two thousand one in standard form is 2001.

44. Sixty-seven million, one hundred sixty-five thousand in standard form is 67,165,000.

46. Two thousand, five hundred forty-four in standard form is 2544.

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. The elevation of Mt. Washington in standard form is 6288. 6288 is written as six thousand, two hundred eighty-eight.

60. 5712 = 5000 + 700 + 10 + 2

62. The second tallest mountain in New England is Mt. Adams.

64. German Shepherd dog has more dogs registered than Golden Retriever.

66. Bulldogs have the fewest registrations; 21,037 is written as twenty-one thousand, thirty-seven.

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. 3 quadrillion in standard form is 3,000,000,000,000,000.

Section 1.3 Practice

1.
$$\begin{array}{r} 7235 \\ +\ 542 \\ \hline 7777 \end{array}$$

2.
$$\begin{array}{r} {\scriptstyle 11\ 11} \\ 27{,}364 \\ +\ 92{,}977 \\ \hline 120{,}341 \end{array}$$

3. $11 + 7 + 8 + 9 + 13$

$20 + 8 + 20$

48

4.
$$\begin{array}{r} {\scriptstyle 11\ 2} \\ 19 \\ 5042 \\ 638 \\ +\ 526 \\ \hline 6225 \end{array}$$

5. 2 cm + 8 cm + 15 cm + 5 cm = 30 cm
The perimeter is 30 centimeters.

6. 647 + 647 + 647 = 1941
The perimeter is 1941 feet.

7.
$$\begin{array}{r} 70 \\ +\ 50 \\ \hline 120 \end{array}$$
Georgia produces 120 million pounds of freestone peaches.

8. a. The country with the fewest endangered species corresponds to the shortest bar, which is Australia.

b. To find the total number of endangered species for Brazil, India, and Mexico, we add.
$$\begin{array}{r} 73 \\ 89 \\ +\ 72 \\ \hline 234 \end{array}$$
The total number of endangered species for Brazil, India, and Mexico is 234.

Calculator Explorations

1. 89 + 45 = 134

2. $76 + 91 = 173$

3. $285 + 55 = 340$

4. $8773 + 652 = 9425$

5.
$$\begin{array}{r} 985 \\ 1210 \\ 562 \\ +\ 77 \\ \hline 2834 \end{array}$$

6.
$$\begin{array}{r} 465 \\ 9888 \\ 620 \\ +\ 1550 \\ \hline 12{,}523 \end{array}$$

Vocabulary and Readiness Check

1. The sum of 0 and any number is the same number.

2. The sum of any number and 0 is the same number.

3. In $35 + 20 = 55$, the number 55 is called the sum and 35 and 20 are each called an addend.

4. The distance around a polygon is called its perimeter.

5. 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.

6. 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.

Exercise Set 1.3

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

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

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

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

10.
$$\begin{array}{r} {\scriptstyle 1} \\ 41 \\ +\ 74 \\ \hline 115 \end{array}$$

12.
$$\begin{array}{r} {\scriptstyle 1} \\ 35 \\ +\ 470 \\ \hline 505 \end{array}$$

14.
$$\begin{array}{r} {\scriptstyle 1} \\ 17{,}427 \\ +\ 821{,}059 \\ \hline 838{,}486 \end{array}$$

16.
$$\begin{array}{r} {\scriptstyle 2} \\ 3 \\ 5 \\ 8 \\ 5 \\ +\ 7 \\ \hline 28 \end{array}$$

18.
$$\begin{array}{r} {\scriptstyle 2} \\ 12 \\ 4 \\ 8 \\ 26 \\ +\ 10 \\ \hline 60 \end{array}$$

20.
$$\begin{array}{r} {\scriptstyle 2\ 2} \\ 64 \\ 28 \\ 56 \\ 25 \\ +\ 32 \\ \hline 205 \end{array}$$

22.
$$\begin{array}{r} {\scriptstyle 2} \\ 23 \\ 49 \\ +\ 18 \\ \hline 90 \end{array}$$

24.
$$\begin{array}{r} 30 \\ 900 \\ +\ 20 \\ \hline 950 \end{array}$$

26.
$$\begin{array}{r} {\scriptstyle 1\,1\,1} \\ 1624 \\ 32 \\ +\ 976 \\ \hline 2632 \end{array}$$

28.
$$\begin{array}{r} {\scriptstyle 1\,1\,2} \\ 16 \\ 1056 \\ 748 \\ +\ 7770 \\ \hline 9590 \end{array}$$

30.
$$\begin{array}{r} {\scriptstyle 1\,1\,1} \\ 427 \\ 383 \\ +\ 229 \\ \hline 1039 \end{array}$$

32.
$$\begin{array}{r} {\scriptstyle 1\,1\ 1\,1} \\ 6\ 789 \\ 4\ 321 \\ +\ 5\ 555 \\ \hline 16,665 \end{array}$$

34.
$$\begin{array}{r} {\scriptstyle 1\,1\,1} \\ 864 \\ 33 \\ +\ 356 \\ \hline 1253 \end{array}$$

36.
$$\begin{array}{r} 5000 \\ 1400 \\ +\ 3021 \\ \hline 9421 \end{array}$$

38.
$$\begin{array}{r} {\scriptstyle 1\ 1\,1} \\ 26 \\ 582 \\ 4\ 763 \\ +\ 62,511 \\ \hline 67,882 \end{array}$$

40.
$$\begin{array}{r} {\scriptstyle 1\,1\,1\,2\ 1\,2} \\ 504,218 \\ 321,920 \\ 38,507 \\ +\ 594,687 \\ \hline 1,459,332 \end{array}$$

42.
$$\begin{array}{r} {\scriptstyle 1} \\ 3 \\ 3 \\ 5 \\ +\ 5 \\ \hline 16 \end{array}$$
The perimeter is 16 kilometers.

44.
$$\begin{array}{r} {\scriptstyle 1} \\ 3 \\ 4 \\ +\ 5 \\ \hline 12 \end{array}$$
The perimeter is 12 centimeters.

46.
$$\begin{array}{r} {\scriptstyle 2} \\ 8 \\ 4 \\ 8 \\ +\ 4 \\ \hline 24 \end{array}$$
The perimeter is 24 miles.

48.
$$\begin{array}{r} {\scriptstyle 1} \\ 23 \\ 23 \\ 23 \\ +\ 23 \\ \hline 92 \end{array}$$
The perimeter is 92 centimeters.

50. $6 + 5 + 7 + 3 + 4 + 7 + 5 = 37$
The perimeter is 37 inches.

52. 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.

54. "Find the sum" indicates addition.
$$\begin{array}{r} {\scriptstyle 1} \\ 802 \\ +\ 6487 \\ \hline 7289 \end{array}$$
The sum of 802 and 6487 is 7289.

56. "Find the total" indicates addition.
$$\begin{array}{r} {\scriptstyle 1\,2} \\ 89 \\ 45 \\ 2 \\ 19 \\ +\ 341 \\ \hline 496 \end{array}$$
The total of 89, 45, 2, 19, and 341 is 496.

58. "Increased by" indicates addition.
$$\begin{array}{r} 712 \\ +\ 38 \\ \hline 750 \end{array}$$
712 increased by 38 is 750.

60. "Plus" indicates addition.
$$\begin{array}{r} {\scriptstyle 1\,2\,1} \\ 3565 \\ 565 \\ +\ 70 \\ \hline 4200 \end{array}$$
3565 plus 565 plus 70 is 4200.

62. Add 4990 to 39,136.

$$\begin{array}{r} {\scriptstyle 1\,1\ 1} \\ 39{,}136 \\ +\ 4\,990 \\ \hline 44{,}126 \end{array}$$

California's projected population in 2020 is 44,126 thousand.

64.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 285 \\ +\ 98 \\ \hline 383 \end{array}$$

The distance from Kansas City to Colby is 383 miles.

66.
$$\begin{array}{r} {\scriptstyle 2\,1} \\ 60 \\ 45 \\ 60 \\ +\ 45 \\ \hline 210 \end{array}$$

The perimeter of the home is 210 feet.

68.
$$\begin{array}{r} {\scriptstyle 1} \\ 240 \\ 100 \\ 355 \\ 500 \\ 200 \\ +\ 500 \\ \hline 1895 \end{array}$$

The fluid intake of the patient was 1895 cc.

70. Add 992 to 1305.

$$\begin{array}{r} {\scriptstyle 1} \\ 1305 \\ +\ 992 \\ \hline 2297 \end{array}$$

Hank Aaron batted in 2297 total runs during his career in professional baseball.

72. Find the sum of 29,719,969 and 4,280,031.

$$\begin{array}{r} {\scriptstyle 11\ 111\ 11} \\ 29{,}719{,}969 \\ +\ 4{,}280{,}031 \\ \hline 34{,}000{,}000 \end{array}$$

The sheep population was 34,000,000.

74.
$$\begin{array}{r} {\scriptstyle 2} \\ 18 \\ 12 \\ 18 \\ +\ 12 \\ \hline 60 \end{array}$$

The perimeter of the puzzle is 60 inches.

76.
$$\begin{array}{r} 1940 \\ +\ 35 \\ \hline 1975 \end{array}$$

Marion Jones was born in the year 1975.

78. Pennsylvania has the fewest Target stores.

80. 53 + 236 + 124 + 56 + 85 + 62 + 60 + 73 + 64 + 146 = 959

The total number in the ten states listed is 959 stores.

82. The total number of stores listed in the table is 959 stores.

$$\begin{array}{r} 959 \\ +\ 739 \\ \hline 1698 \end{array}$$

There are 1698 Target stores in the United States.

84.
$$\begin{array}{r} {\scriptstyle 1} \\ 5193 \\ +\ 1222 \\ \hline 6415 \end{array}$$

The total highway mileage in Rhode Island is 6415 miles.

86. answers may vary

88. answers may vary

90.
$$\begin{array}{r} {\scriptstyle 11\ 2\,2\,2\ 1} \\ 78{,}962 \\ 129{,}968{,}350 \\ +\ 36{,}462{,}880 \\ \hline 166{,}510{,}192 \end{array}$$

92.
$$\begin{array}{r} {\scriptstyle 1\,2\,1} \\ 773 \\ 659 \\ +\ 481 \\ \hline 1913 \end{array}$$

The given answer is correct.

94.
$$\begin{array}{r} {\scriptstyle 1\ 2} \\ 19 \\ 214 \\ 49 \\ +\ 651 \\ \hline 933 \end{array}$$

The given answer is incorrect.

Section 1.4 Practice

1. 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 $42 + 0 = 42$.

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

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

3. a.
$$\begin{array}{r} {\scriptstyle 8\ 17} \\ 6\not{9}\ \not{7} \\ -\ 4\ 9 \\ \hline 64\ 8 \end{array}$$
Check:
$$\begin{array}{r} 648 \\ +\ 49 \\ \hline 697 \end{array}$$

b.
$$\begin{array}{r} {\scriptstyle 2\ 12} \\ \not{3}\not{2}6 \\ -\ 245 \\ \hline 81 \end{array}$$
Check:
$$\begin{array}{r} 81 \\ +\ 245 \\ \hline 326 \end{array}$$

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

4. a.
$$\begin{array}{r} {\scriptstyle 9} \\ {\scriptstyle 3\ \not{1}\not{0}10} \\ \not{4}\ \not{0}\ \not{0} \\ -\ 1\ 6\ 4 \\ \hline 2\ 3\ 6 \end{array}$$
Check:
$$\begin{array}{r} 236 \\ +\ 164 \\ \hline 400 \end{array}$$

b.
$$\begin{array}{r} {\scriptstyle 9} \\ {\scriptstyle 9\not{1}\not{0}10} \\ 1\not{0}\ \not{0}\ \not{0} \\ -\ 7\ 6\ 2 \\ \hline 2\ 3\ 8 \end{array}$$
Check:
$$\begin{array}{r} 238 \\ +\ 762 \\ \hline 1000 \end{array}$$

5.
$$\begin{array}{r} 15,759 \\ -\ \ 458 \\ \hline 15,301 \end{array}$$
The radius of Neptune is 15,301 miles.

6.
$$\begin{array}{r} 92 \\ -\ 47 \\ \hline 45 \end{array}$$
The sale price of the suit is $45.

Calculator Explorations

1. $865 - 95 = 770$

2. $76 - 27 = 49$

3. $147 - 38 = 109$

4. $366 - 87 = 279$

5. $9625 - 647 = 8978$

6. $10{,}711 - 8925 = 1786$

Vocabulary and Readiness Check

1. The difference of any number and that same number is 0.

2. The difference of any number and 0 is the same number.

3. In $37 - 19 = 18$, the number 37 is the minuend, and the number 19 is the subtrahend.

4. In $37 - 19 = 18$, the number 18 is called the difference.

5. $6 - 6 = 0$

6. $93 - 93 = 0$

7. $600 - 0 = 600$

8. $5 - 0 = 5$

Exercise Set 1.4

2.
$$\begin{array}{r} 72 \\ -\ 41 \\ \hline 31 \end{array}$$
Check:
$$\begin{array}{r} 31 \\ +\ 41 \\ \hline 72 \end{array}$$

4.
$$\begin{array}{r} 572 \\ -\ 321 \\ \hline 251 \end{array}$$
Check:
$$\begin{array}{r} 251 \\ +\ 321 \\ \hline 572 \end{array}$$

6. 286
− 45
241
Check:
241
+ 45
286

8. 5766
− 324
5442
Check:
5442
+ 324
5766

10. 4912
− 2610
2302
Check:
2302
+ 2610
4912

12. 257
− 257
0
Check:
0
+ 257
257

14. 55
− 29
26
Check:
1
26
+ 29
55

16. 80
− 37
43
Check:
1
43
+ 37
80

18. 436
− 275
161
Check:
1
161
+ 275
436

20. 674
− 299
375
Check:
11
375
+ 299
674

22. 300
− 149
151
Check:
11
151
+ 149
300

24. 773
− 29
744
Check:
1
744
+ 29
773

26. 813
− 227
586
Check:
11
586
+ 227
813

28. 5349
− 720
4629
Check:
1
4629
+ 720
5349

30. $724 - 16 = 708$

Check:

$$\begin{array}{r} {\scriptstyle 1} \\ 708 \\ +\,16 \\ \hline 724 \end{array}$$

32. $300 - 211 = 89$

Check:

$$\begin{array}{r} {\scriptstyle 11} \\ 89 \\ +\,211 \\ \hline 300 \end{array}$$

34. $1983 - 1914 = 69$

Check:

$$\begin{array}{r} {\scriptstyle 1} \\ 69 \\ +\,1914 \\ \hline 1983 \end{array}$$

36. $76,652 - 29,498 = 47,154$

Check:

$$\begin{array}{r} {\scriptstyle 1\ \ 11} \\ 47,154 \\ +\,29,498 \\ \hline 76,652 \end{array}$$

38. $40,000 - 23,582 = 16,418$

Check:

$$\begin{array}{r} {\scriptstyle 11\ 11} \\ 16,418 \\ +\,23,582 \\ \hline 40,000 \end{array}$$

40. $6050 - 1878 = 4172$

Check:

$$\begin{array}{r} {\scriptstyle 111} \\ 4172 \\ +\,1878 \\ \hline 6050 \end{array}$$

42. $62,222 - 39,898 = 22,324$

Check:

$$\begin{array}{r} {\scriptstyle 11\ 11} \\ 22,324 \\ +\,39,898 \\ \hline 62,222 \end{array}$$

44. $21 - 9 = 12$

21 subtract 9 is 12.

46. $16 - 5 = 11$

The difference of 16 and 5 is 11.

48. $59 - 41 = 18$

59 subtract 41 is 18.

50. $25 - 12 = 13$

25 less 12 is 13.

52. $90 - 86 = 4$

86 subtracted from 90 is 4.

54. $59,320 - 55,492 = 3\,828$

They traveled 3828 miles on their trip.

56. $197 - 98 = 99$

Kelp can grow 99 feet taller than bamboo.

58. $164,000 + 40,000 = 204,000$

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

60.
$$\begin{array}{r} 189,000 \\ -\ 75,000 \\ \hline 114,000 \end{array}$$
The Upper Mississippi sub-basin drains 114,000 square miles more than the Lower Mississippi sub-basin.

62.
$$\begin{array}{r} 68 \\ -\ 58 \\ \hline 10 \end{array}$$
The low temperature was 10° Fahrenheit.

64.
$$\begin{array}{r} 713 \\ -\ 299 \\ \hline 414 \end{array}$$
She will have $414 left in her savings account.

66.
$$\begin{array}{r} 243 \\ -\ 185 \\ \hline 58 \end{array}$$
Pat's blood cholesterol level should be decreased by 58.

68.
$$\begin{array}{r} 547 \\ -\ 99 \\ \hline 448 \end{array}$$
The sale price of the stereo is $448.

70.
$$\begin{array}{r} 38,708 \\ -\ 12,322 \\ \hline 26,386 \end{array}$$
There were 26,386 official participants for the 2009 Boston Marathon.

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

74.
$$\begin{array}{r} 100 \\ -\ 70 \\ \hline 30 \end{array}$$
The difference in sound intensity between live rock music and loud television is 30 dB.

76.
$$\begin{array}{r} 23,729 \\ -\ 13,205 \\ \hline 10,524 \end{array}$$
The number of tornadoes after 2000 was 10,524.

78.
$$\begin{array}{r} 127 \\ -\ 25 \\ \hline 102 \end{array}$$
The increase in the number of California condors is 102.

80. Los Angeles International, Dallas/Ft. Worth International and Denver International airports have fewer than 70 million passengers per year.

82.
$$\begin{array}{r} 89,000,000 \\ -\ 60,000,000 \\ \hline 29,000,000 \end{array}$$
Hartsfield-Jackson Atlanta International Airport has 29 million more passengers per year than the Dallas/Ft. Worth International Airport.

84. Student A Budget
$$\begin{array}{r} {\scriptstyle 1} \\ 600 \\ 200 \\ 150 \\ +\ 120 \\ \hline 1070 \end{array}$$
$$\begin{array}{r} 1200 \\ -\ 1070 \\ \hline 130 \end{array}$$
Student A would have an excess of $130.

Student B Budget
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 300 \\ 400 \\ 240 \\ +\ 170 \\ \hline 1110 \end{array}$$
$$\begin{array}{r} 1200 \\ -\ 1110 \\ \hline 90 \end{array}$$
Student B would have an excess of $90.

86.
$$\begin{array}{r} 986 \\ -\ 48 \\ \hline 938 \end{array}$$

88.
$$\begin{array}{r} {\scriptstyle 2\,2} \\ 80 \\ 93 \\ 17 \\ 9 \\ +\ 2 \\ \hline 201 \end{array}$$

90.
$$\begin{array}{r} 10,000 \\ -\ 1\,786 \\ \hline 8\,214 \end{array}$$

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

94. In $\begin{array}{r} 2863 \\ -\ 1904 \\ \hline \end{array}$, 2863 is the minuend and 1904 is the subtrahend.

96. In find 86 decreased by 25, 86 is the minuend and 25 is the subtrahend.

98. $\begin{array}{r} 478 \\ -\ 89 \\ \hline 389 \end{array}$

The given answer is correct.

Check:

$\begin{array}{r} {\scriptstyle 1} \\ 389 \\ +\ 89 \\ \hline 478 \end{array}$

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

The given answer is incorrect.

Check:

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

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

104. answers may vary

Section 1.5 Practice

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 978,865 rounded to the nearest hundred is 979,000.

4.

49	rounds to	50
25	rounds to	30
32	rounds to	30
51	rounds to	50
98	rounds to	+ 100
		260

5.

3785	rounds to	4000
− 2479	rounds to	− 2000
		2000

6.

11	rounds to	10
16	rounds to	20
19	rounds to	20
+ 31	rounds to	+ 30
		80

The total distance is approximately 80 miles.

7.

48,445	rounds to	48,000
6,584	rounds to	7,000
+ 15,632	rounds to	+ 16,000
		71,000

The total number of cases is approximately 71,000.

Vocabulary and Readiness Check

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.

Exercise Set 1.5

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.

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.

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 11,565 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 hundreds place. Therefore, 11,565 restaurants rounded to the nearest hundred is 11,600 restaurants.

30. To round 60,149 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. Therefore, 60,149 days rounded to the nearest hundred is 60,100 days.

32. To round 305,747,409 to the nearest million, observe that the digit in the hundred-thousands place is 7. Since this digit is at least 5, we add 1 to the digit in the millions place. Therefore, 305,747,409 rounded to the nearest million is 306,000,000.

34. To round 83,503,000,000 to the nearest billion, observe that the digit in the hundred-millions place is 5. Since this digit is at least 5, we add 1 to the digit in the billions place. Therefore, \$83,503,000,000 rounded to the nearest billion is \$84,000,000,000.

36. To round 2,933,888,000 to the nearest ten-million, observe that the digit in the millions place is 3. Since this digit is less than 5, we do not add 1 to the digit in the ten-millions place. Therefore, 2,933,888,000 bushels rounded to the nearest ten-million is 2,930,000,000 bushels.

38.

52	rounds to	50
33	rounds to	30
15	rounds to	20
+ 29	rounds to	+ 30
		130

40.

555	rounds to	560
− 235	rounds to	− 240
		320

42.

4050	rounds to	4100
3133	rounds to	3100
+ 1220	rounds to	+ 1200
		8400

44.

1989	rounds to	2000
− 1870	rounds to	− 1900
		100

46.

799	rounds to	800
1655	rounds to	1700
+ 271	rounds to	+ 300
		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
+ 82	rounds to	+ 80
		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
+ 802	rounds to	+ 800
		2600

The total distance is approximately 2600 miles.

58.

1895	rounds to	1900
− 1524	rounds to	− 1500
		400

The difference in price is approximately \$400.

60.

64	rounds to	60
41	rounds to	40
+ 133	rounds to	+ 130
		230

The total distance is approximately 230 miles.

62.

51,746	rounds to	52,000
− 49,713	rounds to	− 50,000
		2 000

The increase is approximately 2000 credit hours.

64. 364 million dollars written in standard form is \$364,000,000. \$364,000,000 rounded to the nearest ten-million is \$360,000,000. \$364,000,000 rounded to the nearest hundred-million is \$400,000,000.

66. 311 million dollars written in standard form is \$311,000,000. \$311,000,000 rounded to the nearest ten-million is \$310,000,000. \$311,000,000 rounded to the nearest hundred-million is \$300,000,000.

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.

5950	rounds to	6 000
7693	rounds to	7 700
+ 8203	rounds to	+ 8 200
		21,900

The perimeter is approximately 21,900 miles.

Section 1.6 Practice

1. a. $3 \times 0 = 0$

b. $4(1) = 4$

c. $(0)(34) = 0$

d. $1 \cdot 76 = 76$

2. a. $5(2 + 3) = 5 \cdot 2 + 5 \cdot 3$

b. $9(8 + 7) = 9 \cdot 8 + 9 \cdot 7$

c. $3(6 + 1) = 3 \cdot 6 = 3 \cdot 1$

3. a.
$$\begin{array}{r} {\scriptstyle 2} \\ 36 \\ \times\ 4 \\ \hline 144 \end{array}$$

b.
$$\begin{array}{r} {\scriptstyle 2\,1} \\ 132 \\ \times\ 9 \\ \hline 1188 \end{array}$$

4. a.
$$\begin{array}{r} 594 \\ \times\ 72 \\ \hline 1\ 188 \\ 41\ 580 \\ \hline 42,768 \end{array}$$

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

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

b.
$$\begin{array}{r} 288 \\ \times\ 4 \\ \hline 1152 \end{array}$$

6. $75 \cdot 100 = 7500$

7. $808 \cdot 1000 = 808,000$

8.
$$\begin{array}{r} 35 \\ \times\ 3 \\ \hline 105 \end{array}$$
$35 \cdot 3000 = 105,000$
Attach 3 zeros.

9. $600 \cdot 600 = 360,000$

10. Area = length · width
= (360 miles)(280 miles)
= 100,800 square miles
The area of Wyoming is 100,800 square miles.

11.
$$\begin{array}{r} 16 \\ \times\ 45 \\ \hline 80 \\ 640 \\ \hline 720 \end{array}$$
The printer can print 720 pages in 45 minutes.

12.
$8 \times 11 = 88$
$5 \times 9 = 45$

$$\begin{array}{r} {\scriptstyle 1} \\ 88 \\ +\ 45 \\ \hline 133 \end{array}$$

The total cost is \$133.

13. 163 rounds to 200
$\times$ 391 rounds to $\times$ 400
80,000

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 and Readiness Check

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.

Exercise Set 1.6

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. $12(12 + 3) = 12 \cdot 12 + 12 \cdot 3$

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

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

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

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

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

26.
$$\begin{array}{r} 526 \\ \times\ 23 \\ \hline 1\,578 \\ 10\,520 \\ \hline 12{,}098 \end{array}$$

28.
$$\begin{array}{r} 708 \\ \times\ 21 \\ \hline 708 \\ 14\,160 \\ \hline 14{,}868 \end{array}$$

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

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

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

36.
$$\begin{array}{r} 1357 \\ \times \quad 79 \\ \hline 12\,213 \\ 94\,990 \\ \hline 107,203 \end{array}$$

38.
$$\begin{array}{r} 807 \\ \times \quad 127 \\ \hline 5\,649 \\ 16\,140 \\ 80\,700 \\ \hline 102,489 \end{array}$$

40.
$$\begin{array}{r} 1234 \\ \times \quad 567 \\ \hline 8\,638 \\ 74\,040 \\ 617\,000 \\ \hline 699,678 \end{array}$$

42.
$$\begin{array}{r} 426 \\ \times \quad 110 \\ \hline 4\,260 \\ 42\,600 \\ \hline 46,860 \end{array}$$

44.
$$\begin{array}{r} 1876 \\ \times \quad 1407 \\ \hline 13\,132 \\ 750\,400 \\ 1\,876\,000 \\ \hline 2,639,532 \end{array}$$

46. $6 \times 100 = 600$

48. $26 \times 1000 = 26{,}000$

50. $9054 \cdot 10 = 90{,}540$

52. $3 \cdot 9 = 27$
$3 \cdot 9000 = 27{,}000$
(attach 3 zeros)

54. $7 \cdot 3 = 21$
$70 \cdot 300 = 21{,}000$
(attach 3 zeros)

56. $27 \cdot 5 = 135$
$27 \cdot 50{,}000 = 1{,}350{,}000$
(attach 4 zeros)

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

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

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

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

62.
$$\begin{array}{rcr} 982 & \text{rounds to} & 1000 \\ \times\, 650 & \text{rounds to} & \times \quad 700 \\ & & \hline & & 700,000 \end{array}$$

64.
$$\begin{array}{rcr} 111 & \text{rounds to} & 100 \\ \times\, 999 & \text{rounds to} & \times \quad 1000 \\ & & \hline & & 100,000 \end{array}$$

66. 2872×12 is approximately 2872×10, which is 28,720.
The best estimate is b.

68. 706×409 is approximately 700×400, which is 280,000.
The best estimate is d.

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

72. $9 \times 900 = 8100$

74.
$$\begin{array}{r} 3310 \\ \times \quad 3 \\ \hline 9930 \end{array}$$

76.
$$\begin{array}{r} 14 \\ \times \quad 8 \\ \hline 112 \end{array}$$
There are 112 grams of fat in 8 ounces of hulled sunflower seeds.

78.
$$\begin{array}{r} 34 \\ \times 14 \\ \hline 136 \\ 340 \\ \hline 476 \end{array}$$
There are 476 seats in the room.

80. 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.

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

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

86.
$$\begin{array}{r} 700 \\ \times\ 17 \\ \hline 4\,900 \\ 7\,000 \\ \hline 11{,}900 \end{array}$$
The 17 discs hold 11,900 MB.

88.
$$\begin{array}{r} 365 \\ \times\ 3 \\ \hline 1095 \end{array}$$
A cow eats 1095 pounds of grain each year.

90.
$$\begin{array}{r} 13 \\ \times 16 \\ \hline 78 \\ 130 \\ \hline 208 \end{array}$$
There are 208 grams of fat in 16 ounces.

92.

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

94. $12 \times 3 = 36$
There were 36 million older Americans in 2008.

96.
$$\begin{array}{r} 126 \\ -\ \ 8 \\ \hline 118 \end{array}$$

98. $47 + 26 + 10 + 231 + 50 = 364$

100.
$$\begin{array}{r} 19 \\ \times\ 4 \\ \hline 76 \end{array}$$
The product of 19 and 4 is 76.

102.
$$\begin{array}{r} 19 \\ +\ 4 \\ \hline 23 \end{array}$$
The total of 19 and 4 is 23.

104. $11 + 11 + 11 + 11 + 11 + 11 = 6 \cdot 11$ or $11 \cdot 6$

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

b. answers may vary

108.
$$\begin{array}{r} 31 \\ \times\ 50 \\ \hline 1550 \end{array}$$

110. $57 \times 3 = 171$
$57 \times 6 = 342$
The problem is
$$\begin{array}{r} 57 \\ \times\ 63 \\ \hline \end{array}$$

112. answers may vary

114. $3 \times 150 = 450$
$2 \times 775 = 1550$
$450 + 1550 + 623 = 2623$
Kobe Bryant scored 2623 points during the 2007–2008 regular season.

Section 1.7 Practice

1. a. $9\overline{)72}$ $\quad 8$ 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. $1\overline{)11}$ $\quad 11$ 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. $8\overline{)0}$ $\quad 0$ 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 $0 \cdot 14 = 0$.

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

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

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

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

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

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

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

Check: $304 \times 7 = 2128$

b.
$$\begin{array}{r} 5\,100 \\ 9\overline{)\,45{,}900} \\ \underline{-45} \\ 0\,9 \\ \underline{-9} \\ 000 \end{array}$$

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

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

Check: $234 \cdot 4 + 3 = 939$

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

Check: $657 \cdot 5 + 2 = 3287$

7. a.
$$\begin{array}{r} 9067 \text{ R } 2 \\ 9\overline{)\,81{,}605} \\ \underline{-81} \\ 0\,6 \\ \underline{-0} \\ 60 \\ \underline{-54} \\ 65 \\ \underline{-63} \\ 2 \end{array}$$

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

b.
$$\begin{array}{r} 5827 \text{ R } 2 \\ 4\overline{)\,23{,}310} \\ \underline{-20} \\ 3\,3 \\ \underline{-3\,2} \\ 11 \\ \underline{-8} \\ 30 \\ \underline{-28} \\ 2 \end{array}$$

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

8.
$$\begin{array}{r} 524 \text{ R } 12 \\ 17\overline{)\,8920} \\ \underline{-85} \\ 42 \\ \underline{-34} \\ 80 \\ \underline{-68} \\ 12 \end{array}$$

9.
$$\begin{array}{r} 49 \text{ R } 60 \\ 678\overline{)\,33{,}282} \\ \underline{-27\,12} \\ 6\,162 \\ \underline{-6\,102} \\ 60 \end{array}$$

10.
$$\begin{array}{r} 57 \\ 3\overline{)\,171} \\ \underline{-15} \\ 21 \\ \underline{-21} \\ 0 \end{array}$$

Each student got 57 CDs.

11.
$$\begin{array}{r} 44 \\ 12\overline{)\,532} \\ \underline{-48} \\ 52 \\ \underline{-48} \\ 4 \end{array}$$

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

12. Find the sum and divide by 7.

$$\begin{array}{r} 4 \\ 7 \\ 35 \\ 16 \\ 9 \\ 3 \\ +\,52 \\ \hline 126 \end{array} \qquad \begin{array}{r} 18 \\ 7\overline{)\,126} \\ \underline{-7} \\ 56 \\ \underline{-56} \\ 0 \end{array}$$

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 and Readiness Check

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.

Exercise Set 1.7

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. $18 \div 3 = 6$

22.
$$\begin{array}{r} 17 \\ 5\overline{)\,85} \\ \underline{-5} \\ 35 \\ \underline{-35} \\ 0 \end{array}$$
Check: $17 \cdot 5 = 85$

24.
$$\begin{array}{r} 80 \\ 8\overline{)\,640} \\ \underline{-64} \\ 00 \end{array}$$
Check: $80 \cdot 8 = 640$

26.
$$\begin{array}{r} 526 \\ 4\overline{)\,2104} \\ \underline{-20} \\ 10 \\ \underline{-8} \\ 24 \\ \underline{-24} \\ 0 \end{array}$$
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: $413 \cdot 3 + 1 = 1240$

38.
$$\begin{array}{r} 55 \text{ R } 2 \\ 3\overline{)\ 167} \\ \underline{-15} \\ 17 \\ \underline{-15} \\ 2 \end{array}$$

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

40.
$$\begin{array}{r} 833 \text{ R } 1 \\ 4\overline{)\ 3333} \\ \underline{-32} \\ 13 \\ \underline{-12} \\ 13 \\ \underline{-12} \\ 1 \end{array}$$

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

42.
$$\begin{array}{r} 32 \\ 23\overline{)\ 736} \\ \underline{-69} \\ 46 \\ \underline{-46} \\ 0 \end{array}$$

Check: $32 \cdot 23 = 736$

44.
$$\begin{array}{r} 48 \\ 42\overline{)\ 2016} \\ \underline{-168} \\ 336 \\ \underline{-336} \\ 0 \end{array}$$

Check: $48 \cdot 42 = 2016$

46.
$$\begin{array}{r} 44 \text{ R } 2 \\ 44\overline{)\ 1938} \\ \underline{-176} \\ 178 \\ \underline{-176} \\ 2 \end{array}$$

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

48.
$$\begin{array}{r} 612 \text{ R } 10 \\ 12\overline{)\ 7354} \\ \underline{-72} \\ 15 \\ \underline{-12} \\ 34 \\ \underline{-24} \\ 10 \end{array}$$

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

50.
$$\begin{array}{r} 405 \\ 14\overline{)\ 5670} \\ \underline{-56} \\ 07 \\ \underline{-0} \\ 70 \\ \underline{-70} \\ 0 \end{array}$$

Check: $405 \cdot 14 = 5670$

52.
$$\begin{array}{r} 39 \text{ R } 9 \\ 64\overline{)\ 2505} \\ \underline{-192} \\ 585 \\ \underline{-576} \\ 9 \end{array}$$

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

54.
$$\begin{array}{r} 47 \\ 123\overline{)\ 5781} \\ \underline{-492} \\ 861 \\ \underline{-861} \\ 0 \end{array}$$

Check: $47 \cdot 123 = 5781$

56.
$$\begin{array}{r} 96 \text{ R } 52 \\ 240\overline{)\ 23,092} \\ -21\,60 \\ \hline 1\,492 \\ -1\,440 \\ \hline 52 \end{array}$$

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

58.
$$\begin{array}{r} 201 \text{ R } 50 \\ 203\overline{)\ 40,853} \\ -40\,6 \\ \hline 25 \\ -0 \\ \hline 253 \\ -203 \\ \hline 50 \end{array}$$

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

60.
$$\begin{array}{r} 303 \text{ R } 63 \\ 543\overline{)\ 164,592} \\ -162\,9 \\ \hline 1\,69 \\ -\ 0 \\ \hline 1\,692 \\ -1\,629 \\ \hline 63 \end{array}$$

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

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

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

66.
$$\begin{array}{r} 1714 \text{ R } 47 \\ 50\overline{)\ 85,747} \\ -50 \\ \hline 35\,7 \\ -35\,0 \\ \hline 74 \\ -50 \\ \hline 247 \\ -200 \\ \hline 47 \end{array}$$

68.
$$\begin{array}{r} 3\,040 \\ 214\overline{)\ 650,560} \\ -642 \\ \hline 8\,5 \\ -0 \\ \hline 8\,56 \\ -8\,56 \\ \hline 00 \\ -0 \\ \hline 0 \end{array}$$

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

The quotient is 13 R 3.

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

116 divided by 32 is 3 R 20.

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

The quotient is 15 R 3.

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

There are 58 students in the group.

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

Each person received $252,000.

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

The truck hauls 412 bushels on each trip.

82. Lane divider = 25 + 25 = 50

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

There are 105 whole lane dividers.

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

Yes, she has 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.

86.
$$\begin{array}{r} 20 \\ 6\overline{)\,120} \\ -12 \\ \hline 00 \\ -0 \\ \hline 0 \end{array}$$

DeAngelo Williams made 20 touchdowns during 2008.

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

There are 16 whole feet in 1 rod.

90.
$$\begin{array}{r} {\scriptstyle 3} \\ 37 \\ 26 \\ 15 \\ 29 \\ 51 \\ +\ 22 \\ \hline 180 \end{array} \qquad \begin{array}{r} 30 \\ 6\overline{)\,180} \\ -18 \\ \hline 00 \end{array}$$

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

92.
$$\begin{array}{r} {\scriptstyle 2\,1} \\ 121 \\ 200 \\ 185 \\ 176 \\ +\ 163 \\ \hline 845 \end{array} \qquad \begin{array}{r} 169 \\ 5\overline{)\,845} \\ -5 \\ \hline 34 \\ -30 \\ \hline 45 \\ -45 \\ \hline 0 \end{array}$$

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

94.
$$\begin{array}{r} {\scriptstyle 2} \\ 92 \\ 96 \\ 90 \\ 85 \\ 92 \\ +\ 79 \\ \hline 534 \end{array} \qquad \begin{array}{r} 89 \\ 6\overline{)\,534} \\ -48 \\ \hline 54 \\ -54 \\ \hline 0 \end{array}$$

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

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

The average temperature is 41°.

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

100.
$$\begin{array}{r} 712 \\ \times\ \ 54 \\ \hline 2\,848 \\ 35\,600 \\ \hline 38,448 \end{array}$$

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

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

106. $31\overline{)\,304}$ gives 9 R 25, -279, 25

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.

112. The total number of winners for Sweden is 30. There are 6 categories.

$6\overline{)\,30}$ gives 5, -30, 0

The average number of Nobel Prize winners per category for Sweden is 5.

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. $84 \div 21 = 4$
The width is 4 inches.

120. answers may vary
Possible answer: 2 and 2

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

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

Integrated Review

1.
$$\begin{array}{r} {\scriptstyle 11} \\ 23 \\ 46 \\ +\ 79 \\ \hline 148 \end{array}$$

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

3.
$$\begin{array}{r} 36 \\ \times\ 45 \\ \hline 180 \\ 1440 \\ \hline 1620 \end{array}$$

4. $8\overline{)\,4496}$ gives 562, -40, 49, -48, 16, -16, 0

5. $1 \cdot 79 = 79$

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

7. $9 \div 1 = 9$

8. $9 \div 9 = 1$