Developmental Mathematics 4th edition Martin Gay Solutions Manual

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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. 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 11 Literature Nobel Prize winners were born in France.

b. Look at the "Total" column. Three countries have more than 60 Nobel Prize winners. The United States has 259, the United Kingdom has 99, and Germany has 77.

Vocabulary, Readiness & Vocabulary 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 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.

7. hundreds

8. To read (or write) a number, read from left to right.

9. 80,000

10. Boott Spur

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. 22,806 is written as twenty-two thousand, eight hundred six.

22. 118,049 is written as one hundred eighteen thousand, forty-nine.

24. 347,219 is written as three hundred forty-seven thousand, two hundred nineteen.

26. 11,239 is written as eleven thousand, two hundred thirty-nine.

28. 202,700 is written as two hundred two thousand, seven hundred.

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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 eighty in standard form is 2080.

44. Ninety-one million, seventy-one thousand dollars in standard form is $91,071,000.

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. The British Museum in London had more visitors than the Shanghai Science and Technology Museum in Shanghai.

66. The number of visitors to the Louvre was 8,700,000 which is written as eight million, seven hundred thousand.

68. Three of the museums listed were visited by fewer than 6,000,000 people.

70. The largest number is 77,753.

72. Yes

74. answers may vary

76. 5 trillion in the American system is written as 5,000,000,000,000 in standard form.

Section 1.3 Practice Exercises

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

2.
$$\begin{array}{r} {\scriptstyle 1\,1\ \ 1\,1} \\ 27{,}364 \\ +\ 92{,}977 \\ \hline 120{,}341 \end{array}$$

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

$20 + 8 + 20$

48

4.
$$\begin{array}{r} {\scriptstyle 1\,1\ 2} \\ 19 \\ 5042 \\ 638 \\ +\ 526 \\ \hline 6225 \end{array}$$

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 threatened mammal species corresponds to the shortest bar, which is Malaysia.

b. To find the total number of threatened mammal species for Brazil, India, and Mexico, we add.

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$$\begin{array}{r} 82 \\ 92 \\ +\ 95 \\ \hline 269 \end{array}$$

The total number of threatened mammal species for Brazil, India, and Mexico is 269.

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, Readiness & Video Check 1.3

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.

7. To add whole numbers, we line up place values and add from left to right.

8. triangle; 3

9. increased by

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

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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.
$$\begin{array}{r} {\scriptstyle 1\ 1\ \ } \\ 90 \\ 900 \\ +\ 20 \\ \hline 1010 \end{array}$$

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.

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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 4850 to 39,250.

$$\begin{array}{r} {\scriptstyle 1\,1\ \ 1} \\ 39,250 \\ +\ 4\,850 \\ \hline 44,100 \end{array}$$

California's projected population in 2030 is 44,100 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 22,867,835 and 4,573,567.

$$\begin{array}{r} {\scriptstyle 1\ \ 1\,1\,1\ 1\,1} \\ 22,867,835 \\ +\ 4,573,567 \\ \hline 27,441,402 \end{array}$$

The sheep population was 27,441,402.

74.

$$\begin{array}{r} {\scriptstyle 2\,1} \\ 257 \\ 182 \\ 257 \\ +\ 182 \\ \hline 878 \end{array}$$

The perimeter of the puzzle is 878 millimeters.

76.

$$\begin{array}{r} 1940 \\ +\ 45 \\ \hline 1985 \end{array}$$

Allyson Felix was born in the year 1985.

78. Of the states listed, Indiana had the fewest CVS pharmacies.

80. $356 + 867 + 756 + 313 + 301 + 486 + 313 + 309 + 408 + 659 = 4768$

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

82. The total number of pharmacies listed in the table is 4768.

$$\begin{array}{r} {\scriptstyle 1\,1} \\ 4768 \\ +\ 3048 \\ \hline 7816 \end{array}$$

There were 7816 CVS pharmacies in the 50 states.

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84.
$$\begin{array}{r} 5260 \\ +\ 1225 \\ \hline 6485 \end{array}$$
The total highway mileage in Rhode Island is 6485 miles.

86. answers may vary

88. answers may vary

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

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 Exercises

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

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

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

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

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

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

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

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, Readiness & Video Check 1.4

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.

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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. $5 - 0 = 5$

9. 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.

10. Order does not matter when adding, but order does matter when subtracting.

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.
$$\begin{array}{r} 286 \\ -\ 45 \\ \hline 241 \end{array}$$
Check:
$$\begin{array}{r} 241 \\ +\ 45 \\ \hline 286 \end{array}$$

8.
$$\begin{array}{r} 5766 \\ -\ 324 \\ \hline 5442 \end{array}$$
Check:
$$\begin{array}{r} 5442 \\ +\ 324 \\ \hline 5766 \end{array}$$

10.
$$\begin{array}{r} 4912 \\ -\ 2610 \\ \hline 2302 \end{array}$$
Check:
$$\begin{array}{r} 2302 \\ +\ 2610 \\ \hline 4912 \end{array}$$

12.
$$\begin{array}{r} 257 \\ -\ 257 \\ \hline 0 \end{array}$$
Check:
$$\begin{array}{r} 0 \\ +\ 257 \\ \hline 257 \end{array}$$

14.
$$\begin{array}{r} 55 \\ -\ 29 \\ \hline 26 \end{array}$$
Check:
$$\begin{array}{r} {\scriptstyle 1} \\ 26 \\ +\ 29 \\ \hline 55 \end{array}$$

16.
$$\begin{array}{r} 80 \\ -\ 37 \\ \hline 43 \end{array}$$
Check:
$$\begin{array}{r} {\scriptstyle 1} \\ 43 \\ +\ 37 \\ \hline 80 \end{array}$$

18.
$$\begin{array}{r} 436 \\ -\ 275 \\ \hline 161 \end{array}$$
Check:
$$\begin{array}{r} {\scriptstyle 1} \\ 161 \\ +\ 275 \\ \hline 436 \end{array}$$

20.
$$\begin{array}{r} 674 \\ -\ 299 \\ \hline 375 \end{array}$$
Check:
$$\begin{array}{r} {\scriptstyle 11} \\ 375 \\ +\ 299 \\ \hline 674 \end{array}$$

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22. $\begin{array}{r} 300 \\ -\ 149 \\ \hline 151 \end{array}$

Check:

$\begin{array}{r} {\scriptstyle 11\ \ } \\ 151 \\ +\ 149 \\ \hline 300 \end{array}$

24. $\begin{array}{r} 773 \\ -\ 29 \\ \hline 744 \end{array}$

Check:

$\begin{array}{r} {\scriptstyle 1\ \ } \\ 744 \\ +\ 29 \\ \hline 773 \end{array}$

26. $\begin{array}{r} 813 \\ -\ 227 \\ \hline 586 \end{array}$

Check:

$\begin{array}{r} {\scriptstyle 11\ \ } \\ 586 \\ +\ 227 \\ \hline 813 \end{array}$

28. $\begin{array}{r} 5349 \\ -\ 720 \\ \hline 4629 \end{array}$

Check:

$\begin{array}{r} {\scriptstyle 1\ \ \ } \\ 4629 \\ +\ 720 \\ \hline 5349 \end{array}$

30. $\begin{array}{r} 724 \\ -\ 16 \\ \hline 708 \end{array}$

Check:

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

32. $\begin{array}{r} 300 \\ -\ 211 \\ \hline 89 \end{array}$

Check:

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

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

Check:

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

36. $\begin{array}{r} 76,652 \\ -\ 29,498 \\ \hline 47,154 \end{array}$

Check:

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

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

Check:

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

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

Check:

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

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

Check:

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

44. $\begin{array}{r} 21 \\ -\ 9 \\ \hline 12 \end{array}$

21 subtract 9 is 12.

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

The difference of 16 and 5 is 11.

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48.
$$\begin{array}{r} 59 \\ -\ 41 \\ \hline 18 \end{array}$$
59 subtract 41 is 18.

50.
$$\begin{array}{r} 25 \\ -12 \\ \hline 13 \end{array}$$
25 less 12 is 13.

52.
$$\begin{array}{r} 90 \\ -\ 86 \\ \hline 4 \end{array}$$
86 subtracted from 90 is 4.

54.
$$\begin{array}{r} 59{,}320 \\ -\ 55{,}492 \\ \hline 3\,828 \end{array}$$
They traveled 3828 miles on their trip.

56.
$$\begin{array}{r} 197 \\ -\ 98 \\ \hline 99 \end{array}$$
Kelp can grow 99 feet taller than bamboo.

58.
$$\begin{array}{r} 164{,}000 \\ +\ 40{,}000 \\ \hline 204{,}000 \end{array}$$
The total U.S. land area drained by the Ohio and Tennessee sub-basins is 204,000 square miles.

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.
$$\begin{array}{r} 845 \\ -\ 649 \\ \hline 196 \end{array}$$
She will have $196 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.
$$\begin{array}{r} 38{,}708 \\ -\ 6\ 208 \\ \hline 32{,}500 \end{array}$$
There were 32,500 official participants for the 2017 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.
$$\begin{array}{r} 117{,}006 \\ -\ 83{,}424 \\ \hline 33{,}582 \end{array}$$
The population of Springfield was 33,582 greater than the population of Champaign.

78.
$$\begin{array}{r} 276 \\ -\ 27 \\ \hline 249 \end{array}$$
The increase in the number of California condors is 249.

80. New York JFK International and Denver International airports have 60 million or fewer passengers per year.

82.
$$\begin{array}{r} 104 \\ -\ 81 \\ \hline 23 \end{array}$$
Hartsfield-Jackson Atlanta International Airport has 23 million more passengers per year than the Los Angeles 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.

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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. $\begin{array}{r} 10,\underline{2}44 \\ -\,8\,\underline{5}34 \\ \hline \underline{1}\,710 \end{array}$

104. answers may vary

Section 1.5 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.

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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.

2930	rounds to	3 000
18,166	rounds to	18 000
+ 189	rounds to	+ 0
		21,000

The total number of reported cases of these preventable diseases was 21,000 in 2015.

Vocabulary, Readiness & Video Check 1.5

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 or not we add 1 to the digit in the place value being rounded to.

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.

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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 15,667 to the nearest thousand, observe that the digit in the hundreds place is 6. Since this digit is at least 5, we add 1 to the digit in the thousands place. Therefore, 15,667 restaurants rounded to the nearest thousand is 16,000 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 324,758,293 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, 324,758,293 rounded to the nearest million is 325,000,000.

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 15,226,000,000 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, 15,226,000,000 bushels rounded to the nearest ten-million is 15,230,000,000 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.

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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 was approximately 2000 credit hours.

64. $3370 million written in standard form is $3,370,000,000. $3,370,000,000 rounded to the nearest hundred-million is $3,400,000,000. $3,370,000,000 rounded to the nearest billion is $3,000,000,000.

66. $4670 million written in standard form is $4,670,000,000. $4,670,000,000 rounded to the nearest hundred-million is $4,700,000,000. $4,670,000,000 rounded to the nearest billion is $5,000,000,000.

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

70. In 950, the digit in the tens place is 5, which is greater than 5, so to round 950 to the nearest hundred, we add 1 to the digit in the hundreds place. 950 rounded to the nearest hundred is 1000.

72. In 48, the digit in the tens place is 4, which is less than 5, so to round 48 to the nearest hundred, we do not add 1 to the digit in the hundreds place. 48 rounded to the nearest hundred is 0.

74. The largest possible number that rounds to 8600 is 8649.

76. answers may vary

78.

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 Exercises

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

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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.
$$\begin{array}{lll} 163 & \text{rounds to} & 200 \\ \times\ 391 & \text{rounds to} & \times\ 400 \\ & & \hline & & 80{,}000 \end{array}$$
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 1.6

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 · width.

8. We know $9(10 + 8) = 9 \cdot 10 + 9 \cdot 8$ by the distributive property.

9. distributive property

10. To show that 8649 is actually multiplied by 70 and not by just 7.

11. Think of 50 times 9 and then attach the two zeros from 900, or think of 5 times 9 and then attach the three zeros at the end of 50 and 900. Both approaches give us 45,000.

12. Area is measured in square units, and here we have meters times meters, or square meters; the answer is 63 *square* meters.

13. Multiplication is also an application of addition since it is addition of the same addend.

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

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

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

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

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

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)

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

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

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

76.
$$\begin{array}{r} 14 \\ \times\ \ 8 \\ \hline 112 \end{array}$$
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.
$$\begin{array}{r} 14 \\ \times 16 \\ \hline 84 \\ 140 \\ \hline 224 \end{array}$$
There are 224 grams of fat in 16 ounces.

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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. $16 \times 3 = 48$
There were 48 million "older" Americans in 2016.

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. $3 \times 402 = 1206$
$2 \times 403 = 806$
$1206 + 806 + 363 = 2375$
Stephen Curry scored 2375 points during the 2015–2016 regular season.

Section 1.7 Practice Exercises

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. $5 \div 0$ is undefined because if $5 \div 0$ is a number, then the number times 0 would be 5.

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

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

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

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

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

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

Check: $304 \times 7 = 2128$

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

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

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

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

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

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

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

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

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

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

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

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

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

Each student got 57 CDs.

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

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

12. Find the sum and divide by 7.

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

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. $\dfrac{32,886}{126} = 261$

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

7. $0 \div 315 = 0$

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

Vocabulary, Readiness & Video Check 1.7

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 is used to separate a quantity into equal parts.

11. addition and division

Exercise Set 1.7

2. $72 \div 9 = 8$

4. $24 \div 3 = 8$

6. $0 \div 4 = 0$

8. $38 \div 1 = 38$

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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: $32 \cdot 23 = 736$

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

Check: $48 \cdot 42 = 2016$

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

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

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

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

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

Check: $405 \cdot 14 = 5670$

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

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

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

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

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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.

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

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.
$$\begin{array}{r} 20 \\ 6\overline{)\ 120} \\ \underline{-12} \\ 00 \end{array}$$

David Johnson made 20 touchdowns during 2016.

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

There are 16 whole feet in 1 rod.

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

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

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

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

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

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

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

The average temperature is 41°.

98.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 23 \\ 407 \\ 92 \\ +\ 7011 \\ \hline 7533 \end{array}$$

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. $\dfrac{0}{23} = 0$ because $0 \cdot 23 = 0$

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

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.

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112.
$$\begin{array}{r} 29 \\ 25 \\ +\ 24 \\ \hline 78 \end{array} \qquad 3\overline{)\,78} = 26,\ -6,\ 18,\ -18,\ 0$$

The average number of Nobel Prize winners for Sweden, Russia, and Japan is 26.

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

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

5. $1 \cdot 79 = 79$

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

7. $9 \div 1 = 9$

8. $9 \div 9 = 1$

9. $0 \cdot 13 = 0$

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

11. $0 \div 2 = 0$

12. $12 \div 4 = 3$

13.
$$\begin{array}{r} 4219 \\ -1786 \\ \hline 2433 \end{array}$$

14.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 1861 \\ +\ 7965 \\ \hline 9826 \end{array}$$

15. $5\overline{)\,1068} = 213$ R 3, -10, 06, -5, 18, -15, 3

16.
$$\begin{array}{r} 1259 \\ \times\ \ 63 \\ \hline 3\,777 \\ 75\,540 \\ \hline 79{,}317 \end{array}$$

17. $3 \cdot 9 = 27$

18. $45 \div 5 = 9$

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19.
$$\begin{array}{r} 207 \\ -\ 69 \\ \hline 138 \end{array}$$

20.
$$\begin{array}{r} 207 \\ +\ 69 \\ \hline 276 \end{array}$$

21.
$$\begin{array}{r} 1099 \text{ R } 2 \\ 7\overline{)\ 7695} \\ \underline{-7} \\ 06 \\ \underline{-0} \\ 69 \\ \underline{-63} \\ 65 \\ \underline{-63} \\ 2 \end{array}$$

22.
$$\begin{array}{r} 111 \text{ R } 1 \\ 9\overline{)1000} \\ \underline{-9} \\ 10 \\ \underline{-9} \\ 10 \\ \underline{-9} \\ 1 \end{array}$$

23.
$$\begin{array}{r} 663 \text{ R } 6 \\ 32\overline{)\ 21222} \\ \underline{-192} \\ 202 \\ \underline{-192} \\ 102 \\ \underline{-96} \\ 6 \end{array}$$

24.
$$\begin{array}{r} 1076 \text{ R } 60 \\ 65\overline{)\ 70000} \\ \underline{-65} \\ 50 \\ \underline{-0} \\ 500 \\ \underline{-455} \\ 450 \\ \underline{-390} \\ 60 \end{array}$$

25.
$$\begin{array}{r} 4000 \\ -\ 2976 \\ \hline 1024 \end{array}$$

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

27.
$$\begin{array}{r} 303 \\ \times\ 101 \\ \hline 303 \\ 0 \\ 30\,300 \\ \hline 30{,}603 \end{array}$$

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

29.
$$\begin{array}{r} {\scriptstyle 1} \\ 57 \\ +\ 8 \\ \hline 65 \end{array}$$
The total of 57 and 8 is 65.

30.
$$\begin{array}{r} 57 \\ \times\ 8 \\ \hline 456 \end{array}$$
The product of 57 and 8 is 456.

31.
$$\begin{array}{r} 6 \text{ R } 8 \\ 9\overline{)\ 62} \\ \underline{-54} \\ 8 \end{array}$$
The quotient of 62 and 9 is 6 R 8.

32.
$$\begin{array}{r} 62 \\ -\ 9 \\ \hline 53 \end{array}$$
The difference of 62 and 9 is 53.

33.
$$\begin{array}{r} 200 \\ -\ 17 \\ \hline 183 \end{array}$$
17 subtracted from 200 is 183.

34.
$$\begin{array}{r} 432 \\ -201 \\ \hline 231 \end{array}$$
The difference of 432 and 201 is 231.

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		Tens	Hundreds	Thousands
35.	9735	9740	9700	10,000
36.	1429	1430	1400	1000
37.	20,801	20,800	20,800	21,000
38.	432,198	432,200	432,200	432,000

39.
$$\begin{array}{r} {\scriptstyle 2} \\ 6 \\ 6 \\ 6 \\ +\ 6 \\ \hline 24 \end{array}$$
The perimeter is 24 feet.
Area = side × side
= 6 feet × 6 feet
= 36 square feet
The area is 36 square feet.

40.
$$\begin{array}{r} {\scriptstyle 2} \\ 14 \\ 7 \\ 14 \\ +\ 7 \\ \hline 42 \end{array}$$
The perimeter is 42 inches.
Area = length · width = 14 · 7 = 98
The area is 98 square inches.

41.
$$\begin{array}{r} {\scriptstyle 1} \\ 13 \\ 9 \\ +\ 6 \\ \hline 28 \end{array}$$
The perimeter is 28 miles.

42.
$$\begin{array}{r} {\scriptstyle 2} \\ 3 \\ 7 \\ 6 \\ 3 \\ 3 \\ +\ 4 \\ \hline 26 \end{array}$$
The perimeter is 26 meters.

43.
$$\begin{array}{r} {\scriptstyle 3} \\ 19 \\ 15 \\ 25 \\ 37 \\ +\ 24 \\ \hline 120 \end{array} \qquad \begin{array}{r} 24 \\ 5\overline{)\,120} \\ -10 \\ \hline 20 \\ -20 \\ \hline 0 \end{array}$$
The average is 24.

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44.
$$\begin{array}{r} {\scriptstyle 1\,2} \\ 108 \\ 131 \\ 98 \\ +\,159 \\ \hline 496 \end{array} \qquad 4\overline{)\,496} \quad \begin{array}{r} 124 \\ -4 \\ \hline 09 \\ -8 \\ \hline 16 \\ -16 \\ \hline 0 \end{array}$$

The average is 124.

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

Lake Pontchartrain Bridge is 2175 feet longer than the Mackinac Bridge.

46.
$$\begin{array}{r} 365 \\ \times\quad 2 \\ \hline 730 \end{array}$$

On average, 730 quarts of carbonated soft drinks would be consumed in a year.

Section 1.8 Practice Exercises

1. Transamerica Pyramid | is | 74 feet | taller than | 555 California Street

Transamerica Pyramid = 74 + 779

$$\begin{array}{r} {\scriptstyle 1\,1} \\ 74 \\ +\,779 \\ \hline 853 \end{array}$$

The Transamerica Pyramid is 853 feet tall.

2. Amount of money | is | $65,000 | divided by | four friends

Amount of money = 65,000 ÷ 4

$$4\overline{)\,65000} \quad \begin{array}{r} 16250 \\ -4 \\ \hline 25 \\ -24 \\ \hline 10 \\ -8 \\ \hline 20 \\ -20 \\ \hline 00 \\ -0 \\ \hline 0 \end{array}$$

Each person receives $16,250.

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3. Total cost | is | number of flash drives | times | cost of each flash drive

↓ ↓ ↓ ↓ ↓

Total cost = 425 × 4

$$\begin{array}{r} 425 \\ \times\ \ 4 \\ \hline 1700 \end{array}$$

The total cost for the flash drives is $1700.

4. Average Illinois salary | was | average New York salary | less | 7774

↓ ↓ ↓ ↓ ↓

average Illinois salary = 69,118 − 7774

$$\begin{array}{r} 69{,}118 \\ -\ \ 7\ 774 \\ \hline 61{,}344 \end{array}$$

The average public school teacher's salary in Illinois was $61,344.

5. Area of the lot = length × width = 120 feet × 90 feet = 10,800 square feet
Area of the house = length × width = 65 feet × 45 feet = 2925 square feet

Area of the lot not covered by the house | is | Area of the lot | minus | Area of the house

↓ ↓ ↓ ↓ ↓

Area of the lot not covered by the house = 10,800 − 2925

$$\begin{array}{r} 10{,}800 \\ -\ 2\ 925 \\ \hline 7\ 875 \end{array}$$

The area of the lot not covered by the house is 7875 square feet.

Vocabulary, Readiness & Video Check 1.8

1. The George Washington Bridge has a length of 3500 feet.

2. multiplication and addition

Exercise Set 1.8

2. What | is | 12 | multiplied by | 9

↓ ↓ ↓ ↓ ↓

What number = 12 · 9

4. 78 | decreased by | 12 | is | some number

↓ ↓ ↓ ↓ ↓

78 − 12 = some number

$$\begin{array}{r} 78 \\ -\ 12 \\ \hline 66 \end{array}$$

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6. The difference of 48 and 8 is some number

48 − 8 = some number

$$\begin{array}{r} 48 \\ -\ 8 \\ \hline 40 \end{array}$$

8. 60 divided by 10 is some number

60 ÷ 10 = some number

$$10\overline{)\,60}$$
$$\begin{array}{r} 6 \\ 10\overline{)\,60} \\ -60 \\ \hline 0 \end{array}$$

10. a. Perimeter is two times length plus two times width

Perimeter = 2 · 100 + 2 · 150

$= 2 \cdot 100 + 2 \cdot 150$

$= 200 + 300$

$= 500$

The perimeter is 500 feet.

b. Area is length times width

Area = 100 × 150

The area is 15,000 square feet.

12.

Each person's share	is	lottery amount	divided by	number of persons
↓	↓	↓	↓	↓
Each person's share	=	147,000,000	÷	3

$$3\overline{)\,147000000}$$
$$\begin{array}{r} 49000000 \\ 3\overline{)\,147000000} \end{array}$$

Each person would receive $49 million.

14. Minutes per day is minutes per hour times hours per day

minutes per day = 60 · 24

$$\begin{array}{r} 60 \\ \times\ 24 \\ \hline 240 \\ 1200 \\ \hline 1440 \end{array}$$

There are 1440 minutes in a day.

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16.

Volume of helium in Goodyear GZ-20	is	Volume of helium in Goodyear NT	minus	fewer
↓	↓	↓	↓	↓
Volume	=	297,527	–	94,827

$$\begin{array}{r} 297{,}527 \\ -\ 94{,}827 \\ \hline 202{,}700 \end{array}$$

The GZ-20 held 202,700 cubic feet of helium.

18.

Year Radio Flyer Wagons were first introduced	is	Year Razor Scooter was first introduced	minus	years earlier
↓	↓	↓	↓	↓
Year	=	2000	–	83

$$\begin{array}{r} 2000 \\ -\ 83 \\ \hline 1917 \end{array}$$

Radio Flyer Wagons were first introduced in the year 1917.

20.

Earnings in a 52-week year	is	average weekly pay	times	number of weeks
↓	↓	↓	↓	↓
Earnings in a 52-week year	=	425	·	52

$$\begin{array}{r} 425 \\ \times\ 52 \\ \hline 850 \\ 21\,250 \\ \hline 22{,}100 \end{array}$$

A home health aide will earn $22,100.

22.

Total paid to bank	is	cost of Atlantic Avenue	plus	cost of Ventnor Avenue	plus	cost of Marvin Gardens
↓	↓	↓	↓	↓	↓	↓
Total	=	260	+	260	+	280

$$\begin{array}{r} {\scriptstyle 2} \\ 260 \\ 260 \\ +\ 280 \\ \hline 800 \end{array}$$

A player must pay $800 to the bank to purchase the yellow-colored group of properties.

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24.

Hourly pay	is	weekly pay	divided by	hours per week
↓	↓	↓	↓	↓
Hourly pay	=	960	÷	40

$$\begin{array}{r} 24 \\ 40\overline{)\,960} \\ -80 \\ \hline 160 \\ -160 \\ \hline 0 \end{array}$$

The hourly pay of the paralegal is $24.

26.

Calories per piece	is	calories per whole cheesecake	divided by	number of equal pieces
↓	↓	↓	↓	↓
Calories	=	3360	÷	12

$$\begin{array}{r} 280 \\ 12\overline{)\,3360} \\ -24 \\ \hline 96 \\ -96 \\ \hline 00 \\ -0 \\ \hline 0 \end{array}$$

Each piece of cheesecake has 280 calories.

28.

Average number of associates per store	is	total number of associates	divided by	number of stores
↓	↓	↓	↓	↓
Average number of associates per store	=	55,000	÷	1500

$$\begin{array}{r} 36 \\ 1500\overline{)\,55{,}000} \\ -45\,00 \\ \hline 10\,000 \\ -9\,000 \\ \hline 1\,000 \end{array}$$

The average number of associates at each PetSmart store was 36.

30.

Total number of visitors	is	average number of visitors per month	times	number of months
↓	↓	↓	↓	↓
Total number of visitors	=	625,100	·	12

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$$\begin{array}{r} 625{,}100 \\ \times \quad 12 \\ \hline 1\,250\,200 \\ 6\,251\,000 \\ \hline 7{,}501{,}200 \end{array}$$

The National Air and Space Museum had 7,501,200 visitors in 2016.

32.

Number of stores outside of California	is	total number of stores	minus	number of stores in California
↓	↓	↓	↓	↓
Number of stores outside of California	=	1806	–	193

$$\begin{array}{r} 1806 \\ -\ 193 \\ \hline 1613 \end{array}$$

1613 Target stores were located in states other than California.

34.

number of muscles to frown	is	number of muscles to smile	plus	more muscles
↓	↓	↓	↓	↓
muscles	=	14	+	29

$$\begin{array}{r} {\scriptstyle 1} \\ 14 \\ +\ 29 \\ \hline 43 \end{array}$$

It takes 43 muscles to frown.

36.

Each payment	is	amount of loan	divided by	number of payments
↓	↓	↓	↓	↓
Each payment	=	6240	÷	48

$$\begin{array}{r} 130 \\ 48\overline{)\ 6240} \\ \underline{-48} \\ 144 \\ \underline{-144} \\ 00 \\ \underline{-0} \\ 0 \end{array}$$

Each payment is $130.

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38.

Total cost	is	number of computers	times	cost of computer	plus	number of boxes of diskettes	times	cost of box of diskettes
↓	↓	↓	↓	↓	↓	↓	↓	↓
Total	=	10	·	2100	+	7	·	12

$= 21{,}000 + 84$
$= 21{,}084$
The total cost is \$21,084.

40.

New temperature	is	starting temperature	minus	drop in temperature	plus	rise in temperature
↓	↓	↓	↓	↓	↓	↓
New temperature	=	57	–	18	+	23

$$\begin{array}{r} 57 \\ -\ 18 \\ \hline 39 \end{array}$$

$$\begin{array}{r} {\scriptstyle 1} \\ 39 \\ +\ 23 \\ \hline 62 \end{array}$$

The new temperature is 62°F.

42. Option a: $6 \cdot \$3 + 4 \cdot \$3 + 4 \cdot \$1 = \$18 + \$12 + \$4 = \$34$

Option b: $4 \cdot \$4 + 4 \cdot \$2 + 2 \cdot \$1 + 4 \cdot \$1$
$= \$16 + \$8 + \$2 + \$4$
$= \$30$
The family will save \$4 by ordering (b) instead of (a).

44. Oceania/Australia had the least number of Internet users in 2017.

46. Africa had 346 million Internet users. The Middle East had 142 million users.

$$\begin{array}{r} 346 \\ -\ 142 \\ \hline 204 \end{array}$$

Africa had 204 million more Internet users than the Middle East.

48. Europe had 637 million Internet users. North America had 320 million users. Thus, Europe had more Internet users than North America.

$$\begin{array}{r} 637 \\ -\ 320 \\ \hline 317 \end{array}$$

Europe had 317 million more Internet users than North America.

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50. The four least numbers of Internet users are 28 million, 142 million, 320 million and 346 million.

$$\begin{array}{r} 28 \\ 142 \\ 320 \\ +\ 346 \\ \hline 836 \end{array} \qquad \begin{array}{r} 209 \\ 4\overline{)\,836} \\ -8 \\ \hline 03 \\ -0 \\ \hline 36 \\ -36 \\ \hline 0 \end{array}$$

The average number of Internet users was 209 million.

52. $\text{Total cost} = 36 \cdot \$585 + 10 \cdot \$388$
$= \$21,060 + \$3880$
$= \$24,940$
The total cost is \$24,940.

54. $\text{The total bill} = \$1750 + \$709 + \$2168$
$= \$4627$
The total bill for the semester is \$4627.

56. a. $\text{Area} = (\text{side})(\text{side})$
$= (100 \text{ yards})(100 \text{ yards})$
$= 10,000 \text{ square yards}$

b. $\text{Area} = \text{length} \cdot \text{width}$
$= 15 \cdot 25$
$= 375 \text{ square yards}$

c.
$$\begin{array}{r} 10,000 \\ -\ 375 \\ \hline 9625 \end{array}$$
The area of the park that is not part of the playground is 9625 square yards.

58. 919,500,000 rounded to the nearest hundred-million is 900,000,000.
19,790,000,000 rounded to the nearest hundred-million is 19,800,000,000.
$19,800,000,000 \div 900,000,000 = 22$
The average revenue generated by each customer was \$22.

Section 1.9 Practice Exercises

1. $8 \cdot 8 \cdot 8 \cdot 8 = 8^4$

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

3. $10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 10^5$

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

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

6. $7^3 = 7 \cdot 7 \cdot 7 = 343$

7. $11^1 = 11$

8. $2 \cdot 3^2 = 2 \cdot 3 \cdot 3 = 18$

9. $\sqrt{100} = 10$ because $10 \cdot 10 = 100$.

10. $\sqrt{4} = 2$ because $2 \cdot 2 = 4$.

11. $\sqrt{1} = 1$ because $1 \cdot 1 = 1$.

12. $9 \cdot 3 - 8 \div 4 = 27 - 8 \div 4 = 27 - 2 = 25$

13. $48 \div 3 \cdot 2^2 = 48 \div 3 \cdot 4 = 16 \cdot 4 = 64$

14. $(10-7)^4 + 2 \cdot 3^2 = 3^4 + 2 \cdot 3^2$
$= 81 + 2 \cdot 9$
$= 81 + 18$
$= 99$

15. $36 \div [20 - (4 \cdot 2)] + 4^3 - 6 = 36 \div [20 - 8] + 4^3 - 6$
$= 36 \div 12 + 4^3 - 6$
$= 36 \div 12 + 64 - 6$
$= 3 + 64 - 6$
$= 61$

16. $\dfrac{25 + 8 \cdot 2 - 3^3}{2(3-2)} = \dfrac{25 + 8 \cdot 2 - 27}{2(1)}$
$= \dfrac{25 + 16 - 27}{2}$
$= \dfrac{14}{2}$
$= 7$

17. $81 \div \sqrt{81} \cdot 5 + 7 = 81 \div 9 \cdot 5 + 7$
$= 9 \cdot 5 + 7$
$= 45 + 7$
$= 52$

18. $\text{Area} = (\text{side})^2$
$= (12 \text{ centimeters})^2$
$= 144 \text{ square centimeters}$
The area of the square is 144 square centimeters.

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Calculator Explorations

1. $4^6 = 4096$
2. $5^6 = 15,625$
3. $5^5 = 3125$
4. $7^6 = 117,649$
5. $2^{11} = 2048$
6. $6^8 = 1,679,616$
7. $7^4 + 5^3 = 2526$
8. $12^4 - 8^4 = 16,640$
9. $63 \cdot 75 - 43 \cdot 10 = 4295$
10. $8 \cdot 22 + 7 \cdot 16 = 288$
11. $4(15 \div 3 + 2) - 10 \cdot 2 = 8$
12. $155 - 2(17 + 3) + 185 = 300$

Vocabulary, Readiness & Video Check 1.9

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. The square root of a whole number is one of two identical factors of the number.
7. exponent; base
8. 1
9. Because $8 \cdot 8 = 64$.
10. division, multiplication, addition
11. The area of a rectangle is length · width. A square is a special rectangle where length = width. Thus, the area of a square is side · side or $(\text{side})^2$.

Exercise Set 1.9

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

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

46. $\sqrt{36} = 6$ since $6 \cdot 6 = 36$.

48. $\sqrt{121} = 11$ since $11 \cdot 11 = 121$.

50. $\sqrt{0} = 0$ since $0 \cdot 0 = 0$.

52. $\sqrt{169} = 13$ since $13 \cdot 13 = 169$

54. $24 + 6 \cdot 3 = 24 + 18 = 42$

56. $100 \div 10 \cdot 5 + 4 = 10 \cdot 5 + 4 = 50 + 4 = 54$

58. $42 \div 7 - 6 = 6 - 6 = 0$

60. $32 + \frac{8}{2} = 32 + 4 = 36$

62. $3 \cdot 4 + 9 \cdot 1 = 12 + 9 = 21$

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

66. $6^2 \cdot (10-8) = 6^2 \cdot 2 = 36 \cdot 2 = 72$

68. $5^3 \div (10+15) + 9^2 + 3^3 = 5^3 \div 25 + 9^2 + 3^3$
$= 125 \div 25 + 81 + 27$
$= 5 + 81 + 27$
$= 113$

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

72. $(9-7) \cdot (12+18) = 2 \cdot 30 = 60$

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

76. $18 - 7 \div 0 =$ undefined

78. $2^3 \cdot 3 - (100 \div 10) = 2^3 \cdot 3 - 10$
$= 8 \cdot 3 - 10$
$= 24 - 10$
$= 14$

80. $[40-(8-2)] - 2^5 = [40-6] - 2^5$
$= 34 - 2^5$
$= 34 - 32$
$= 2$

82. $(18 \div 6) + [(3+5) \cdot 2] = (18 \div 6) + (8 \cdot 2)$
$= 3 + (8 \cdot 2)$
$= 3 + 16$
$= 19$

84. $35 \div [3^2 + (9-7) - 2^2] + 10 \cdot 3$
$= 35 \div [3^2 + 2 - 2^2] + 10 \cdot 3$
$= 35 \div [9 + 2 - 4] + 10 \cdot 3$
$= 35 \div 7 + 10 \cdot 3$
$= 5 + 10 \cdot 3$
$= 5 + 30$
$= 35$

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

88. $3 \cdot \sqrt{25} + 2 \cdot \sqrt{81} = 3 \cdot 5 + 2 \cdot 9 = 15 + 18 = 33$

90. $7 \cdot \sqrt{36} - 0 \div \sqrt{64} = 7 \cdot 6 - 0 \div 8 = 42 - 0 = 42$

92. $\frac{\sqrt{9} + 9^2}{3(10-6) - 2^2 - 1} = \frac{3+81}{3(4) - 4 - 1}$
$= \frac{84}{12 - 4 - 1}$
$= \frac{84}{8-1}$
$= \frac{84}{7}$
$= 12$

94. $\sqrt{100} \div \sqrt{4} + 3^3 \cdot 2 - 20 = 10 \div 2 + 27 \cdot 2 - 20$
$= 5 + 54 - 20$
$= 59 - 20$
$= 39$

96. $\left[\sqrt{169} \div (20-7) + 2^5\right] - \left(\sqrt{4} + \sqrt{9}\right)^2$
$= [13 \div (13) + 32] - (2+3)^2$
$= [1 + 32] - (5)^2$
$= 33 - 25$
$= 8$

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98. $29-\left\{5+3\left[8\cdot\left(10-\sqrt{64}\right)\right]-50\right\}$
$=29-\{5+3[8\cdot(10-8)]-50\}$
$=29-\{5+3[8\cdot(2)]-50\}$
$=29-\{5+3[16]-50\}$
$=29-\{5+48-50\}$
$=29-\{53-50\}$
$=29-3$
$=26$

100. Area of a square $=(\text{side})^2$
$=(9 \text{ centimeters})^2$
$=81$ square centimeters
Perimeter $=4(\text{side})$
$=4(9 \text{ centimeters})$
$=36$ centimeters

102. Area of a square $=(\text{side})^2$
$=(41 \text{ feet})^2$
$=1681$ square feet
Perimeter $=4(\text{side})=4(41 \text{ feet})=164$ feet

104. The statement is true.

106. $4^9=4\cdot4\cdot4\cdot4\cdot4\cdot4\cdot4\cdot4\cdot4$
The statement is false.

108. $(2+3)\cdot(6-2)=(5)\cdot(4)=20$

110. $24\div(3\cdot2+2)\cdot5=24\div(6+2)\cdot5$
$=24\div8\cdot5$
$=3\cdot5$
$=15$

112. The total perimeter is 1260 feet.
$4\times1260=5040$
The total charge is \$5040.

114. $25^3\cdot(45-7\cdot5)\cdot5=25^3\cdot(45-35)\cdot5$
$=25^3\cdot(10)\cdot5$
$=15,625\cdot10\cdot5$
$=156,250\cdot5$
$=781,250$

116. answers may vary

Chapter 1 Vocabulary Check

1. The whole numbers are 0, 1, 2, 3, ...

2. The perimeter of a polygon is its distance around or the sum of the lengths of its sides.

3. The position of each digit in a number determines its place value.

4. An exponent is a shorthand notation for repeated multiplication of the same factor.

5. To find the area of a rectangle, multiply length times width.

6. A square root of a number is one of two identical factors of the number.

7. The digits used to write numbers are 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9.

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

9. The 5 above is called the divisor.

10. The 35 above is called the dividend.

11. The 7 above is called the quotient.

12. The 3 above is called a factor.

13. The 6 above is called the product.

14. The 20 above is called the minuend.

15. The 9 above is called the subtrahend.

16. The 11 above is called the difference.

17. The 4 above is called an addend.

18. The 21 above is called the sum.

Chapter 1 Review

1. The place value of 4 in 7640 is tens.

2. The place value of 4 in 46,200,120 is ten-millions.

3. 7640 is written as seven thousand, six hundred forty.

4. 46,200,120 is written as forty-six million, two hundred thousand, one hundred twenty.

5. $3158=3000+100+50+8$

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

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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 Internet Users column. There were 636,831,820 Internet users in Europe.

10. Locate Latin America in the first column and read across to the number in the Facebook Users column. There were 326,975,340 Facebook users in Caribbean.

11. Locate the largest number in the Facebook Users column. Asia had the largest number of Facebook users.

12. Locate the smallest number in the Internet Users column. Oceania/Australia had the smallest number of Internet users.

13.
$$\begin{array}{r} {\scriptstyle 1} \\ 17 \\ +\ 46 \\ \hline 63 \end{array}$$

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

15.
$$\begin{array}{r} {\scriptstyle 1} \\ 25 \\ 8 \\ +\ 15 \\ \hline 48 \end{array}$$

16.
$$\begin{array}{r} {\scriptstyle 1} \\ 27 \\ 9 \\ +\ 41 \\ \hline 77 \end{array}$$

17.
$$\begin{array}{r} 932 \\ +\ 24 \\ \hline 956 \end{array}$$

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

19.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 567 \\ +\ 7383 \\ \hline 7950 \end{array}$$

20.
$$\begin{array}{r} {\scriptstyle 1\,1\,1} \\ 463 \\ +\ 6787 \\ \hline 7250 \end{array}$$

21.
$$\begin{array}{r} {\scriptstyle 1\,2\,1} \\ 91 \\ 3623 \\ +\ 497 \\ \hline 4211 \end{array}$$

22.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 82 \\ 1647 \\ +\ 238 \\ \hline 1967 \end{array}$$

23.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 86 \\ 331 \\ +\ 909 \\ \hline 1326 \end{array}$$
The sum is 1326.

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

25.
$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 26{,}481 \\ +\ \ 865 \\ \hline 27{,}346 \end{array}$$
26,481 increased by 865 is 27,346.

26.
$$\begin{array}{r} {\scriptstyle 1\ 1\,1} \\ 38{,}556 \\ +\ \ 744 \\ \hline 39{,}300 \end{array}$$
38,556 increased by 744 is 39,300.

27.
$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 7318 \\ +\ 714 \\ \hline 8032 \end{array}$$
The total distance from Chicago to New Delhi if traveling by air through New York City is 8032 miles.

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28.
$$\begin{array}{r} {\scriptstyle 1\,1\,1\;\;1} \\ 62{,}589 \\ 65{,}340 \\ +\;69{,}770 \\ \hline 197{,}699 \end{array}$$
Susan Summerline's total earnings for the years 2014, 2015, and 2016 was $197,699.

29.
$$\begin{array}{r} {\scriptstyle 2} \\ 72 \\ 72 \\ 82 \\ +\;50 \\ \hline 276 \end{array}$$
The perimeter is 276 feet.

30.
$$\begin{array}{r} 10 \\ 26 \\ +\;30 \\ \hline 66 \end{array}$$
The perimeter is 66 kilometers.

31.
$$\begin{array}{r} 93 \\ -\;79 \\ \hline 14 \end{array}$$
Check:
$$\begin{array}{r} {\scriptstyle 1} \\ 14 \\ +\;79 \\ \hline 93 \end{array}$$

32.
$$\begin{array}{r} 61 \\ -\;27 \\ \hline 34 \end{array}$$
Check:
$$\begin{array}{r} {\scriptstyle 1} \\ 34 \\ +\;27 \\ \hline 61 \end{array}$$

33.
$$\begin{array}{r} 462 \\ -\;397 \\ \hline 65 \end{array}$$
Check:
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 65 \\ +\;397 \\ \hline 462 \end{array}$$

34.
$$\begin{array}{r} 583 \\ -\;279 \\ \hline 304 \end{array}$$
Check:
$$\begin{array}{r} {\scriptstyle 1} \\ 304 \\ +\;279 \\ \hline 583 \end{array}$$

35.
$$\begin{array}{r} 4000 \\ -\;\;86 \\ \hline 3914 \end{array}$$
Check:
$$\begin{array}{r} 3914 \\ +\;\;86 \\ \hline 4000 \end{array}$$

36.
$$\begin{array}{r} 8000 \\ -\;\;92 \\ \hline 7908 \end{array}$$
Check:
$$\begin{array}{r} 7908 \\ +\;\;92 \\ \hline 8000 \end{array}$$

37.
$$\begin{array}{r} 25{,}862 \\ -\;7\;965 \\ \hline 17{,}897 \end{array}$$

38.
$$\begin{array}{r} 39{,}007 \\ -\;4\;349 \\ \hline 34{,}658 \end{array}$$

39.
$$\begin{array}{r} 1{,}469{,}485 \\ -\;1{,}327{,}551 \\ \hline 141{,}934 \end{array}$$
The increase in population was 141,934 people.

40.
$$\begin{array}{r} 713{,}862 \\ -\;677{,}116 \\ \hline 36{,}746 \end{array}$$
The decrease in population was 36,746 people.

41.
$$\begin{array}{r} 712 \\ -\;315 \\ \hline 397 \end{array}$$
Bob Roma has 397 pages left to proofread.

42.
$$\begin{array}{r} 28{,}425 \\ -\;1\;599 \\ \hline 26{,}826 \end{array} \qquad \begin{array}{r} 26{,}826 \\ -\;1\;200 \\ \hline 25{,}626 \end{array}$$
Shelly Winter paid $25,626 for the new car.

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43. The balance was the least during the month of May.

44. The balance was the greatest during the month of August.

45.
$$\begin{array}{r} 280 \\ -\ 170 \\ \hline 110 \end{array}$$
The balance decrease by \$110 from February to April.

46.
$$\begin{array}{r} 490 \\ -\ 250 \\ \hline 240 \end{array}$$
The balance increased by \$240 from June to August.

47. To round 93 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 93 rounded to the nearest ten is 90.

48. 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.

49. To round 467 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 467 rounded to the nearest ten is 470.

50. 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.

51. To round 4832 to the nearest hundred, observe that the digit in the tens place is 3. Since this digit is less than 5, we do not add 1 to the digit in the hundreds place. the number 4832 rounded to the nearest hundred is 4800.

52. 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.

53. To round 49,683,712 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. 9 + 1 = 10, so replace the digit 9 by 0 and carry 1 to the place value to the left. The number 49,683,712 rounded to the nearest million is 50,000,000.

54. 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.

55. To round 263,610,220 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. The number 263,610,220 rounded to the nearest million is 264,000,000.

56. To round 98,454 to the nearest thousand, observe that the digit in the hundreds place is 4. Since this digit is less than 5, we do not add 1 to the digit in the thousands place. The number 98,454 rounded to the nearest thousand is 98,000.

57.
$$\begin{array}{rcr} 4892 & \text{rounds to} & 4900 \\ 647 & \text{rounds to} & 600 \\ +\ 1876 & \text{rounds to} & +\ 1900 \\ & \text{rounds to} & \hline 7400 \end{array}$$
The estimated sum is 7400.

58.
$$\begin{array}{rcr} 5925 & \text{rounds to} & 5900 \\ -\ 1787 & \text{rounds to} & -\ 1800 \\ & & \hline 4100 \end{array}$$
The estimated difference is 4100.

59.
$$\begin{array}{rcr} 628 & \text{rounds to} & 600 \\ 290 & \text{rounds to} & 300 \\ 172 & \text{rounds to} & 200 \\ 58 & \text{rounds to} & 100 \\ 508 & \text{rounds to} & 500 \\ 445 & \text{rounds to} & 400 \\ +\ 383 & \text{rounds to} & +\ 400 \\ & & \hline 2500 \end{array}$$
The students traveled approximately 2500 miles on their week-long trip.

60.
$$\begin{array}{rcr} 2,239,558 & \text{rounds to} & 2,200,000 \\ -\ 1,376,410 & \text{rounds to} & -\ 1,400,000 \\ & & \hline 800,000 \end{array}$$
Houston was approximately 800,000 people larger than San Diego in 2016.

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61.
$$\begin{array}{r} 273 \\ \times\ 7 \\ \hline 1911 \end{array}$$

62.
$$\begin{array}{r} 349 \\ \times\ 4 \\ \hline 1396 \end{array}$$

63.
$$\begin{array}{r} 47 \\ \times 30 \\ \hline 0 \\ 1410 \\ \hline 1410 \end{array}$$

64.
$$\begin{array}{r} 69 \\ \times 42 \\ \hline 138 \\ 2760 \\ \hline 2898 \end{array}$$

65. $20(8)(5) = 160 \cdot 5 = 800$

66. $25(9)(4) = 225 \cdot (4) = 900$

67.
$$\begin{array}{r} 48 \\ \times\ 77 \\ \hline 336 \\ 3360 \\ \hline 3696 \end{array}$$

68.
$$\begin{array}{r} 77 \\ \times 22 \\ \hline 154 \\ 1540 \\ \hline 1694 \end{array}$$

69. $49 \cdot 49 \cdot 9 = 0$

70. $62 \cdot 88 \cdot 0 = 0$

71.
$$\begin{array}{r} 586 \\ \times\ 29 \\ \hline 5\,274 \\ 11\,720 \\ \hline 16{,}994 \end{array}$$

72.
$$\begin{array}{r} 242 \\ \times\ 37 \\ \hline 1694 \\ 7260 \\ \hline 8954 \end{array}$$

73.
$$\begin{array}{r} 642 \\ \times\ 177 \\ \hline 4\,494 \\ 44\,940 \\ 64\,200 \\ \hline 113{,}634 \end{array}$$

74.
$$\begin{array}{r} 347 \\ \times\ 129 \\ \hline 3\,123 \\ 6\,940 \\ 34\,700 \\ \hline 44{,}763 \end{array}$$

75.
$$\begin{array}{r} 1026 \\ \times\ 401 \\ \hline 1\,026 \\ 0 \\ 410\,400 \\ \hline 411{,}426 \end{array}$$

76.
$$\begin{array}{r} 2107 \\ \times\ 302 \\ \hline 4\,214 \\ 0 \\ 632\,100 \\ \hline 636{,}314 \end{array}$$

77. $375 \cdot 1000 = 375{,}000$
Attach 3 zeros.

78. $108 \cdot 1000 = 108{,}000$
Attach 3 zeros.

79.
$$\begin{array}{r} 30 \\ \times\ 4 \\ \hline 120 \end{array}$$
$30 \cdot 400 = 30 \cdot 4 \cdot 100 = 120 \cdot 100 = 12{,}000$
Attach 2 zeros.

80.
$$\begin{array}{r} 50 \\ \times\ 7 \\ \hline 350 \end{array}$$
$50 \cdot 700 = 50 \cdot 7 \cdot 100 = 350 \cdot 100 = 35{,}000$
Attach 2 zeros.

81.
$$\begin{array}{r} 17 \\ \times 3 \\ \hline 51 \end{array}$$
$1700 \cdot 3000 = 5{,}100{,}000$
Attach 5 zeros.

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

$1900 \cdot 4000 = 7{,}600{,}000$
Attach 5 zeros.

83. $\begin{array}{r} 230 \\ \times\ 5 \\ \hline 1150 \end{array}$

The product of 5 and 230 is 1150.

84. $\begin{array}{r} 820 \\ \times\ 6 \\ \hline 4920 \end{array}$

The product of 6 and 820 is 4920.

85. $\begin{array}{r} 12 \\ \times\ 9 \\ \hline 108 \end{array}$

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

87. $\begin{array}{r} 8 \\ \times 3 \\ \hline 24 \end{array}$

Three ounces of Swiss cheese has 24 grams of fat.

88. $\begin{array}{r} 7949 \\ \times\ \ 20 \\ \hline 158{,}980 \end{array}$

The total cost is $158,980.

89. Area = length · width = $12 \times 5 = 60$
The area is 60 square miles.

90. Area = length · width = $25 \times 20 = 500$
The area is 500 square centimeters.

91. $6\overline{)\,18}$, $\begin{array}{r} 3 \\ -18 \\ \hline 0 \end{array}$

Check: $\begin{array}{r} 3 \\ \times 6 \\ \hline 18 \end{array}$

92. $9\overline{)\,36}$, $\begin{array}{r} 4 \\ -36 \\ \hline 0 \end{array}$

Check: $\begin{array}{r} 4 \\ \times 9 \\ \hline 36 \end{array}$

93. $7\overline{)\,42}$, $\begin{array}{r} 6 \\ -42 \\ \hline 0 \end{array}$

Check: $\begin{array}{r} 6 \\ \times 7 \\ \hline 42 \end{array}$

94. $5\overline{)\,35}$, $\begin{array}{r} 7 \\ -35 \\ \hline 0 \end{array}$

Check: $\begin{array}{r} 7 \\ \times 5 \\ \hline 35 \end{array}$

95. $5\overline{)\,27}$, $\begin{array}{r} 5 \text{ R } 2 \\ -25 \\ \hline 2 \end{array}$

Check: $5 \cdot 5 + 2 = 25 + 2 = 27$

96. $4\overline{)\,18}$, $\begin{array}{r} 4 \text{ R } 2 \\ -16 \\ \hline 2 \end{array}$

Check: $4 \cdot 4 + 2 = 16 + 2 = 18$

97. $16 \div 0$ is undefined.

98. $0 \div 8 = 0$

99. $9 \div 9 = 1$

100. $10 \div 1 = 10$

101. $0 \div 668 = 0$

102. $918 \div 0$ is undefined.

103. $5\overline{)\,167}$, $\begin{array}{r} 33 \text{ R } 2 \\ -15 \\ \hline 17 \\ -15 \\ \hline 2 \end{array}$

Check: $33 \cdot 5 + 2 = 165 + 2 = 167$

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104.
$$\begin{array}{r} 19 \text{ R } 7 \\ 8\overline{)159} \\ -8 \\ \hline 79 \\ -72 \\ \hline 7 \end{array}$$

Check: $19 \cdot 8 + 7 = 152 + 7 = 159$

105.
$$\begin{array}{r} 24 \text{ R } 2 \\ 26\overline{)626} \\ -52 \\ \hline 106 \\ -104 \\ \hline 2 \end{array}$$

Check: $24 \cdot 26 + 2 = 624 + 2 = 626$

106.
$$\begin{array}{r} 35 \text{ R } 15 \\ 19\overline{)680} \\ -57 \\ \hline 110 \\ -95 \\ \hline 15 \end{array}$$

Check: $35 \cdot 19 + 15 = 665 + 15 = 680$

107.
$$\begin{array}{r} 506 \text{ R } 10 \\ 47\overline{)23792} \\ -235 \\ \hline 29 \\ -0 \\ \hline 292 \\ -282 \\ \hline 10 \end{array}$$

Check: $506 \cdot 47 + 10 = 23{,}782 + 10 = 23{,}792$

108.
$$\begin{array}{r} 907 \text{ R } 40 \\ 53\overline{)48111} \\ -477 \\ \hline 41 \\ -0 \\ \hline 411 \\ -371 \\ \hline 40 \end{array}$$

Check: $907 \cdot 53 + 40 = 48{,}071 + 40 = 48{,}111$

109.
$$\begin{array}{r} 2793 \text{ R } 140 \\ 207\overline{)578291} \\ -414 \\ \hline 1642 \\ -1449 \\ \hline 1939 \\ -1863 \\ \hline 761 \\ -621 \\ \hline 140 \end{array}$$

Check:
$2793 \cdot 207 + 140 = 578{,}151 + 140 = 578{,}291$

110.
$$\begin{array}{r} 2012 \text{ R } 60 \\ 306\overline{)615732} \\ -612 \\ \hline 37 \\ -0 \\ \hline 373 \\ -306 \\ \hline 672 \\ -612 \\ \hline 60 \end{array}$$

Check:
$2012 \cdot 306 + 60 = 615{,}672 + 60 = 615{,}732$

111.
$$\begin{array}{r} 18 \text{ R } 2 \\ 5\overline{)92} \\ -5 \\ \hline 42 \\ -40 \\ \hline 2 \end{array}$$

The quotient of 92 and 5 is 18 R 2.

112.
$$\begin{array}{r} 21 \text{ R } 2 \\ 4\overline{)86} \\ -8 \\ \hline 06 \\ -4 \\ \hline 2 \end{array}$$

The quotient of 86 and 4 is 21 R 2.

113.
$$\begin{array}{r} 458 \\ 12\overline{)5496} \\ -48 \\ \hline 69 \\ -60 \\ \hline 96 \\ -96 \\ \hline 0 \end{array}$$

458 feet are in 5496 inches.

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114.
$$\begin{array}{r} 13 \\ 1760\overline{)\ 22880} \\ -1760 \\ \hline 5280 \\ -5280 \\ \hline 0 \end{array}$$
13 miles are in 22,880 yards.

115.
$$\begin{array}{r} {\scriptstyle 2\,2} \\ 76 \\ 49 \\ 32 \\ +\ 47 \\ \hline 204 \end{array} \qquad \begin{array}{r} 51 \\ 4\overline{)\ 204} \\ -20 \\ \hline 04 \\ -4 \\ \hline 0 \end{array}$$
The average is 51.

116.
$$\begin{array}{r} {\scriptstyle 2\,1} \\ 23 \\ 85 \\ 62 \\ +\ 66 \\ \hline 236 \end{array} \qquad \begin{array}{r} 59 \\ 4\overline{)\ 236} \\ -20 \\ \hline 36 \\ -36 \\ \hline 0 \end{array}$$
The average is 59.

117.
$$\begin{array}{r} 27 \\ 24\overline{)\ 648} \\ -48 \\ \hline 168 \\ -168 \\ \hline 0 \end{array}$$
27 boxes can be filled with 648 cans of corn.

118.
$$\begin{array}{r} 32 \\ \times\ 6 \\ \hline 192 \end{array}$$
The cost of 32 tickets is $192.

119.
$$\begin{array}{r} 3{,}500{,}000{,}000 \\ -\ 1{,}800{,}000{,}000 \\ \hline 1{,}700{,}000{,}000 \end{array}$$
General Motors spent $1,700,000,000 more than Toyota on television advertising.

120.
$$\begin{array}{r} 27 \\ +\ 45 \\ \hline 75 \end{array}$$
The cost to banks for a person to deposit a check with a teller is 75¢.

121.
$$\begin{array}{r} 32 \\ \times\ 15 \\ \hline 160 \\ 320 \\ \hline 480 \end{array} \qquad \begin{array}{r} 38 \\ \times 11 \\ \hline 38 \\ 380 \\ \hline 418 \end{array} \qquad \begin{array}{r} 480 \\ +\ 418 \\ \hline 898 \end{array}$$
The cost of 15 large and 11 extra-large shirts is $898.

122.
$$\begin{array}{r} 110 \\ \times\ 65 \\ \hline 550 \\ 6600 \\ \hline 7150 \end{array} \qquad 200 \times 80 = 16{,}000 \qquad \begin{array}{r} 16{,}000 \\ +\ 7\,150 \\ \hline 23{,}150 \end{array}$$
The total area of the land purchased is 23,150 square feet.

123. $7^2 = 7 \cdot 7 = 49$

124. $5^3 = 5 \cdot 5 \cdot 5 = 125$

125. $5 \cdot 3^2 = 5 \cdot 9 = 45$

126. $4 \cdot 10^2 = 4 \cdot 100 = 400$

127. $18 \div 3 + 7 = 6 + 7 = 13$

128. $12 - 8 \div 4 = 12 - 2 = 10$

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

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

131. $48 \div 8 \cdot 2 = 6 \cdot 2 = 12$

132. $27 \div 9 \cdot 3 = 3 \cdot 3 = 9$

133.
$$\begin{aligned} 2 + 3[1^5 + (20 - 17) \cdot 3] + 5 \cdot 2 &= 2 + 3[1 + (3) \cdot 3] + 10 \\ &= 2 + 3[1 + 9] + 10 \\ &= 2 + 3[10] + 10 \\ &= 2 + 30 + 10 \\ &= 32 + 10 \\ &= 42 \end{aligned}$$

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134. $21-[2^4-(7-5)-10]+8\cdot 2$
$=21-[16-(2)-10]+16$
$=21-[16-2-10]+16$
$=21-[14-10]+16$
$=21-[4]+16$
$=17+16$
$=33$

135. $\sqrt{81}=9$ since $9\cdot 9=81$.

136. $\sqrt{4}=2$ since $2\cdot 2=4$.

137. $\sqrt{1}=1$ since $1\cdot 1=1$.

138. $\sqrt{0}=0$ since $0\cdot 0=0$.

139. $4\cdot\sqrt{25}-2\cdot 7=4\cdot 5-2\cdot 7=20-14=6$

140. $8\cdot\sqrt{49}-3\cdot 9=8\cdot 7-27=56-27=29$

141. $\left(\sqrt{36}-\sqrt{16}\right)^3\cdot[10^2\div(3+17)]$
$=(6-4)^3\cdot[100\div(20)]$
$=(2)^3\cdot[5]$
$=8\cdot[5]$
$=40$

142. $\left(\sqrt{49}-\sqrt{25}\right)^3\cdot[9^2\div(2+7)]=(7-5)^3\cdot[81\div(9)]$
$=(2)^3\cdot[9]$
$=8\cdot[9]$
$=72$

143. $\dfrac{5\cdot 7-3\cdot\sqrt{25}}{2\left(\sqrt{121}-3^2\right)}=\dfrac{35-3\cdot 5}{2(11-9)}=\dfrac{35-15}{2\cdot(2)}=\dfrac{20}{4}=5$

144. $\dfrac{4\cdot 8-1\cdot\sqrt{121}}{3\left(\sqrt{81}-2^3\right)}=\dfrac{32-1\cdot 11}{3(9-8)}=\dfrac{32-11}{3(1)}=\dfrac{21}{3}=7$

145. Area $=(\text{side})^2=(7\text{ meters})^2=49$ square meters
The area is 49 square meters.

146. Area $=(\text{side})^2=(3\text{ inches})^2=9$ square inches
The area is 9 square inches.

147.
$$\begin{array}{r} 375 \\ -\ 68 \\ \hline 307 \end{array}$$

148.
$$\begin{array}{r} 729 \\ -\ 47 \\ \hline 682 \end{array}$$

149.
$$\begin{array}{r} 723 \\ \times\ \ 3 \\ \hline 2169 \end{array}$$

150.
$$\begin{array}{r} 629 \\ \times\ \ 4 \\ \hline 2516 \end{array}$$

151.
$$\begin{array}{r} {\scriptstyle 2\ 2} \\ 264 \\ 39 \\ +\ 598 \\ \hline 901 \end{array}$$

152.
$$\begin{array}{r} {\scriptstyle 2\ 1} \\ 593 \\ 52 \\ +\ 766 \\ \hline 1411 \end{array}$$

153.
$$\begin{array}{r} 458 \text{ R } 8 \\ 13\overline{)\ 5962} \\ \underline{-52} \\ 76 \\ \underline{-65} \\ 112 \\ \underline{-104} \\ 8 \end{array}$$

154.
$$\begin{array}{r} 237 \text{ R } 1 \\ 18\overline{)\ 4267} \\ \underline{-36} \\ 66 \\ \underline{-54} \\ 127 \\ \underline{-126} \\ 1 \end{array}$$

155.
$$\begin{array}{r} 1968 \\ \times\ \ 36 \\ \hline 11\,808 \\ 59\,040 \\ \hline 70{,}848 \end{array}$$

156.
$$\begin{array}{r} 5324 \\ \times\ \ 18 \\ \hline 42\,592 \\ 53\,240 \\ \hline 95{,}832 \end{array}$$

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157.
$$\begin{array}{r} 2000 \\ -\ 356 \\ \hline 1644 \end{array}$$

158.
$$\begin{array}{r} 9000 \\ -\ 519 \\ \hline 8481 \end{array}$$

159. To round 736 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 736 rounded to the nearest ten is 740.

160. To round 258,371 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 258,371 rounded to the nearest thousand is 258,000.

161. To round 1999 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. 9 + 1 = 10, so replace the digit 9 by 0 and carry 1 to the place value to the left. The number 1999 rounded to the nearest hundred is 2000.

162. To round 44,499 to the nearest ten-thousand, observe that the digit in the thousands place is 4. Since this digit is less than 5, we do not add 1 to the digit in the ten-thousands place. The number 44,499 rounded to the nearest ten-thousand is 40,000.

163. 36,911 written in words is thirty-six thousand nine hundred eleven.

164. 154,863 written in words is one hundred fifty-four thousand, eight hundred sixty-three.

165. Seventy thousand, nine hundred forty-three in standard form is 70,943.

166. Forty-three thousand, four hundred one in standard form is 43,401.

167. $4^3 = 4 \cdot 4 \cdot 4 = 64$

168. $5^3 = 5 \cdot 5 \cdot 5 = 125$

169. $\sqrt{144} = 12$ since $12 \cdot 12 = 144$.

170. $\sqrt{100} = 10$ since $10 \cdot 10 = 100$.

171. $24 \div 4 \cdot 2 = 6 \cdot 2 = 12$

172. $\sqrt{256} - 3 \cdot 5 = 16 - 15 = 1$

173. $$\frac{8(7-4)-10}{4^2-3^2} = \frac{8(3)-10}{16-9} = \frac{24-10}{7} = \frac{14}{7} = 2$$

174.
$$\begin{aligned} \frac{\left(15+\sqrt{9}\right)\cdot(8-5)}{2^3+1} &= \frac{(15+3)(3)}{8+1} \\ &= \frac{(18)(3)}{9} \\ &= \frac{54}{9} \\ &= 6 \end{aligned}$$

175.
$$\begin{array}{r} 4 \\ 9\overline{)\ 36} \\ \underline{-36} \\ 0 \end{array}$$
36 divided by 9 is 4.

176.
$$\begin{array}{r} 12 \\ \times\ 2 \\ \hline 24 \end{array}$$
The product of 2 and 12 is 24.

177.
$$\begin{array}{r} {\scriptstyle 1} \\ 16 \\ +\ 8 \\ \hline 24 \end{array}$$
16 increased by 8 is 24.

178.
$$\begin{array}{r} 21 \\ -\ 7 \\ \hline 14 \end{array}$$
7 subtracted from 21 is 14.

179.
$$\begin{array}{r} 5,946,000 \\ -\ 5,756,000 \\ \hline 190,000 \end{array}$$
The average salary for a San Francisco Giants player was $190,000 more in 2016 than in 2015.

180.
$$\begin{array}{r} 7,361,000 \\ -\ 6,072,000 \\ \hline 1,289,000 \end{array}$$
The average Boston Red Sox salary was $1,289,000 less than the average New York Yankee salary in 2016.

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181.
$$\begin{array}{r} 53 \text{ R } 18 \\ 32\overline{)\,1714} \\ -160 \\ \hline 114 \\ -96 \\ \hline 18 \end{array}$$
There are 53 full boxes of drinking glasses with 18 drinking glasses left over.

182. $27 \times 2 = 54$ $\quad 8 \times 4 = 32$ $\quad 54 + 32 = 86$
The total bill is \$86.

Chapter 1 Getting Ready for the Test

1. In the number 189,570,264, the digit 9 is in the millions place; D.

2. In the number 189,570,264, the digit 7 is in the ten-thousands place; C.

3. In the number 189,570,264, the digit 0 is in the thousands place; B.

4. In the number 189,570,264, the digit 8 is in the ten-millions place; E.

5. 5,726,953 rounded to the nearest million is 6,000,000; C.

6. 5,726,953 rounded to the nearest ten is 5,726,950; A.

7. 5,726,953 rounded to the nearest hundred is 5,727,000 and rounded to the nearest thousand is 5,727,000; B and E.

8. 5,726,953 rounded to the nearest ten-thousand is 5,730,000; D.

9. 276,000 is 27,600 multiplied by 10; B.

10. 276 is 27,600 divided by 100; C.

11. 2760 is 27,600 divided by 10; A.

12. 2,760,000 is 27,600 multiplied by 100; D.

13. $9^2 = 9 \cdot 9 = 81$
Choice B is correct.

14. $\sqrt{9} = 3$ because $3 \cdot 3 = 9$.
Choice A is correct.

15. $9^1 = 9$
Choice E is correct.

16. $16 - 4 \div 2^2 = 16 - 4 \div 4 = 16 - 1 = 15$
Choice C is correct.

17. 49×52 rounds to $50 \times 50 = 2500$
Choice C is the best estimate.

18. 3275×11 rounds to $3275 \times 10 = 32{,}750$
Choice A is the best estimate.

19. $87 + 86 + 91$ rounds to $90 + 90 + 90 = 270$
Choice B is the best estimate.

20. $1000 - 62$ rounds to $1000 - 60 = 940$
Choice A is the best estimate.

Chapter 1 Test

1. 82,426 is written as eighty-two thousand, four hundred twenty-six.

2. Four hundred two thousand, five hundred fifty in standard form is 402,550.

3.
$$\begin{array}{r} {\scriptstyle 11} \\ 59 \\ +\,82 \\ \hline 141 \end{array}$$

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

5.
$$\begin{array}{r} 496 \\ \times\ 30 \\ \hline 0 \\ 14\,880 \\ \hline 14{,}880 \end{array}$$

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6.
$$\begin{array}{r} 766 \text{ R } 42 \\ 69\overline{)\,52896} \\ -483 \\ \hline 459 \\ -414 \\ \hline 456 \\ -414 \\ \hline 42 \end{array}$$

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

8. $\sqrt{4} \cdot \sqrt{25} = 2 \cdot 5 = 10$

9. $0 \div 49 = 0$

10. $62 \div 0$ is undefined.

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

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

13.
$$\begin{aligned} \frac{64 \div 8 \cdot 2}{\left(\sqrt{9} - \sqrt{4}\right)^2 + 1} &= \frac{8 \cdot 2}{(3-2)^2 + 1} \\ &= \frac{16}{1^2 + 1} \\ &= \frac{16}{1+1} \\ &= \frac{16}{2} \\ &= 8 \end{aligned}$$

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

15. $5698 \cdot 1000 = 5{,}698{,}000$
Attach 3 zeros.

16.
$$\begin{array}{r} 14 \\ \times\ 8 \\ \hline 112 \end{array}$$
$8000 \cdot 1400 = 11{,}200{,}000$
Attach 5 zeros.

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.

18.
$$\begin{array}{rrr} 6289 & \text{rounds to} & 6300 \\ 5403 & \text{rounds to} & 5400 \\ +\ 1957 & \text{rounds to} & +\ 2000 \\ \hline & \text{rounds to} & 13{,}700 \end{array}$$
The estimated sum is 13,700.

19.
$$\begin{array}{rrr} 4267 & \text{rounds to} & 4300 \\ -\ 2738 & \text{rounds to} & -\ 2700 \\ \hline & & 1600 \end{array}$$
The estimated difference is 1600.

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

21.
$$\begin{array}{r} {\scriptstyle 1} \\ 15 \\ +\ 107 \\ \hline 122 \end{array}$$
The sum of 15 and 107 is 122.

22.
$$\begin{array}{r} 107 \\ \times\ 15 \\ \hline 535 \\ 1070 \\ \hline 1605 \end{array}$$
The product of 15 and 107 is 1605.

23.
$$\begin{array}{r} 7 \text{ R } 2 \\ 15\overline{)\,107} \\ -105 \\ \hline 2 \end{array}$$
The quotient is 7 R 2.

24.
$$\begin{array}{r} 17 \\ 29\overline{)\,493} \\ -29 \\ \hline 203 \\ -203 \\ \hline 0 \end{array}$$
Each can of paint was \$17.

25.
$$\begin{array}{r} 725 \\ -\ 599 \\ \hline 126 \end{array}$$
The higher-priced refrigerator costs \$126 more than the lower-priced one.

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26.
$$\begin{array}{r} 45 \\ \times\ 8 \\ \hline 360 \end{array}$$
Eight tablespoons of sugar contains 360 calories.

27.
$$\begin{array}{r} 430 \\ \times\ 16 \\ \hline 2580 \\ 4300 \\ \hline 6880 \end{array} \qquad \begin{array}{r} 205 \\ \times\ 5 \\ \hline 1025 \end{array} \qquad \begin{array}{r} 6880 \\ +\ 1025 \\ \hline 7905 \end{array}$$
The total cost for these items is \$7905.

28.
$$\begin{array}{r} 5 \\ 5 \\ 5 \\ +\ 5 \\ \hline 20 \end{array}$$
The perimeter is 20 centimeters.

$$\begin{aligned} \text{Area} &= (\text{side})^2 \\ &= (5 \text{ centimeters})^2 \\ &= 25 \text{ square centimeters} \end{aligned}$$
The area is 25 square centimeters.

29.
$$\begin{aligned} \text{Perimeter} &= 2(\text{length}) + 2(\text{width}) \\ &= 2(20 \text{ yards}) + 2(10 \text{ yards}) \\ &= 40 \text{ yards} + 20 \text{ yards} \\ &= 60 \text{ yards} \end{aligned}$$
The perimeter is 60 yards.

$$\begin{aligned} \text{Area} &= (\text{length}) \cdot (\text{width}) \\ &= (20 \text{ yards}) \cdot (10 \text{ yards}) \\ &= 200 \text{ square yards} \end{aligned}$$
The area is 200 square yards.

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