

CHAPTER 1 WHOLE NUMBERS

1.1 Reading and Writing Whole Numbers

1.1 Margin Exercises

1. (a) 341
4 is in the *tens* place.
(b) 714
4 is in the *ones* place.
(c) 479
4 is in the *hundreds* place.
2. The place value of each digit:
(a) 14,218; ones: 8; tens: 1; hundreds: 2; thousands: 4; ten-thousands: 1
(b) 460,329; ones: 9; tens: 2; hundreds: 3; thousands: 0; ten-thousands: 6; hundred-thousands: 4
3. The digits in each period (group) of 3,251,609,328:
(a) 3 is in the billions period.
(b) 251 is in the millions period.
(c) 609 is in the thousands period.
(d) 328 is in the ones period.
4. (a) 18 is eighteen.
(b) 36 is thirty-six.
(c) 418 is four hundred eighteen.
(d) 902 is nine hundred two.
5. (a) 3104 is three thousand, one hundred four.
(b) 95,372 is ninety-five thousand, three hundred seventy-two.
(c) 100,075,002 is one hundred-million, seventy-five thousand, two.
(d) 11,022,040,000 is eleven billion, twenty-two million, forty thousand.
6. (a) One thousand, four hundred thirty-seven is 1437.
(b) Nine hundred seventy-one thousand, six is 971,006.
(c) Eighty-two million, three hundred twenty-five is 82,000,325.

1.1 Reading and Writing Whole Numbers

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7. (a) 14 million in digits is 14,000,000.
(b) 13 million in digits is 13,000,000.
(c) \$42,936 is forty-two thousand, nine hundred thirty-six dollars.
(d) \$28,050 is twenty-eight thousand, fifty dollars.

1.1 Section Exercises

1. 3065; thousands: 3; tens: 6
2. 4681; thousands: 4; ones: 1
3. 18,015; ten-thousands: 1; hundreds: 0
4. 86,332; ten-thousands: 8; ones: 2
5. 7,628,592,183; millions: 8; thousands: 2
6. 1,700,225,016; billions: 1; millions: 0
7. 3,561,435; millions: 3; thousands: 561; ones: 435
8. 28,785,203; millions: 28; thousands: 785; ones: 203
9. 60,000,502,109; billions: 60; millions: 000; thousands: 502; ones: 109
10. 100,258,100,006; billions: 100; millions: 258; thousands: 100; ones: 006
11. Evidence suggests that this is true. It is common to count using fingers.
12. No doubt there is a relationship here. One answer might be that people could count using their fingers and toes and, therefore, thought of them as numbers or digits.
13. 23,115 is twenty-three thousand, one hundred fifteen.
14. 37,886 is thirty-seven thousand, eight hundred eighty-six.
15. 346,009 is three hundred forty-six thousand, nine.
16. 218,033 is two hundred eighteen thousand, thirty-three.
17. 25,756,665 is twenty-five million, seven hundred fifty-six thousand, six hundred sixty-five.
18. 999,993,000 is nine hundred ninety-nine million, nine hundred ninety-three thousand.
19. Sixty-three thousand, one hundred sixty-three is 63,163.
20. Ninety-five thousand, one hundred eleven is 95,111.
21. Ten million, two hundred twenty-three is 10,000,223.

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22. One hundred-million, two hundred is 100,000,200.
23. Three million, two hundred thousand in digits is 3,200,000.
24. Two hundred eighty million, four hundred eighty-nine thousand in digits is 280,489,000.
25. Fifty million, fifty-one thousand, five hundred seven in digits is 50,051,507.
26. Twenty-three million, five hundred thirty-five thousand in digits is 23,535,000.
27. Fifty-four million, seven hundred fifty thousand in digits is 54,750,000.
28. Two million, four hundred thousand in digits is 2,400,000.
29. Eight hundred trillion, six hundred twenty-one million, twenty thousand, two hundred fifteen in digits is 800,000,621,020,215.
30. 70,306,735,002,102 is seventy trillion, three hundred six billion, seven hundred thirty-five million, two thousand, one hundred two.
31. The least used method of transportation is public transportation. 6,069,589 in words is six million, sixty-nine thousand, five hundred eighty-nine.
32. From the table, "drive alone" is the method of transportation most used. 84,215,298 written out is eighty-four million, two hundred fifteen thousand, two hundred ninety-eight.
33. The number of people who walk to work or work at home is 7,894,911. In words, 7,894,911 is written as seven million, eight hundred ninety-four thousand, nine hundred eleven.
34. From the table, the number of people who carpool is 15,377,634. Written out, 15,377,634 is fifteen million, three hundred seventy-seven thousand, six hundred thirty-four.

$$\begin{array}{r} \text{(b)} \quad 5 \\ 6 \quad 5 + 6 = 11 \\ 3 \quad 11 + 3 = 14 \\ 2 \quad 14 + 2 = 16 \\ + 4 \quad 16 + 4 = 20 \\ \hline 20 \end{array}$$

$$\begin{array}{r} \text{(c)} \quad 9 \\ 6 \quad 9 + 6 = 15 \\ 8 \quad 15 + 8 = 23 \\ 7 \quad 23 + 7 = 30 \\ + 3 \quad 30 + 3 = 33 \\ \hline 33 \end{array}$$

$$\begin{array}{r} \text{(d)} \quad 3 \\ 8 \quad 3 + 8 = 11 \\ 6 \quad 11 + 6 = 17 \\ 4 \quad 17 + 4 = 21 \\ + 8 \quad 21 + 8 = 29 \\ \hline 29 \end{array}$$

$$\begin{array}{r} 3. \quad \text{(a)} \quad 26 \\ + 73 \\ \hline 99 \end{array}$$

$$\begin{array}{r} \text{(b)} \quad 534 \\ + 265 \\ \hline 799 \end{array}$$

$$\begin{array}{r} \text{(c)} \quad 42,305 \\ + 11,563 \\ \hline 53,868 \end{array}$$

$$\begin{array}{r} 4. \quad \text{(a)} \quad \frac{1}{66} \\ + 27 \quad 6 + 7 = 13 \\ \hline 93 \end{array}$$

$$\begin{array}{r} \text{(b)} \quad \frac{1}{58} \\ + 33 \quad 8 + 3 = 11 \\ \hline 91 \end{array}$$

$$\begin{array}{r} \text{(c)} \quad \frac{1}{56} \\ + 37 \quad 6 + 7 = 13 \\ \hline 93 \end{array}$$

$$\begin{array}{r} \text{(d)} \quad \frac{1}{34} \\ + 49 \quad 4 + 9 = 13 \\ \hline 83 \end{array}$$

$$\begin{array}{r} 5. \quad \text{(a)} \quad \frac{21}{42} \\ 651 \\ 396 \\ + 87 \\ \hline 1176 \end{array}$$

1.2 Adding Whole Numbers

1.2 Margin Exercises

1. (a) $2 + 6 = 8$; $6 + 2 = 8$
 (b) $9 + 5 = 14$; $5 + 9 = 14$
 (c) $4 + 7 = 11$; $7 + 4 = 11$
 (d) $6 + 9 = 15$; $9 + 6 = 15$

$$\begin{array}{r} 2. \quad \text{(a)} \quad 3 \\ 8 \quad 3 + 8 = 11 \\ 5 \quad 11 + 5 = 16 \\ 4 \quad 16 + 4 = 20 \\ + 6 \quad 20 + 6 = 26 \\ \hline 26 \end{array}$$

$$\begin{array}{r} \text{(b)} \quad 1 \overline{) 21} \\ 4 \overline{) 271} \\ 372 \\ + 8 \overline{) 976} \\ \hline 13,781 \end{array}$$

$$\begin{array}{r} \text{(c)} \quad 2 \overline{) 57} \\ 4 \\ 392 \\ 804 \\ 51 \\ + 27 \\ \hline 1335 \end{array}$$

$$\begin{array}{r} \text{(d)} \quad 2 \overline{) 821} \\ 7 \overline{) 821} \\ 435 \\ 72 \\ 305 \\ + 1 \overline{) 693} \\ \hline 10,326 \end{array}$$

$$\begin{array}{r} \text{6. (a)} \quad 816 \\ 363 \\ 17 \\ 2 \\ 5 \\ + 7654 \\ \hline 8857 \end{array}$$

$$\begin{array}{r} \text{(b)} \quad 3305 \\ 650 \\ 708 \\ 29 \\ 40 \\ 6 \\ + 3 \\ \hline 4741 \end{array}$$

$$\begin{array}{r} \text{(c)} \quad 15,829 \\ 765 \\ 78 \\ 15 \\ 9 \\ 7 \\ + 13,179 \\ \hline 29,882 \end{array}$$

7. The shortest route from Lake Buena Vista to Conway is as follows:

$$\begin{array}{r} 4 \text{ Lake Buena Vista to Resort Area} \\ 6 \text{ Resort Area to Pine Castle} \\ 3 \text{ Pine Castle to Belle Isle} \\ + 6 \text{ Belle Isle to Conway} \\ \hline 19 \text{ miles} \end{array}$$

8. The next shortest route from Orlando to Clear Lake is as follows:

$$\begin{array}{r} 5 \text{ Orlando to Pine Hills} \\ 8 \text{ Pine Hills to Altamonte Springs} \\ 5 \text{ Altamonte Springs to Casselberry} \\ 6 \text{ Casselberry to Bertha} \\ 7 \text{ Bertha to Winter Park} \\ + 7 \text{ Winter Park to Clear Lake} \\ \hline 38 \text{ miles} \end{array}$$

$$\begin{array}{r} \text{9.} \quad 2 \overline{) 526} \\ 297 \\ 526 \\ + 297 \\ \hline 1646 \text{ feet} \end{array}$$

The amount of fencing needed is 1646 feet, which is the perimeter of (distance around) the project.

$$\begin{array}{r} \text{10. (a)} \quad 63 \\ 4 \\ 9 \\ + 28 \\ \hline 104 \text{ correct} \end{array}$$

$$\begin{array}{r} \text{(b)} \quad 927 \\ 395 \\ 64 \\ + 251 \\ \hline 1637 \text{ correct} \end{array}$$

$$\begin{array}{r} \text{(c)} \quad 79 \\ 218 \\ 7 \\ + 639 \\ \hline 943 \text{ (953 is incorrect.)} \end{array}$$

$$\begin{array}{r} \text{(d)} \quad 21,892 \\ 11,746 \\ + 43,925 \\ \hline 77,563 \text{ (79,563 is incorrect.)} \end{array}$$

1.2 Section Exercises

$$\begin{array}{r} \text{1.} \quad 43 \\ + 54 \\ \hline 97 \end{array}$$

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$$\begin{array}{r} 2. \quad 18 \\ + 11 \\ \hline 29 \end{array}$$

$$\begin{array}{r} 3. \quad 56 \\ + 33 \\ \hline 89 \end{array}$$

$$\begin{array}{r} 4. \quad 83 \\ + 15 \\ \hline 98 \end{array}$$

$$\begin{array}{r} 5. \quad 317 \\ + 572 \\ \hline 889 \end{array}$$

$$\begin{array}{r} 6. \quad 574 \\ + 325 \\ \hline 899 \end{array}$$

$$\begin{array}{r} 7. \quad 318 \\ 151 \\ + 420 \\ \hline 889 \end{array}$$

$$\begin{array}{r} 8. \quad 135 \\ 253 \\ + 410 \\ \hline 798 \end{array}$$

$$\begin{array}{r} 9. \quad 6310 \\ 252 \\ + 1223 \\ \hline 7785 \end{array}$$

$$\begin{array}{r} 10. \quad 121 \\ 5705 \\ + 3163 \\ \hline 8989 \end{array}$$

$$\begin{array}{r} 11. \text{ Line up:} \quad 932 \\ \quad \quad \quad 44 \\ \quad \quad + 613 \\ \quad \quad \hline \quad 1589 \end{array}$$

$$\begin{array}{r} 12. \text{ Line up:} \quad 517 \\ \quad \quad \quad 131 \\ \quad \quad + 250 \\ \quad \quad \hline \quad 898 \end{array}$$

$$\begin{array}{r} 13. \text{ Line up:} \quad 1251 \\ \quad \quad \quad 4311 \\ \quad \quad + 2114 \\ \quad \quad \hline \quad 7676 \end{array}$$

$$\begin{array}{r} 14. \text{ Line up:} \quad 3241 \\ \quad \quad \quad 1513 \\ \quad \quad + 2014 \\ \quad \quad \hline \quad 6768 \end{array}$$

$$\begin{array}{r} 15. \text{ Line up:} \quad 12,142 \\ \quad \quad \quad 43,201 \\ \quad \quad + 23,103 \\ \quad \quad \hline \quad 78,446 \end{array}$$

$$\begin{array}{r} 16. \text{ Line up:} \quad 41,124 \\ \quad \quad \quad 12,302 \\ \quad \quad + 23,500 \\ \quad \quad \hline \quad 76,926 \end{array}$$

$$\begin{array}{r} 17. \text{ Line up:} \quad 3213 \\ \quad \quad + 5715 \\ \quad \quad \hline \quad 8928 \end{array}$$

$$\begin{array}{r} 18. \text{ Line up:} \quad 6344 \\ \quad \quad + 1655 \\ \quad \quad \hline \quad 7999 \end{array}$$

$$\begin{array}{r} 19. \text{ Line up:} \quad 38,204 \\ \quad \quad + 21,020 \\ \quad \quad \hline \quad 59,224 \end{array}$$

$$\begin{array}{r} 20. \text{ Line up:} \quad 63,251 \\ \quad \quad + 36,305 \\ \quad \quad \hline \quad 99,556 \end{array}$$

$$\begin{array}{r} 21. \quad \frac{1}{8}7 \\ \quad + 63 \\ \quad \hline \quad 150 \end{array}$$

$$\begin{array}{r} 22. \quad \frac{1}{1}9 \\ \quad + 92 \\ \quad \hline \quad 111 \end{array}$$

$$\begin{array}{r} 23. \quad \frac{1}{8}6 \\ \quad + 69 \\ \quad \hline \quad 155 \end{array}$$

$$\begin{array}{r} 24. \quad \frac{1}{3}7 \\ \quad + 85 \\ \quad \hline \quad 122 \end{array}$$

$$\begin{array}{r} 25. \quad \frac{1}{4}7 \\ \quad + 74 \\ \quad \hline \quad 121 \end{array}$$

$$\begin{array}{r} 26. \quad \frac{1}{9}7 \\ \quad + 79 \\ \quad \hline \quad 176 \end{array}$$

$$\begin{array}{r} 27. \quad \overset{1}{6}7 \\ + 78 \\ \hline 145 \end{array}$$

$$\begin{array}{r} 28. \quad \overset{1}{9}6 \\ + 47 \\ \hline 143 \end{array}$$

$$\begin{array}{r} 29. \quad \overset{1}{7}3 \\ + 29 \\ \hline 102 \end{array}$$

$$\begin{array}{r} 30. \quad \overset{1}{6}8 \\ + 37 \\ \hline 105 \end{array}$$

$$\begin{array}{r} 31. \quad \overset{1}{7}46 \\ + 905 \\ \hline 1651 \end{array}$$

$$\begin{array}{r} 32. \quad \overset{1}{6}21 \\ + 359 \\ \hline 980 \end{array}$$

$$\begin{array}{r} 33. \quad \overset{1}{3}06 \\ + 848 \\ \hline 1154 \end{array}$$

$$\begin{array}{r} 34. \quad \overset{11}{7}98 \\ + 206 \\ \hline 1004 \end{array}$$

$$\begin{array}{r} 35. \quad \overset{11}{2}78 \\ + 135 \\ \hline 413 \end{array}$$

$$\begin{array}{r} 36. \quad \overset{1}{1}72 \\ + 156 \\ \hline 328 \end{array}$$

$$\begin{array}{r} 37. \quad \overset{1}{9}28 \\ + 843 \\ \hline 1771 \end{array}$$

$$\begin{array}{r} 38. \quad \overset{11}{6}86 \\ + 726 \\ \hline 1412 \end{array}$$

$$\begin{array}{r} 39. \quad \overset{11}{5}26 \\ + 884 \\ \hline 1410 \end{array}$$

$$\begin{array}{r} 40. \quad \overset{11}{1}16 \\ + 897 \\ \hline 1013 \end{array}$$

$$\begin{array}{r} 41. \quad \overset{1}{3}\overset{1}{5}\overset{1}{7}4 \\ + 2817 \\ \hline 6391 \end{array}$$

$$\begin{array}{r} 42. \quad \overset{1}{6}871 \\ + 7528 \\ \hline 14,399 \end{array}$$

$$\begin{array}{r} 43. \quad \overset{1}{7}\overset{11}{8}96 \\ + 3728 \\ \hline 11,624 \end{array}$$

$$\begin{array}{r} 44. \quad \overset{1}{9}382 \\ + 7586 \\ \hline 16,968 \end{array}$$

$$\begin{array}{r} 45. \quad \overset{1}{9}\overset{11}{6}25 \\ + 7986 \\ \hline 17,611 \end{array}$$

$$\begin{array}{r} 46. \quad \overset{1}{5}\overset{1}{7}\overset{1}{1}8 \\ 5623 \\ + 7436 \\ \hline 18,777 \end{array}$$

$$\begin{array}{r} 47. \quad \overset{22}{9}056 \\ 78 \\ 6089 \\ + 731 \\ \hline 15,954 \end{array}$$

$$\begin{array}{r} 48. \quad \overset{1}{4}\overset{1}{0}22 \\ 709 \\ 8621 \\ + 37 \\ \hline 13,389 \end{array}$$

$$\begin{array}{r} 49. \quad \overset{112}{1}8 \\ 708 \\ 9286 \\ + 636 \\ \hline 10,648 \end{array}$$

$$\begin{array}{r} 50. \quad \overset{2}{1}\overset{11}{7}08 \\ 321 \\ 61 \\ + 8926 \\ \hline 11,016 \end{array}$$

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$$\begin{array}{r} 51. \quad \begin{array}{r} 111 \\ 422 \\ 6074 \\ 435 \\ + 8663 \\ \hline 15,594 \end{array} \end{array}$$

$$\begin{array}{r} 52. \quad \begin{array}{r} 12 \\ 6505 \\ 173 \\ 7044 \\ + 168 \\ \hline 13,890 \end{array} \end{array}$$

$$\begin{array}{r} 53. \quad \begin{array}{r} 11 \\ 321 \\ 9603 \\ 8 \\ 21 \\ + 1604 \\ \hline 11,557 \end{array} \end{array}$$

$$\begin{array}{r} 54. \quad \begin{array}{r} 212 \\ 7631 \\ 5983 \\ 7 \\ 36 \\ + 505 \\ \hline 14,162 \end{array} \end{array}$$

$$\begin{array}{r} 55. \quad \begin{array}{r} 112 \\ 2109 \\ 63 \\ 16 \\ 3 \\ + 9887 \\ \hline 12,078 \end{array} \end{array}$$

$$\begin{array}{r} 56. \quad \begin{array}{r} 113 \\ 322 \\ 6508 \\ 93 \\ 745 \\ 18 \\ + 2005 \\ \hline 9691 \end{array} \end{array}$$

$$\begin{array}{r} 57. \quad \begin{array}{r} 233 \\ 553 \\ 97 \\ 2772 \\ 437 \\ 63 \\ + 328 \\ \hline 4250 \end{array} \end{array}$$

$$\begin{array}{r} 58. \quad \begin{array}{r} 223 \\ 3187 \\ 810 \\ 527 \\ 76 \\ 2665 \\ + 317 \\ \hline 7582 \end{array} \end{array}$$

$$\begin{array}{r} 59. \quad \begin{array}{r} 212 \\ 413 \\ 85 \\ 9919 \\ 602 \\ 31 \\ + 1218 \\ \hline 12,268 \end{array} \end{array}$$

$$\begin{array}{r} 60. \quad \begin{array}{r} 332 \\ 576 \\ 7934 \\ 60 \\ 781 \\ 5968 \\ + 371 \\ \hline 15,690 \end{array} \end{array}$$

61. Add up to check addition.

$$\begin{array}{r} 2091 \\ 832 \\ 468 \\ + 791 \\ \hline 2091 \text{ correct} \end{array}$$

62. Add up to check addition.

$$\begin{array}{r} 1857 \\ 326 \\ 852 \\ + 679 \\ \hline 1857 \text{ correct} \end{array}$$

63. Add up to check addition.

$$\begin{array}{r} 769 \\ 179 \\ 214 \\ + 376 \\ \hline 759 \text{ incorrect; should be 769} \end{array}$$

64. Add up to check addition.

$$\begin{array}{r} 1120 \\ \hline 17 \\ 296 \\ 713 \\ + 94 \\ \hline 1220 \end{array}$$

incorrect; should be 1120

65. Add up to check addition.

$$\begin{array}{r} 5420 \\ \hline 4713 \\ 28 \\ 615 \\ + 64 \\ \hline 5420 \end{array}$$

correct

66. Add up to check addition.

$$\begin{array}{r} 11,583 \\ \hline 3\,628 \\ 72 \\ 564 \\ + 7\,319 \\ \hline 11,583 \end{array}$$

correct

67. Add up to check addition.

$$\begin{array}{r} 11,577 \\ \hline 678 \\ 7\,952 \\ 56 \\ 718 \\ + 2\,173 \\ \hline 11,377 \end{array}$$

incorrect; should be 11,577

68. Add up to check addition.

$$\begin{array}{r} 11,212 \\ \hline 516 \\ 8\,760 \\ 24 \\ 189 \\ + 1\,723 \\ \hline 11,212 \end{array}$$

correct

69. Add up to check addition.

$$\begin{array}{r} 14,332 \\ \hline 4714 \\ 27 \\ 77 \\ 8878 \\ + 636 \\ \hline 14,332 \end{array}$$

correct

70. Add up to check addition.

$$\begin{array}{r} 16,709 \\ \hline 6\,715 \\ 283 \\ 9\,617 \\ 13 \\ + 81 \\ \hline 16,719 \end{array}$$

incorrect; should be 16,709

71. Changing the order in which numbers are added does not change the sum. You can add from bottom to top when checking addition.

72. Grouping the addition of numbers in any order does not change the sum. You can add numbers in any order. For example, you can add pairs of numbers that add to 10.

73. The shortest route between Southtown and Rena is through Thomasville.

$$\begin{array}{r} 21 \text{ Southtown to Thomasville} \\ + 12 \text{ Thomasville to Rena} \\ \hline 33 \text{ miles} \end{array}$$

74. The shortest route from Elk Hill to Oakton is through Thomasville.

$$\begin{array}{r} 18 \text{ Elk Hill to Thomasville} \\ + 17 \text{ Thomasville to Oakton} \\ \hline 35 \text{ miles} \end{array}$$

75. The shortest route between Thomasville and Murphy is through Rena and Austin.

$$\begin{array}{r} 12 \text{ Thomasville to Rena} \\ 15 \text{ Rena to Austin} \\ + 11 \text{ Austin to Murphy} \\ \hline 38 \text{ miles} \end{array}$$

76. The shortest route from Murphy to Thomasville is through Austin and Rena.

$$\begin{array}{r} 11 \text{ Murphy to Austin} \\ 15 \text{ Austin to Rena} \\ + 12 \text{ Rena to Thomasville} \\ \hline 38 \text{ miles} \end{array}$$

77. $\begin{array}{r} \$3\,482 \text{ flea market} \\ + 12,860 \text{ annual auction} \\ \hline \$16,342 \text{ total amount raised} \end{array}$

78. $\begin{array}{r} 75 \text{ tops} \\ + 52 \text{ pairs of shorts} \\ \hline 127 \text{ total items} \end{array}$

79. $\begin{array}{r} 413 \text{ women} \\ + 286 \text{ men} \\ \hline 699 \text{ total people} \end{array}$

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$$\begin{array}{r} 80. \quad 283 \text{ employees} \\ + 218 \text{ employees} \\ \hline 501 \text{ total employees} \end{array}$$

$$\begin{array}{r} 81. \quad 13,786 \text{ on-campus day} \\ \quad 3,497 \text{ on-campus night} \\ + 2,874 \text{ on-line} \\ \hline 20,157 \text{ total students} \end{array}$$

$$\begin{array}{r} 82. \quad \$10,329 \text{ car loan} \\ \quad 2,685 \text{ credit card} \\ + 169,760 \text{ home loan} \\ \hline \$182,774 \text{ total loan amount} \end{array}$$

83. To find the perimeter, add the 4 sides in any order.

$$\begin{array}{r} 325 \\ 160 \\ 325 \\ + 160 \\ \hline 970 \text{ feet} \end{array}$$

970 feet is the total distance around the lot.

84. To find the perimeter, add the 4 sides in any order.

$$\begin{array}{r} 48 \\ 32 \\ 48 \\ + 32 \\ \hline 160 \text{ feet} \end{array}$$

Maria will need 160 feet of gutters.

85. To find the perimeter, add the 3 sides in any order.

$$\begin{array}{r} 30 \\ 24 \\ + 18 \\ \hline 72 \text{ feet} \end{array}$$

Martin will need 72 feet of lumber.

86. To find the perimeter, add the 4 sides in any order.

$$\begin{array}{r} 65 \\ 73 \\ 98 \\ + 73 \\ \hline 309 \text{ meters} \end{array}$$

309 meters of fencing will be needed.

87. The largest four-digit number possible, using the digits 4, 1, 9, and 2 each once, will begin with the largest digit in the thousands place and the remaining digits will descend in size until the smallest digit is in the ones place. Therefore, the largest four-digit number possible is 9421.

88. The smallest four-digit number possible, using the digits 4, 1, 9, and 2 each once, will begin with the smallest digit in the thousands place and the remaining digits will ascend in size until the largest digit is in the ones place. Therefore, the smallest four-digit number possible is 1249.

89. The largest five-digit number possible, using the digits 6, 2, and 7 at least once, will use the largest digit in the ten-thousands, thousands, and hundreds place and the remaining digits will descend in size until the smallest digit is in the ones place. Therefore, the largest five-digit number possible is 77,762.

90. The smallest five-digit number possible, using the digits 6, 2, and 7 at least once, will use the smallest digit in the ten-thousands, thousands, and hundreds place and the remaining digits will ascend in size until the largest digit is in the ones place. Therefore, the smallest five-digit number possible is 22,267.

91. The largest seven-digit number possible is 9,994,433.

92. The smallest seven-digit number possible is 3,334,499.

93. To write the largest seven-digit number possible, using the digits 4, 3, and 9, and using each digit at least twice, write the largest digits on the left, and use the smaller digits as you move right.

94. To write the smallest seven-digit number possible, using the digits 4, 3, and 9, and using each digit at least twice, write the smallest digits on the left, and use the larger digits as you move right.

1.3 Subtracting Whole Numbers

1.3 Margin Exercises

1. (a) $7 + 2 = 9$:

$$9 - 2 = 7 \text{ or } 9 - 7 = 2$$

- (b) $7 + 4 = 11$:

$$11 - 7 = 4 \text{ or } 11 - 4 = 7$$

- (c) $15 + 22 = 37$:

$$37 - 15 = 22 \text{ or } 37 - 22 = 15$$

- (d) $23 + 55 = 78$:

$$78 - 55 = 23 \text{ or } 78 - 23 = 55$$

2. (a) $7 - 5 = 2$:

$$7 = 5 + 2 \text{ or } 7 = 2 + 5$$

- (b) $9 - 4 = 5$:

$$9 = 4 + 5 \text{ or } 9 = 5 + 4$$

(c) $21 - 15 = 6$:

$21 = 15 + 6$ or $21 = 6 + 15$

(d) $58 - 42 = 16$:

$58 = 42 + 16$ or $58 = 16 + 42$

3. (a)
$$\begin{array}{r} 74 \\ - 43 \\ \hline 31 \end{array}$$
 $4 - 3 = 1$
 $7 - 4 = 3$

(b)
$$\begin{array}{r} 68 \\ - 24 \\ \hline 44 \end{array}$$
 $8 - 4 = 4$
 $6 - 2 = 4$

(c)
$$\begin{array}{r} 429 \\ - 318 \\ \hline 111 \end{array}$$

(d)
$$\begin{array}{r} 3927 \\ - 2614 \\ \hline 1313 \end{array}$$

(e)
$$\begin{array}{r} 5464 \\ - 324 \\ \hline 5140 \end{array}$$

4. (a)
$$\begin{array}{r} 76 \\ - 45 \\ \hline 31 \end{array}$$
 Subtraction problem
$$\begin{array}{r} 45 \\ + 31 \\ \hline 76 \end{array}$$
 Addition problem

Match: 31 is correct.

(b)
$$\begin{array}{r} 53 \\ - 22 \\ \hline 21 \end{array}$$
 Subtraction problem
$$\begin{array}{r} 22 \\ + 21 \\ \hline 43 \end{array}$$
 Addition problem

Not a match: 21 is incorrect.

Rework.

$$\begin{array}{r} 53 \\ - 22 \\ \hline 31 \end{array}$$
 Subtraction problem
$$\begin{array}{r} 22 \\ + 31 \\ \hline 53 \end{array}$$
 Addition problem

Match: 31 is correct.

(c)
$$\begin{array}{r} 374 \\ - 251 \\ \hline 113 \end{array}$$
 Subtraction problem
$$\begin{array}{r} 251 \\ + 113 \\ \hline 364 \end{array}$$
 Addition problem

Not a match: 113 is incorrect.

Rework.

$$\begin{array}{r} 374 \\ - 251 \\ \hline 123 \end{array}$$
 Subtraction problem
$$\begin{array}{r} 251 \\ + 123 \\ \hline 374 \end{array}$$
 Addition problem

Match: 123 is correct.

(d)
$$\begin{array}{r} 7531 \\ - 4301 \\ \hline 3230 \end{array}$$
 Subtraction problem
$$\begin{array}{r} 4301 \\ + 3230 \\ \hline 7531 \end{array}$$
 Addition problem

Match: 3230 is correct.

5. (a)
$$\begin{array}{r} 418 \\ 58 \\ - 19 \\ \hline 39 \end{array}$$

(b)
$$\begin{array}{r} 716 \\ 86 \\ - 38 \\ \hline 48 \end{array}$$

(c)
$$\begin{array}{r} 311 \\ 41 \\ - 27 \\ \hline 14 \end{array}$$

(d)
$$\begin{array}{r} 513 \\ 863 \\ - 47 \\ \hline 816 \end{array}$$

(e)
$$\begin{array}{r} 512 \\ 762 \\ - 157 \\ \hline 605 \end{array}$$

6. (a)
$$\begin{array}{r} 812 \\ 927 \\ - 43 \\ \hline 884 \end{array}$$

(b)
$$\begin{array}{r} 51615 \\ 675 \\ - 86 \\ \hline 589 \end{array}$$

(c)
$$\begin{array}{r} 31617 \\ 477 \\ - 389 \\ \hline 88 \end{array}$$

(d)
$$\begin{array}{r} 0131017 \\ 1417 \\ - 988 \\ \hline 429 \end{array}$$

(e)
$$\begin{array}{r} 71613 \\ 8739 \\ - 3892 \\ \hline 4847 \end{array}$$

7. (a)
$$\begin{array}{r} 9 \\ 1016 \\ 206 \\ - 177 \\ \hline 29 \end{array}$$

$$\begin{array}{r} 9 \\ 6\cancel{1}013 \\ 7\cancel{0}3 \\ - 415 \\ \hline 288 \end{array}$$

$$\begin{array}{r} 9 \\ 6\cancel{1}012 \\ 7\cancel{0}24 \\ - 2632 \\ \hline 4392 \end{array}$$

$$8. \quad \begin{array}{r} 9 \\ 2\cancel{1}018 \\ 3\cancel{0}8 \\ - 159 \\ \hline 149 \end{array}$$

$$\begin{array}{r} 610 \\ 5\cancel{7}0 \\ - 368 \\ \hline 202 \end{array}$$

$$\begin{array}{r} 0141610 \\ 1\cancel{5}70 \\ - 983 \\ \hline 587 \end{array}$$

$$\begin{array}{r} 99 \\ 6\cancel{1}01011 \\ 7\cancel{0}01 \\ - 5193 \\ \hline 1808 \end{array}$$

$$\begin{array}{r} 99 \\ 3\cancel{1}01010 \\ 4\cancel{0}00 \\ - 1782 \\ \hline 2218 \end{array}$$

$$9. \quad \begin{array}{r} 357 \\ - 168 \\ \hline 189 \end{array} \quad \begin{array}{r} 168 \\ + 189 \\ \hline 357 \end{array}$$

Match: 189 is correct.

$$\begin{array}{r} 570 \\ - 328 \\ \hline 252 \end{array} \quad \begin{array}{r} 328 \\ + 252 \\ \hline 580 \end{array}$$

Not a match: 252 is incorrect.

Rework.

$$\begin{array}{r} 570 \\ - 328 \\ \hline 242 \end{array} \quad \begin{array}{r} 328 \\ + 242 \\ \hline 570 \end{array}$$

Match: 242 is correct.

$$\begin{array}{r} 14,726 \\ - 8839 \\ \hline 5887 \end{array} \quad \begin{array}{r} 8839 \\ + 5887 \\ \hline 14,726 \end{array}$$

Match: 5887 is correct.

$$\begin{array}{r} \$56,655 \text{ Bachelor's degree} \\ - 43,094 \text{ Associate of Arts degree} \\ \hline \$13,561 \text{ More earnings} \end{array}$$

$$\begin{array}{r} \$43,094 \text{ Associate of Arts degree} \\ - 27,401 \text{ Not a high school graduate} \\ \hline \$15,693 \end{array}$$

1.3 Section Exercises

$$1. \quad \begin{array}{r} 48 \\ - 32 \\ \hline 16 \end{array} \quad \begin{array}{r} \text{Check: } 32 \\ + 16 \\ \hline 48 \end{array}$$

$$2. \quad \begin{array}{r} 17 \\ - 13 \\ \hline 4 \end{array} \quad \begin{array}{r} \text{Check: } 13 \\ + 4 \\ \hline 17 \end{array}$$

$$3. \quad \begin{array}{r} 86 \\ - 53 \\ \hline 33 \end{array} \quad \begin{array}{r} \text{Check: } 53 \\ + 33 \\ \hline 86 \end{array}$$

$$4. \quad \begin{array}{r} 78 \\ - 35 \\ \hline 43 \end{array} \quad \begin{array}{r} \text{Check: } 35 \\ + 43 \\ \hline 78 \end{array}$$

$$5. \quad \begin{array}{r} 77 \\ - 60 \\ \hline 17 \end{array} \quad \begin{array}{r} \text{Check: } 60 \\ + 17 \\ \hline 77 \end{array}$$

$$6. \quad \begin{array}{r} 87 \\ - 63 \\ \hline 24 \end{array} \quad \begin{array}{r} \text{Check: } 63 \\ + 24 \\ \hline 87 \end{array}$$

$$7. \quad \begin{array}{r} 335 \\ - 122 \\ \hline 213 \end{array} \quad \begin{array}{r} \text{Check: } 213 \\ + 122 \\ \hline 335 \end{array}$$

$$8. \quad \begin{array}{r} 602 \\ - 301 \\ \hline 301 \end{array} \quad \begin{array}{r} \text{Check: } 301 \\ + 301 \\ \hline 602 \end{array}$$

$$9. \quad \begin{array}{r} 552 \\ - 451 \\ \hline 101 \end{array} \quad \begin{array}{r} \text{Check: } 451 \\ + 101 \\ \hline 552 \end{array}$$

$$10. \quad \begin{array}{r} 888 \\ - 215 \\ \hline 673 \end{array} \quad \begin{array}{r} \text{Check: } 215 \\ + 673 \\ \hline 888 \end{array}$$

$$11. \quad \begin{array}{r} 7352 \\ - 241 \\ \hline 7111 \end{array} \quad \begin{array}{r} \text{Check: } 241 \\ + 7111 \\ \hline 7352 \end{array}$$

$$12. \quad \begin{array}{r} 4420 \\ - 310 \\ \hline 4110 \end{array} \quad \begin{array}{r} \text{Check: } 4110 \\ + 310 \\ \hline 4420 \end{array}$$

13.
$$\begin{array}{r} 5546 \\ - 2134 \\ \hline 3412 \end{array}$$
 Check:
$$\begin{array}{r} 3412 \\ + 2134 \\ \hline 5546 \end{array}$$
14.
$$\begin{array}{r} 1875 \\ - 1362 \\ \hline 513 \end{array}$$
 Check:
$$\begin{array}{r} 1362 \\ + 513 \\ \hline 1875 \end{array}$$
15.
$$\begin{array}{r} 6259 \\ - 4148 \\ \hline 2111 \end{array}$$
 Check:
$$\begin{array}{r} 4148 \\ + 2111 \\ \hline 6259 \end{array}$$
16.
$$\begin{array}{r} 9654 \\ - 4323 \\ \hline 5331 \end{array}$$
 Check:
$$\begin{array}{r} 4323 \\ + 5331 \\ \hline 9654 \end{array}$$
17.
$$\begin{array}{r} 24,392 \\ - 11,232 \\ \hline 13,160 \end{array}$$
 Check:
$$\begin{array}{r} 13,160 \\ + 11,232 \\ \hline 24,392 \end{array}$$
18.
$$\begin{array}{r} 57,921 \\ - 34,801 \\ \hline 23,120 \end{array}$$
 Check:
$$\begin{array}{r} 23,120 \\ + 34,801 \\ \hline 57,921 \end{array}$$
19.
$$\begin{array}{r} 46,253 \\ - 5,143 \\ \hline 41,110 \end{array}$$
 Check:
$$\begin{array}{r} 41,110 \\ + 5,143 \\ \hline 46,253 \end{array}$$
20.
$$\begin{array}{r} 75,904 \\ - 3,702 \\ \hline 72,202 \end{array}$$
 Check:
$$\begin{array}{r} 72,202 \\ + 3,702 \\ \hline 75,904 \end{array}$$
21.
$$\begin{array}{r} 54 \\ - 42 \\ \hline 12 \end{array}$$
 Check:
$$\begin{array}{r} 42 \\ + 12 \\ \hline 54 \end{array}$$
 correct
22.
$$\begin{array}{r} 87 \\ - 43 \\ \hline 44 \end{array}$$
 Check:
$$\begin{array}{r} 43 \\ + 44 \\ \hline 87 \end{array}$$
 correct
23.
$$\begin{array}{r} 89 \\ - 27 \\ \hline 63 \end{array}$$
 Check:
$$\begin{array}{r} 63 \\ + 27 \\ \hline 90 \end{array}$$
 incorrect
- Rework.**
- $$\begin{array}{r} 89 \\ - 27 \\ \hline 62 \end{array}$$
 Check:
$$\begin{array}{r} 62 \\ + 27 \\ \hline 89 \end{array}$$
 correct
24.
$$\begin{array}{r} 47 \\ - 35 \\ \hline 13 \end{array}$$
 Check:
$$\begin{array}{r} 13 \\ + 35 \\ \hline 48 \end{array}$$
 incorrect
- Rework.**
- $$\begin{array}{r} 47 \\ - 35 \\ \hline 12 \end{array}$$
 Check:
$$\begin{array}{r} 12 \\ + 35 \\ \hline 47 \end{array}$$
 correct

25.
$$\begin{array}{r} 382 \\ - 261 \\ \hline 131 \end{array}$$
 Check:
$$\begin{array}{r} 261 \\ + 131 \\ \hline 392 \end{array}$$
 incorrect
- Rework.**
- $$\begin{array}{r} 382 \\ - 261 \\ \hline 121 \end{array}$$
 Check:
$$\begin{array}{r} 261 \\ + 121 \\ \hline 382 \end{array}$$
 correct
26.
$$\begin{array}{r} 754 \\ - 342 \\ \hline 412 \end{array}$$
 Check:
$$\begin{array}{r} 342 \\ + 412 \\ \hline 754 \end{array}$$
 correct
27.
$$\begin{array}{r} 4683 \\ - 3542 \\ \hline 1141 \end{array}$$
 Check:
$$\begin{array}{r} 3542 \\ + 1141 \\ \hline 4683 \end{array}$$
 correct
28.
$$\begin{array}{r} 5217 \\ - 4105 \\ \hline 1132 \end{array}$$
 Check:
$$\begin{array}{r} 1132 \\ + 4105 \\ \hline 5237 \end{array}$$
 incorrect
- Rework.**
- $$\begin{array}{r} 5217 \\ - 4105 \\ \hline 1112 \end{array}$$
 Check:
$$\begin{array}{r} 1112 \\ + 4105 \\ \hline 5217 \end{array}$$
 correct
29.
$$\begin{array}{r} 8643 \\ - 1421 \\ \hline 7212 \end{array}$$
 Check:
$$\begin{array}{r} 7212 \\ + 1421 \\ \hline 8633 \end{array}$$
 incorrect
- Rework.**
- $$\begin{array}{r} 8643 \\ - 1421 \\ \hline 7222 \end{array}$$
 Check:
$$\begin{array}{r} 7222 \\ + 1421 \\ \hline 8643 \end{array}$$
 correct
30.
$$\begin{array}{r} 9428 \\ - 3124 \\ \hline 6324 \end{array}$$
 Check:
$$\begin{array}{r} 6324 \\ + 3124 \\ \hline 9448 \end{array}$$
 incorrect
- Rework.**
- $$\begin{array}{r} 9428 \\ - 3124 \\ \hline 6304 \end{array}$$
 Check:
$$\begin{array}{r} 6304 \\ + 3124 \\ \hline 9428 \end{array}$$
 correct
31.
$$\begin{array}{r} 615 \\ 75 \\ - 37 \\ \hline 38 \end{array}$$
32.
$$\begin{array}{r} 716 \\ 86 \\ - 28 \\ \hline 58 \end{array}$$
33.
$$\begin{array}{r} 814 \\ 94 \\ - 49 \\ \hline 45 \end{array}$$

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$$\begin{array}{r} 34. \quad \begin{array}{r} 518 \\ \cancel{6}8 \\ - 39 \\ \hline 29 \end{array} \end{array}$$

$$\begin{array}{r} 35. \quad \begin{array}{r} 417 \\ \cancel{5}7 \\ - 38 \\ \hline 19 \end{array} \end{array}$$

$$\begin{array}{r} 36. \quad \begin{array}{r} 317 \\ \cancel{4}7 \\ - 29 \\ \hline 18 \end{array} \end{array}$$

$$\begin{array}{r} 37. \quad \begin{array}{r} 712 \\ \cancel{8}28 \\ - 547 \\ \hline 281 \end{array} \end{array}$$

$$\begin{array}{r} 38. \quad \begin{array}{r} 81016 \\ \cancel{9}1\cancel{0} \\ - 618 \\ \hline 298 \end{array} \end{array}$$

$$\begin{array}{r} 39. \quad \begin{array}{r} 611 \\ \cancel{7}7\cancel{1} \\ - 252 \\ \hline 519 \end{array} \end{array}$$

$$\begin{array}{r} 40. \quad \begin{array}{r} 81613 \\ \cancel{9}7\cancel{3} \\ - 788 \\ \hline 185 \end{array} \end{array}$$

$$\begin{array}{r} 41. \quad \begin{array}{r} 41218 \\ \cancel{7}5\cancel{3}8 \\ - 479 \\ \hline 7059 \end{array} \end{array}$$

$$\begin{array}{r} 42. \quad \begin{array}{r} 71513 \\ \cancel{5}8\cancel{6}3 \\ - 1295 \\ \hline 4568 \end{array} \end{array}$$

$$\begin{array}{r} 43. \quad \begin{array}{r} 81718 \\ \cancel{9}9\cancel{8}8 \\ - 2399 \\ \hline 7589 \end{array} \end{array}$$

$$\begin{array}{r} 44. \quad \begin{array}{r} 215616 \\ \cancel{3}5\cancel{7}6 \\ - 1658 \\ \hline 1918 \end{array} \end{array}$$

$$\begin{array}{r} 45. \quad \begin{array}{r} 217 \quad 121215 \\ \cancel{3}8, \cancel{3}3\cancel{5} \\ - 29,476 \\ \hline 8859 \end{array} \end{array}$$

$$\begin{array}{r} 46. \quad \begin{array}{r} 711 \quad 17211 \\ \cancel{8}2, \cancel{7}3\cancel{1} \\ - 14,826 \\ \hline 67,905 \end{array} \end{array}$$

$$\begin{array}{r} 47. \quad \begin{array}{r} 310 \\ \cancel{4}0 \\ - 37 \\ \hline 3 \end{array} \end{array}$$

$$\begin{array}{r} 48. \quad \begin{array}{r} 710 \\ \cancel{8}0 \\ - 73 \\ \hline 7 \end{array} \end{array}$$

$$\begin{array}{r} 49. \quad \begin{array}{r} 510 \\ \cancel{6}0 \\ - 37 \\ \hline 23 \end{array} \end{array}$$

$$\begin{array}{r} 50. \quad \begin{array}{r} 610 \\ \cancel{7}0 \\ - 27 \\ \hline 43 \end{array} \end{array}$$

$$\begin{array}{r} 51. \quad \begin{array}{r} 9 \\ 21018 \\ \cancel{3}08 \\ - 289 \\ \hline 19 \end{array} \end{array}$$

$$\begin{array}{r} 52. \quad \begin{array}{r} 9 \\ 51010 \\ \cancel{6}00 \\ - 599 \\ \hline 1 \end{array} \end{array}$$

$$\begin{array}{r} 53. \quad \begin{array}{r} 310 \quad 311 \\ \cancel{4}0 \quad \cancel{4}1 \\ - 1208 \\ \hline 2833 \end{array} \end{array}$$

$$\begin{array}{r} 54. \quad \begin{array}{r} 9 \\ 51012 \\ \cancel{4}602 \\ - 2063 \\ \hline 2539 \end{array} \end{array}$$

$$\begin{array}{r} 55. \quad \begin{array}{r} 81210 \\ \cancel{9}305 \\ - 1530 \\ \hline 7775 \end{array} \end{array}$$

$$\begin{array}{r} 56. \quad \begin{array}{r} 01110 \\ \cancel{7}120 \\ - 6033 \\ \hline 1087 \end{array} \end{array}$$

$$\begin{array}{r} 57. \quad \begin{array}{r} 710 \\ 1580 \\ - 1077 \\ \hline 503 \end{array} \end{array}$$

$$\begin{array}{r} 58. \quad \begin{array}{r} 210 \\ \cancel{3}068 \\ - 2105 \\ \hline 963 \end{array} \end{array}$$

$$\begin{array}{r} 9 \\ 1\cancel{0}10 \\ 59. \quad 2\cancel{0}\cancel{0}6 \\ - 1850 \\ \hline 156 \end{array}$$

$$\begin{array}{r} 9 \\ 711\cancel{10}13 \\ 60. \quad 8\cancel{2}\cancel{0}\cancel{3} \\ - 5365 \\ \hline 2838 \end{array}$$

$$\begin{array}{r} 11310 \\ 8\cancel{2}\cancel{4}\cancel{0} \\ 61. \quad - 6056 \\ \hline 2184 \end{array}$$

$$\begin{array}{r} 410 \\ 70\cancel{5}\cancel{0} \\ 62. \quad - 6045 \\ \hline 1005 \end{array}$$

$$\begin{array}{r} 9 \\ 714\cancel{10}13 \\ 63. \quad 8\cancel{5}\cancel{0}\cancel{3} \\ - 2816 \\ \hline 5687 \end{array}$$

$$\begin{array}{r} 99 \\ 5\cancel{10}\cancel{10}14 \\ 64. \quad 1\cancel{6},\cancel{0}\cancel{0}\cancel{4} \\ - 5087 \\ \hline 10,917 \end{array}$$

$$\begin{array}{r} 9 \\ 710\cancel{6}\cancel{10}15 \\ 65. \quad 8\cancel{0},\cancel{7}\cancel{0}\cancel{5} \\ - 61,667 \\ \hline 19,038 \end{array}$$

$$\begin{array}{r} 99 \\ 710\cancel{10}\cancel{10}10 \\ 66. \quad 8\cancel{1},\cancel{0}\cancel{0}\cancel{0} \\ - 55,456 \\ \hline 25,544 \end{array}$$

$$\begin{array}{r} 99 \\ 5\cancel{10}\cancel{10}10 \\ 67. \quad 6\cancel{6},\cancel{0}\cancel{0}\cancel{0} \\ - 34,444 \\ \hline 31,556 \end{array}$$

$$\begin{array}{r} 99 \\ 6\cancel{10}\cancel{10}10 \\ 68. \quad 7\cancel{7},\cancel{0}\cancel{0}\cancel{0} \\ - 65,308 \\ \hline 11,692 \end{array}$$

$$\begin{array}{r} 99 \\ 1\cancel{10}\cancel{10}1710 \\ 69. \quad 2\cancel{0},\cancel{0}\cancel{8}\cancel{0} \\ - 13,496 \\ \hline 6584 \end{array}$$

$$\begin{array}{r} 99 \\ 710\cancel{10}1416 \\ 70. \quad 8\cancel{0},\cancel{0}\cancel{5}\cancel{6} \\ - 23,869 \\ \hline 56,187 \end{array}$$

$$\begin{array}{r} 9428 \quad 4509 \\ - 4509 \quad + 4919 \\ \hline 4919 \quad 9428 \quad \text{correct} \end{array}$$

$$\begin{array}{r} 1671 \quad 1325 \\ - 1325 \quad + 1346 \\ \hline 1346 \quad 2671 \quad \text{incorrect} \end{array}$$

Rework.

$$\begin{array}{r} 611 \\ 16\cancel{7}\cancel{1} \quad 1325 \\ - 1325 \quad + 346 \\ \hline 346 \quad 1671 \quad \text{correct} \end{array}$$

$$\begin{array}{r} 2548 \quad 2278 \\ - 2278 \quad + 270 \\ \hline 270 \quad 2548 \quad \text{correct} \end{array}$$

$$\begin{array}{r} 5274 \quad 4144 \\ - 1130 \quad + 1130 \\ \hline 4144 \quad 5274 \quad \text{correct} \end{array}$$

$$\begin{array}{r} 93,758 \quad 52,869 \\ - 52,869 \quad + 40,889 \\ \hline 40,889 \quad 93,758 \quad \text{correct} \end{array}$$

$$\begin{array}{r} 82,357 \quad 68,961 \\ - 14,396 \quad + 14,396 \\ \hline 68,961 \quad 83,357 \quad \text{incorrect} \end{array}$$

Rework.

$$\begin{array}{r} 711\cancel{12}15 \\ 8\cancel{2},\cancel{3}\cancel{5}\cancel{7} \quad 67,961 \\ - 14,396 \quad + 14,396 \\ \hline 67,961 \quad 82,357 \quad \text{correct} \end{array}$$

$$\begin{array}{r} 36,778 \quad 19,373 \\ - 17,405 \quad + 17,405 \\ \hline 19,373 \quad 36,778 \quad \text{correct} \end{array}$$

$$\begin{array}{r} 34,821 \quad 17,735 \\ - 17,735 \quad + 17,735 \\ \hline 17,735 \quad 35,470 \quad \text{incorrect} \end{array}$$

Rework.

$$\begin{array}{r} 214\cancel{711}11 \\ 3\cancel{4},\cancel{8}\cancel{2}\cancel{1} \quad 17,086 \\ - 17,735 \quad + 17,735 \\ \hline 17,086 \quad 34,821 \quad \text{correct} \end{array}$$

79. Possible answers are:

$3 + 2 = 5$ could be changed to $5 - 2 = 3$ or
 $5 - 3 = 2$.

$6 - 4 = 2$ could be changed to $2 + 4 = 6$ or
 $4 + 2 = 6$.

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80. No, you cannot. Numbers must be subtracted in the order given. The difference found in subtracting is the result of subtracting the subtrahend from the minuend. Changing the order of the minuend and subtrahend *does* change the answer.

$$\begin{array}{r} 187 \text{ calories man burns} \\ - 140 \text{ calories woman burns} \\ \hline 47 \text{ fewer calories woman burned} \end{array}$$

A woman burns 47 fewer calories.

$$\begin{array}{r} 403 \text{ calories man burns} \\ - 302 \text{ calories woman burns} \\ \hline 101 \text{ more calories man burned} \end{array}$$

A man burns 101 more calories.

$$\begin{array}{r} 1821 \text{ height of CN Tower} \\ - 1454 \text{ height of Sears Tower} \\ \hline 367 \text{ difference in heights} \end{array}$$

There is a difference in height of 367 feet.

$$\begin{array}{r} 580 \text{ Boeing 747} \\ - 217 \text{ peregrine falcon} \\ \hline 363 \text{ difference} \end{array}$$

The plane travels 363 miles per hour faster than the falcon.

$$\begin{array}{r} 1815 \text{ passengers on the ship} \\ - 1348 \text{ passengers who go ashore} \\ \hline 467 \text{ passengers who remain on the ship} \end{array}$$

467 passengers are left on the ship.

86. The Ford Explorers had greater sales.

$$\begin{array}{r} 81,465 \text{ Ford Explorers} \\ - 70,449 \text{ Jeep Grand Cherokees} \\ \hline 11,016 \end{array}$$

There were 11,016 more Ford Explorers sold.

$$\begin{array}{r} 6970 \text{ jobs six years ago} \\ - 3700 \text{ jobs that remain} \\ \hline 3270 \text{ jobs eliminated} \end{array}$$

There were 3270 jobs eliminated.

$$\begin{array}{r} \$33,065 \text{ price of 2009 Ford Mustang} \\ - 2,500 \text{ price of 1964 Ford Mustang} \\ \hline \$30,565 \text{ increase in price} \end{array}$$

$$\begin{array}{r} 14,608 \text{ flags manufactured} \\ - 5,069 \text{ flags sold} \\ \hline 9,539 \text{ flags remaining} \end{array}$$

There are 9539 flags that remain.

$$\begin{array}{r} 23,156 \text{ total students} \\ - 14,679 \text{ students with eye exams} \\ \hline 8,477 \text{ students without eye exams} \end{array}$$

In the district, 8477 students have not received eye exams.

$$\begin{array}{r} \$913 \text{ monthly housing expense} \\ - 650 \text{ monthly rent} \\ \hline \$263 \text{ increase in monthly housing expense} \end{array}$$

They will pay \$263 more per month if they buy a house.

$$\begin{array}{r} \$1568 \text{ new amount} \\ - 1479 \text{ old amount} \\ \hline \$89 \text{ difference} \end{array}$$

The monthly increase is \$89.

93. More people visited the park on Tuesday.

$$\begin{array}{r} 12,352 \text{ visitors to the park on Tuesday} \\ - 11,594 \text{ visitors to the park on Monday} \\ \hline 758 \text{ more visitors on Tuesday} \end{array}$$

There were 758 more visitors on Tuesday.

$$\begin{array}{r} 2,820,000 \text{ nurses needed in 2020} \\ - 1,810,000 \text{ nurses will be available} \\ \hline 1,010,000 \text{ difference} \end{array}$$

Based on these predictions, the shortage in the number of nurses will be 1,010,000.

95. Rewrite one hundred one thousand, five hundred dollars using digits.

$$\begin{array}{r} \$101,500 \text{ salary of a general manager} \\ - 44,000 \text{ salary of a director} \\ \hline \$57,500 \text{ difference in salaries} \end{array}$$

A general manager's average salary is \$57,500 more than a director's.

$$\begin{array}{r} 555,800 \text{ knee surgeries this year} \\ - 328,900 \text{ knee surgeries six years ago} \\ \hline 226,900 \text{ difference} \end{array}$$

There were 226,900 more knee surgeries this year than six years ago.

$$\begin{array}{r} 560 \text{ calories in a Big Mac} \\ - 230 \text{ calories in a 6-inch Veggie Delite} \\ \hline 330 \text{ fewer calories in the Veggie Delite} \end{array}$$

$$\begin{array}{r} 30 \text{ grams of fat in a Big Mac} \\ - 3 \text{ grams of fat in a 6-inch Veggie Delite} \\ \hline 27 \text{ fewer grams of fat in the Veggie Delite} \end{array}$$

98.
$$\begin{array}{r} 670 \text{ calories in a Whopper} \\ - 290 \text{ calories in a 6" Turkey Breast \& Ham} \\ \hline 380 \text{ fewer calories in the Turkey \& Ham} \end{array}$$
- $$\begin{array}{r} 39 \text{ grams of fat in a Whopper} \\ - 5 \text{ grams of fat in a 6" Turkey Breast \& Ham} \\ \hline 34 \text{ fewer grams of fat in the Turkey \& Ham} \end{array}$$
99.
$$\begin{array}{r} 330 \text{ calories in Roasted Chicken Breast} \\ 5 \text{ calories in 2 tsp. of mustard} \\ + 45 \text{ calories in 1 tsp. of olive oil} \\ \hline 380 \text{ total calories} \end{array}$$
- $$\begin{array}{r} 5 \text{ grams of fat in Roasted Chicken Breast} \\ 0 \text{ grams of fat in 2 tsp. of mustard} \\ + 5 \text{ grams of fat in 1 tsp. of olive oil} \\ \hline 10 \text{ total grams of fat} \end{array}$$
100. The sandwich with the least calories is the Veggie Delite and the sandwich with the most calories is the Sweet Onion Chicken Teriyaki.
- $$\begin{array}{r} 230 \text{ calories in Veggie Delite} \\ + 370 \text{ calories in Sweet Onion Ch. Teriyaki} \\ \hline 600 \text{ total calories} \end{array}$$
- $$\begin{array}{r} 3 \text{ grams of fat in Veggie Delite} \\ + 5 \text{ grams of fat in Sweet Onion Ch. Teriyaki} \\ \hline 8 \text{ total grams of fat} \end{array}$$

1.4 Multiplying Whole Numbers

1.4 Margin Exercises

1. (a)
$$\begin{array}{r} 8 \text{ factor} \\ \times 5 \text{ factor} \\ \hline 40 \text{ product} \end{array}$$
- (b)
$$\begin{array}{r} 6 \text{ factor} \\ \times 4 \text{ factor} \\ \hline 24 \text{ product} \end{array}$$
- (c)
$$\begin{array}{r} 7 \text{ factor} \\ \times 6 \text{ factor} \\ \hline 42 \text{ product} \end{array}$$
- (d)
$$\begin{array}{r} 3 \text{ factor} \\ \times 9 \text{ factor} \\ \hline 27 \text{ product} \end{array}$$
2. (a) $7 \times 4 = 28$
- (b) $0 \times 9 = 0$
- (c) $8(5) = 40$
- (d) $6 \cdot 5 = 30$
- (e) $(3)(8) = 24$

3. (a) $3 \times 2 \times 5 = (3 \times 2) \times 5 = 6 \times 5 = 30$
- (b) $4 \cdot 7 \cdot 1 = (4 \cdot 7) \cdot 1 = 28 \cdot 1 = 28$
- (c) $(8)(3)(0) = 24(0) = 0$

4. (a)
$$\begin{array}{r} 1 \\ 53 \\ \times 5 \\ \hline 265 \end{array}$$

(b)
$$\begin{array}{r} 79 \\ \times 0 \\ \hline 0 \end{array}$$

(c)
$$\begin{array}{r} 46 \\ 758 \\ \times 8 \\ \hline 6064 \end{array}$$

(d)
$$\begin{array}{r} 52 \\ 2831 \\ \times 7 \\ \hline 19,817 \end{array}$$

(e)
$$\begin{array}{r} 513 \\ 4714 \\ \times 8 \\ \hline 37,712 \end{array}$$

5. (a) $63 \times 10 = 630$ Attach 0.
- (b) $305 \times 100 = 30,500$ Attach 00.
- (c) $714 \times 1000 = 714,000$ Attach 000.

6. (a) 16×50

$$\begin{array}{r} 16 \\ \times 5 \\ \hline 80 \end{array} \quad 16 \times 50 = 800 \text{ Attach 0.}$$

- (b) 73×400

$$\begin{array}{r} 73 \\ \times 4 \\ \hline 292 \end{array} \quad 73 \times 400 = 29,200 \text{ Attach 00.}$$

- (c) 180×30

$$\begin{array}{r} 18 \\ \times 3 \\ \hline 54 \end{array} \quad 180 \times 30 = 5400 \text{ Attach 00.}$$

- (d) 4200×80

$$\begin{array}{r} 42 \\ \times 8 \\ \hline 336 \end{array} \quad 4200 \times 80 = 336,000 \text{ Attach 000.}$$

- (e) 800×600

$$\begin{array}{r} 8 \\ \times 6 \\ \hline 48 \end{array} \quad 800 \times 600 = 480,000 \text{ Attach 0000.}$$

$$\begin{array}{r}
 7. \quad (a) \quad \begin{array}{r} 35 \\ \times 54 \\ \hline 140 \\ 175 \text{ Add} \\ \hline 1890 \end{array}
 \end{array}$$

$$\begin{array}{r}
 (b) \quad \begin{array}{r} 76 \\ \times 49 \\ \hline 684 \\ 304 \text{ Add} \\ \hline 3724 \end{array}
 \end{array}$$

$$\begin{array}{r}
 8. \quad (a) \quad \begin{array}{r} 52 \\ \times 16 \\ \hline 312 \leftarrow 6 \times 52 \\ 52 \leftarrow 1 \times 52 \\ \hline 832 \end{array}
 \end{array}$$

$$\begin{array}{r}
 (b) \quad \begin{array}{r} 81 \\ \times 49 \\ \hline 729 \leftarrow 9 \times 81 \\ 324 \leftarrow 4 \times 81 \\ \hline 3969 \end{array}
 \end{array}$$

$$\begin{array}{r}
 (c) \quad \begin{array}{r} 75 \\ \times 63 \\ \hline 225 \leftarrow 3 \times 75 \\ 450 \leftarrow 6 \times 75 \\ \hline 4725 \end{array}
 \end{array}$$

$$\begin{array}{r}
 (d) \quad \begin{array}{r} 234 \\ \times 73 \\ \hline 702 \leftarrow 3 \times 234 \\ 1638 \leftarrow 7 \times 234 \\ \hline 17,082 \end{array}
 \end{array}$$

$$\begin{array}{r}
 (e) \quad \begin{array}{r} 835 \\ \times 189 \\ \hline 7515 \leftarrow 9 \times 835 \\ 6680 \leftarrow 8 \times 835 \\ 835 \leftarrow 1 \times 835 \\ \hline 157,815 \end{array}
 \end{array}$$

$$\begin{array}{r}
 9. \quad (a) \quad \begin{array}{r} 28 \\ \times 60 \\ \hline 1680 \end{array}
 \end{array}$$

$$\begin{array}{r}
 (b) \quad \begin{array}{r} 728 \\ \times 50 \\ \hline 36,400 \end{array}
 \end{array}$$

$$\begin{array}{r}
 (c) \quad \begin{array}{r} 562 \\ \times 109 \\ \hline 5058 \\ 5620 \quad 1 \times 562 = 562 \text{ Insert 0} \\ \hline 61,258 \end{array}
 \end{array}$$

$$\begin{array}{r}
 (d) \quad \begin{array}{r} 3526 \\ \times 6002 \\ \hline 7052 \\ 2115600 \quad 6 \times 3526 = 21,156 \text{ Insert 00} \\ \hline 21,163,052 \end{array}
 \end{array}$$

$$\begin{array}{r}
 10. \quad (a) \quad \begin{array}{r} 289 \\ \times 12 \\ \hline 578 \\ 289 \\ \hline 3468 \end{array}
 \end{array}$$

The total cost of 289 redwood planters is \$3468.

$$\begin{array}{r}
 (b) \quad \begin{array}{r} 129 \\ \times 58 \\ \hline 1032 \\ 645 \\ \hline 7482 \end{array}
 \end{array}$$

The total cost of 58 compound miter saws is \$7482.

$$\begin{array}{r}
 (c) \quad \begin{array}{r} 28,300 \\ \times 12 \\ \hline 56600 \\ 28300 \\ \hline 339,600 \end{array}
 \end{array}$$

The total cost of 12 delivery vans is \$339,600.

1.4 Section Exercises

$$1. \quad \begin{array}{l} 2 \times 6 \times 2 = (2 \times 6) \times 2 = 12 \times 2 = 24 \\ \text{or } 2 \times (6 \times 2) = 2 \times 12 = 24. \end{array}$$

$$2. \quad \begin{array}{l} 3 \times 5 \times 3 = (3 \times 5) \times 3 = 15 \times 3 = 45 \\ \text{or } 3 \times (5 \times 3) = 3 \times 15 = 45. \end{array}$$

$$3. \quad \begin{array}{l} 8 \times 6 \times 1 = (8 \times 6) \times 1 = 48 \times 1 = 48 \\ \text{or } 8 \times (6 \times 1) = 8 \times 6 = 48. \end{array}$$

$$4. \quad \begin{array}{l} 2 \times 4 \times 5 = (2 \times 4) \times 5 = 8 \times 5 = 40 \\ \text{or } 2 \times (4 \times 5) = 2 \times 20 = 40. \end{array}$$

$$5. \quad \begin{array}{l} 7 \cdot 8 \cdot 0 = (7 \cdot 8) \cdot 0 = 56 \cdot 0 = 0 \\ \text{or } 7 \cdot (8 \cdot 0) = 7 \cdot 0 = 0. \end{array}$$

The product of any number and 0 is 0.

$$6. \quad \begin{array}{l} 9 \cdot 0 \cdot 5 = (9 \cdot 0) \cdot 5 = 0 \cdot 5 = 0 \\ \text{or } 9 \cdot (0 \cdot 5) = 9 \cdot 0 = 0. \end{array}$$

The product of any number and 0 is 0.

7. $4 \cdot 1 \cdot 6 = (4 \cdot 1) \cdot 6 = 4 \cdot 6 = 24$
or $4 \cdot (1 \cdot 6) = 4 \cdot 6 = 24.$

8. $1 \cdot 5 \cdot 7 = (1 \cdot 5) \cdot 7 = 5 \cdot 7 = 35$
or $1 \cdot (5 \cdot 7) = 1 \cdot 35 = 35.$

9. $(4)(5)(2) = [(4)(5)](2) = 20(2) = 40$
or $(4)[(5)(2)] = (4)(10) = 40.$

10. $(4)(1)(9) = [(4)(1)](9) = 4(9) = 36$
or $(4)[(1)(9)] = (4)(9) = 36.$

11. $(3)(0)(7) = [(3)(0)](7) = 0(7) = 0$
or $(3)[(0)(7)] = (3)(0) = 0.$

The product of any number and 0 is 0.

12. $(0)(9)(4) = [(0)(9)](4) = 0(4) = 0$
or $(0)[(9)(4)] = (0)(36) = 0.$

The product of any number and 0 is 0.

13. Factors may be multiplied in any order to get the same answer. The commutative properties of addition and multiplication are similar since with either you may add or multiply numbers in any order.

14. You may shift the parentheses in a multiplication problem. Just as in addition, the different grouping results in the same answer.

15.
$$\begin{array}{r} 3 \\ 35 \\ \times 6 \\ \hline 210 \end{array}$$

$6 \cdot 5 = 30$ Write 0, carry 3 tens.

$6 \cdot 3 = 18$ Add 3 to get 21. Write 21.

16.
$$\begin{array}{r} 2 \\ 53 \\ \times 7 \\ \hline 371 \end{array}$$

$7 \cdot 3 = 21$ Write 1, carry 2 tens.

$7 \cdot 5 = 35$ Add 2 to get 37. Write 37.

17.
$$\begin{array}{r} 2 \\ 34 \\ \times 7 \\ \hline 238 \end{array}$$

$7 \cdot 4 = 28$ Write 8, carry 2 tens.

$7 \cdot 3 = 21$ Add 2 to get 23. Write 23.

18.
$$\begin{array}{r} 3 \\ 76 \\ \times 5 \\ \hline 380 \end{array}$$

$5 \cdot 6 = 30$ Write 0, carry 3 tens.

$5 \cdot 7 = 35$ Add 3 to get 38. Write 38.

19.
$$\begin{array}{r} 21 \\ 642 \\ \times 5 \\ \hline 3210 \end{array}$$

$5 \cdot 2 = 10$ Write 0, carry 1 ten.

$5 \cdot 4 = 20$ Add 1 to get 21. Write 1, carry 2.

$5 \cdot 6 = 30$ Add 2 to get 32. Write 32.

20.
$$\begin{array}{r} 2 \\ 472 \\ \times 4 \\ \hline 1888 \end{array}$$

$4 \cdot 2 = 8$ Write 8.

$4 \cdot 7 = 28$ Write 8, carry 2.

$4 \cdot 4 = 16$ Add 2 to get 18. Write 18.

21.
$$\begin{array}{r} 1 \\ 624 \\ \times 3 \\ \hline 1872 \end{array}$$

$3 \cdot 4 = 12$ Write 2, carry 1 ten.

$3 \cdot 2 = 6$ Add 1 to get 7. Write 7.

$3 \cdot 6 = 18$ Write 18.

22.
$$\begin{array}{r} 31 \\ 852 \\ \times 7 \\ \hline 5964 \end{array}$$

$7 \cdot 2 = 14$ Write 4, carry 1 ten.

$7 \cdot 5 = 35$ Add 1 to get 36. Write 6, carry 3.

$7 \cdot 8 = 56$ Add 3 to get 59. Write 59.

23.
$$\begin{array}{r} 21 \\ 2153 \\ \times 4 \\ \hline 8612 \end{array}$$

$4 \cdot 3 = 12$ Write 2, carry 1 ten.

$4 \cdot 5 = 20$ Add 1 to get 21. Write 1, carry 2.

$4 \cdot 1 = 4$ Add 2 to get 6. Write 6.

$4 \cdot 2 = 8$ Write 8.

24.
$$\begin{array}{r} 12 \\ 1137 \\ \times 3 \\ \hline 3411 \end{array}$$

$3 \cdot 7 = 21$ Write 1, carry 2 tens.

$3 \cdot 3 = 9$ Add 2 to get 11. Write 1, carry 1.

$3 \cdot 1 = 3$ Add 1 to get 4. Write 4.

$3 \cdot 1 = 3$ Write 3.

25.
$$\begin{array}{r} 2 \\ 2521 \\ \times 4 \\ \hline 10,084 \end{array}$$

continued

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- $4 \cdot 1 = 4$ Write 4.
 $4 \cdot 2 = 8$ Write 8.
 $4 \cdot 5 = 20$ Write 0, carry 2.
 $4 \cdot 2 = 8$ Add 2 to get 10. Write 10.

26.
$$\begin{array}{r} 111 \\ 2544 \\ \times 3 \\ \hline 7632 \end{array}$$

- $3 \cdot 4 = 12$ Write 2, carry 1 ten.
 $3 \cdot 4 = 12$ Add 1 to get 13. Write 3, carry 1.
 $3 \cdot 5 = 15$ Add 1 to get 16. Write 6, carry 1.
 $3 \cdot 2 = 6$ Add 1 to get 7. Write 7.

27.
$$\begin{array}{r} 44 \\ 2561 \\ \times 8 \\ \hline 20,488 \end{array}$$

- $8 \cdot 1 = 8$ Write 8.
 $8 \cdot 6 = 48$ Write 8, carry 4.
 $8 \cdot 5 = 40$ Add 4 to get 44. Write 4, carry 4.
 $8 \cdot 2 = 16$ Add 4 to get 20. Write 20.

28.
$$\begin{array}{r} 113 \\ 7326 \\ \times 5 \\ \hline 36,630 \end{array}$$

- $5 \cdot 6 = 30$ Write 0, carry 3 tens.
 $5 \cdot 2 = 10$ Add 3 to get 13. Write 3, carry 1.
 $5 \cdot 3 = 15$ Add 1 to get 16. Write 6, carry 1.
 $5 \cdot 7 = 35$ Add 1 to get 36. Write 36.

29.
$$\begin{array}{r} 461 \\ 36,921 \\ \times 7 \\ \hline 258,447 \end{array}$$

- $7 \cdot 1 = 7$ Write 7.
 $7 \cdot 2 = 14$ Write 4, carry 1.
 $7 \cdot 9 = 63$ Add 1 to get 64. Write 4, carry 6.
 $7 \cdot 6 = 42$ Add 6 to get 48. Write 8, carry 4.
 $7 \cdot 3 = 21$ Add 4 to get 25. Write 25.

30.
$$\begin{array}{r} 32 \\ 28,116 \\ \times 4 \\ \hline 112,464 \end{array}$$

- $4 \cdot 6 = 24$ Write 4, carry 2 tens.
 $4 \cdot 1 = 4$ Add 2 to get 6. Write 6.
 $4 \cdot 1 = 4$ Write 4.
 $4 \cdot 8 = 32$ Write 2, carry 3.
 $4 \cdot 2 = 8$ Add 3 to get 11. Write 11.

31.
$$\begin{array}{r} 40 \quad 4 \quad 40 \\ \times 7 \quad \times 7 \quad \times 7 \\ \hline 28 \quad 280 \end{array} \text{ Attach 0.}$$

32.
$$\begin{array}{r} 20 \quad 2 \quad 20 \\ \times 7 \quad \times 7 \quad \times 7 \\ \hline 14 \quad 140 \end{array} \text{ Attach 0.}$$

33.
$$\begin{array}{r} 80 \quad 8 \quad 80 \\ \times 6 \quad \times 6 \quad \times 6 \\ \hline 48 \quad 480 \end{array} \text{ Attach 0.}$$

34.
$$\begin{array}{r} 70 \quad 7 \quad 70 \\ \times 5 \quad \times 5 \quad \times 5 \\ \hline 35 \quad 350 \end{array} \text{ Attach 0.}$$

35.
$$\begin{array}{r} 740 \quad 74 \quad 740 \\ \times 3 \quad \times 3 \quad \times 3 \\ \hline 222 \quad 2220 \end{array} \text{ Attach 0.}$$

36.
$$\begin{array}{r} 400 \quad 4 \quad 400 \\ \times 8 \quad \times 8 \quad \times 8 \\ \hline 32 \quad 3200 \end{array} \text{ Attach 00.}$$

37.
$$\begin{array}{r} 600 \quad 6 \quad 600 \\ \times 6 \quad \times 6 \quad \times 6 \\ \hline 36 \quad 3600 \end{array} \text{ Attach 00.}$$

38.
$$\begin{array}{r} 860 \quad 86 \quad 860 \\ \times 7 \quad \times 7 \quad \times 7 \\ \hline 602 \quad 6020 \end{array} \text{ Attach 0.}$$

39.
$$\begin{array}{r} 125 \quad 125 \quad 125 \\ \times 30 \quad \times 3 \quad \times 30 \\ \hline 375 \quad 3750 \end{array} \text{ Attach 0.}$$

40.
$$\begin{array}{r} 246 \quad 246 \quad 246 \\ \times 50 \quad \times 5 \quad \times 50 \\ \hline 1230 \quad 12,300 \end{array} \text{ Attach 0.}$$

41.
$$\begin{array}{r} 1635 \quad 1635 \quad 1635 \\ \times 40 \quad \times 4 \quad \times 40 \\ \hline 6540 \quad 65,400 \end{array} \text{ Attach 0.}$$

42.
$$\begin{array}{r} 7311 \quad 7311 \quad 7311 \\ \times 50 \quad \times 5 \quad \times 50 \\ \hline 36,555 \quad 365,550 \end{array} \text{ Attach 0.}$$

43.
$$\begin{array}{r} 900 \quad 9 \quad 900 \\ \times 300 \quad \times 3 \quad \times 300 \\ \hline 27 \quad 270,000 \end{array} \text{ Attach 0000.}$$

44.
$$\begin{array}{r} 400 \quad 4 \quad 400 \\ \times 700 \quad \times 7 \quad \times 700 \\ \hline 28 \quad 280,000 \end{array} \text{ Attach 0000.}$$

45.
$$\begin{array}{r} 43,000 \quad 43 \quad 43,000 \\ \times 2000 \quad \times 2 \quad \times 2000 \\ \hline 86 \quad 86,000,000 \end{array} \text{ Attach 000000.}$$

46.
$$\begin{array}{r} 11,000 \quad 11 \quad 11,000 \\ \times 9000 \quad \times 9 \quad \times 9000 \\ \hline 99 \quad 99,000,000 \end{array} \text{ Attach 000000.}$$

$$\begin{array}{r} 47. \quad 970 \cdot 50 \quad 97 \\ \quad \times 5 \\ \hline \quad 485 \end{array}$$

$$970 \cdot 50 = 48,500 \quad \text{Attach } 00.$$

$$\begin{array}{r} 48. \quad 730 \cdot 40 \quad 73 \\ \quad \times 4 \\ \hline \quad 292 \end{array}$$

$$730 \cdot 40 = 29,200 \quad \text{Attach } 00.$$

$$\begin{array}{r} 49. \quad 800 \cdot 900 \quad 8 \\ \quad \times 9 \\ \hline \quad 72 \end{array}$$

$$800 \cdot 900 = 720,000 \quad \text{Attach } 0000.$$

$$\begin{array}{r} 50. \quad 850 \cdot 700 \quad 85 \\ \quad \times 7 \\ \hline \quad 595 \end{array}$$

$$850 \cdot 700 = 595,000 \quad \text{Attach } 000.$$

$$\begin{array}{r} 51. \quad 9700 \cdot 200 \quad 97 \\ \quad \times 2 \\ \hline \quad 194 \end{array}$$

$$9700 \cdot 200 = 1,940,000 \quad \text{Attach } 0000.$$

$$\begin{array}{r} 52. \quad 10,050 \cdot 300 \quad 1005 \\ \quad \times 3 \\ \hline \quad 3015 \end{array}$$

$$10,050 \cdot 300 = 3,015,000 \quad \text{Attach } 000.$$

$$\begin{array}{r} 53. \quad 28 \\ \times 17 \\ \hline 196 \leftarrow 7 \times 28 \\ 28 \leftarrow 1 \times 28 \\ \hline 476 \end{array}$$

$$\begin{array}{r} 54. \quad 16 \\ \times 34 \\ \hline 64 \leftarrow 4 \times 16 \\ 48 \leftarrow 3 \times 16 \\ \hline 544 \end{array}$$

$$\begin{array}{r} 55. \quad 75 \\ \times 32 \\ \hline 150 \leftarrow 2 \times 75 \\ 225 \leftarrow 3 \times 75 \\ \hline 2400 \end{array}$$

$$\begin{array}{r} 56. \quad 82 \\ \times 32 \\ \hline 164 \leftarrow 2 \times 82 \\ 246 \leftarrow 3 \times 82 \\ \hline 2624 \end{array}$$

$$\begin{array}{r} 57. \quad 83 \\ \times 45 \\ \hline 415 \leftarrow 5 \times 83 \\ 332 \leftarrow 4 \times 83 \\ \hline 3735 \end{array}$$

$$\begin{array}{r} 58. \quad (75)(21) \quad 75 \\ \quad \times 21 \\ \hline 75 \leftarrow 1 \times 75 \\ 150 \leftarrow 2 \times 75 \\ \hline 1575 \end{array}$$

$$\begin{array}{r} 59. \quad (58)(41) \quad 58 \\ \quad \times 41 \\ \hline 58 \leftarrow 1 \times 58 \\ 232 \leftarrow 4 \times 58 \\ \hline 2378 \end{array}$$

$$\begin{array}{r} 60. \quad (82)(67) \quad 82 \\ \quad \times 67 \\ \hline 574 \leftarrow 7 \times 82 \\ 492 \leftarrow 6 \times 82 \\ \hline 5494 \end{array}$$

$$\begin{array}{r} 61. \quad (67)(92) \quad 67 \\ \quad \times 92 \\ \hline 134 \leftarrow 2 \times 67 \\ 603 \leftarrow 9 \times 67 \\ \hline 6164 \end{array}$$

$$\begin{array}{r} 62. \quad (26)(33) \quad 26 \\ \quad \times 33 \\ \hline 78 \leftarrow 3 \times 26 \\ 78 \leftarrow 3 \times 26 \\ \hline 858 \end{array}$$

$$\begin{array}{r} 63. \quad (28)(564) \quad 564 \\ \quad \times 28 \\ \hline 4512 \leftarrow 8 \times 564 \\ 1128 \leftarrow 2 \times 564 \\ \hline 15,792 \end{array}$$

$$\begin{array}{r} 64. \quad (58)(312) \quad 312 \\ \quad \times 58 \\ \hline 2496 \leftarrow 8 \times 312 \\ 1560 \leftarrow 5 \times 312 \\ \hline 18,096 \end{array}$$

$$\begin{array}{r} 65. \quad (619)(35) \quad 619 \\ \quad \times 35 \\ \hline 3095 \leftarrow 5 \times 619 \\ 1857 \leftarrow 3 \times 619 \\ \hline 21,665 \end{array}$$

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$$\begin{array}{r}
 66. \quad (681)(47) \quad \begin{array}{r} 681 \\ \times 47 \\ \hline 4767 \\ 2724 \\ \hline 32,007 \end{array} \begin{array}{l} \leftarrow 7 \times 681 \\ \leftarrow 4 \times 681 \end{array}
 \end{array}$$

$$\begin{array}{r}
 67. \quad (55)(286) \quad \begin{array}{r} 286 \\ \times 55 \\ \hline 1430 \\ 1430 \\ \hline 15,730 \end{array} \begin{array}{l} \leftarrow 5 \times 286 \\ \leftarrow 5 \times 286 \end{array}
 \end{array}$$

$$\begin{array}{r}
 68. \quad \begin{array}{r} 286 \\ \times 574 \\ \hline 1144 \\ 2002 \\ 1430 \\ \hline 164,164 \end{array} \begin{array}{l} \leftarrow 4 \times 286 \\ \leftarrow 7 \times 286 \\ \leftarrow 5 \times 286 \end{array}
 \end{array}$$

$$\begin{array}{r}
 69. \quad \begin{array}{r} 735 \\ \times 112 \\ \hline 1470 \\ 735 \\ 735 \\ \hline 82,320 \end{array} \begin{array}{l} \leftarrow 2 \times 735 \\ \leftarrow 1 \times 735 \\ \leftarrow 1 \times 735 \end{array}
 \end{array}$$

$$\begin{array}{r}
 70. \quad \begin{array}{r} 621 \\ \times 415 \\ \hline 3105 \\ 621 \\ 2484 \\ \hline 257,715 \end{array} \begin{array}{l} \leftarrow 5 \times 621 \\ \leftarrow 1 \times 621 \\ \leftarrow 4 \times 621 \end{array}
 \end{array}$$

$$\begin{array}{r}
 71. \quad \begin{array}{r} 538 \\ \times 342 \\ \hline 1076 \\ 2152 \\ 1614 \\ \hline 183,996 \end{array} \begin{array}{l} \leftarrow 2 \times 538 \\ \leftarrow 4 \times 538 \\ \leftarrow 3 \times 538 \end{array}
 \end{array}$$

$$\begin{array}{r}
 72. \quad \begin{array}{r} 3228 \\ \times 751 \\ \hline 3228 \\ 16140 \\ 22596 \\ \hline 2,424,228 \end{array} \begin{array}{l} \leftarrow 1 \times 3228 \\ \leftarrow 5 \times 3228 \\ \leftarrow 7 \times 3228 \end{array}
 \end{array}$$

$$\begin{array}{r}
 73. \quad \begin{array}{r} 9352 \\ \times 264 \\ \hline 37408 \\ 56112 \\ 18704 \\ \hline 2,468,928 \end{array} \begin{array}{l} \leftarrow 4 \times 9352 \\ \leftarrow 6 \times 9352 \\ \leftarrow 2 \times 9352 \end{array}
 \end{array}$$

$$\begin{array}{r}
 74. \quad \begin{array}{r} 528 \\ \times 106 \\ \hline 3168 \\ 5280 \\ \hline 55,968 \end{array} \begin{array}{l} \leftarrow 6 \times 528 \\ \leftarrow 10 \times 528 \end{array}
 \end{array}$$

$$\begin{array}{r}
 75. \quad \begin{array}{r} 215 \\ \times 307 \\ \hline 1505 \\ 6450 \\ \hline 66,005 \end{array} \begin{array}{l} \leftarrow 7 \times 215 \\ \leftarrow 30 \times 215 \end{array}
 \end{array}$$

$$\begin{array}{r}
 76. \quad \begin{array}{r} 218 \\ \times 106 \\ \hline 1308 \\ 2180 \\ \hline 23,108 \end{array} \begin{array}{l} \leftarrow 6 \times 218 \\ \leftarrow 10 \times 218 \end{array}
 \end{array}$$

$$\begin{array}{r}
 77. \quad \begin{array}{r} 428 \\ \times 201 \\ \hline 428 \\ 8560 \\ \hline 86,028 \end{array} \begin{array}{l} \leftarrow 1 \times 428 \\ \leftarrow 20 \times 428 \end{array}
 \end{array}$$

$$\begin{array}{r}
 78. \quad \begin{array}{r} 3706 \\ \times 208 \\ \hline 29648 \\ 74120 \\ \hline 770,848 \end{array} \begin{array}{l} \leftarrow 8 \times 3706 \\ \leftarrow 20 \times 3706 \end{array}
 \end{array}$$

$$\begin{array}{r}
 79. \quad \begin{array}{r} 6310 \\ \times 3078 \\ \hline 50480 \\ 44170 \\ 189300 \\ \hline 19,422,180 \end{array} \begin{array}{l} \leftarrow 8 \times 6310 \\ \leftarrow 7 \times 6310 \\ \leftarrow 30 \times 6310 \end{array}
 \end{array}$$

$$\begin{array}{r}
 80. \quad \begin{array}{r} 3533 \\ \times 5001 \\ \hline 3533 \\ 1766500 \\ \hline 17,668,533 \end{array} \begin{array}{l} \leftarrow 1 \times 3533 \\ \leftarrow 500 \times 3533 \end{array}
 \end{array}$$

$$\begin{array}{r}
 81. \quad \begin{array}{r} 2195 \\ \times 1038 \\ \hline 17560 \\ 6585 \\ 21950 \\ \hline 2,278,410 \end{array} \begin{array}{l} \leftarrow 8 \times 2195 \\ \leftarrow 3 \times 2195 \\ \leftarrow 10 \times 2195 \end{array}
 \end{array}$$

$$\begin{array}{r}
 82. \quad 1502 \\
 \times 2009 \\
 \hline
 13518 \leftarrow 9 \times 1502 \\
 300400 \leftarrow 200 \times 1502 \\
 \hline
 3,017,518
 \end{array}$$

83. To multiply by 10, 100, or 1000, just add one, two, or three zeros, respectively, to the number you are multiplying and that's your answer.

$$\begin{array}{r}
 84. \quad 291 \quad 291 \\
 \times 307 \quad \times 307 \\
 \hline
 2037 \quad 2037 \\
 000 \quad 8730 \\
 873 \quad 89,337 \\
 \hline
 89,337
 \end{array}$$

$$\begin{array}{r}
 85. \quad 300 \text{ cartons} \\
 \times 10 \text{ balls per carton} \\
 \hline
 3000 \text{ balls}
 \end{array}$$

3000 balls were purchased.

$$\begin{array}{r}
 86. \quad 500 \text{ tablets per bottle} \\
 \times 30 \text{ bottles} \\
 \hline
 15,000 \text{ tablets}
 \end{array}$$

15,000 tablets are in the medical supply house.

$$\begin{array}{r}
 87. \quad 36 \text{ eggs per carton} \\
 \times 15 \text{ cartons} \\
 \hline
 180 \\
 36 \\
 \hline
 540 \text{ eggs}
 \end{array}$$

540 eggs were purchased.

$$\begin{array}{r}
 88. \quad 65 \text{ times per second} \\
 \times 30 \text{ seconds} \\
 \hline
 1950 \text{ times}
 \end{array}$$

The hummingbird's wings beat 1950 times in 30 seconds.

$$\begin{array}{r}
 89. \quad 365 \text{ days per year} \\
 \times 66 \text{ gallons per day} \\
 \hline
 2190 \\
 2190 \\
 \hline
 24,090 \text{ gallons per year}
 \end{array}$$

The average person in the United States uses 24,090 gallons of water in one year.

$$\begin{array}{r}
 90. \quad 27 \text{ fishing boats} \\
 \times 40 \text{ tons of squid per boat} \\
 \hline
 1080 \text{ tons}
 \end{array}$$

The total catch for the night was 1080 tons.

91. 75 first-aid kits at \$8 per kit

$$\begin{array}{r}
 75 \\
 \times 8 \\
 \hline
 600
 \end{array}$$

The total cost is \$600.

92. 38 gardeners at \$64 per day

$$\begin{array}{r}
 64 \\
 \times 38 \\
 \hline
 512 \\
 192 \\
 \hline
 2432
 \end{array}$$

The total cost is \$2432.

93. 65 rebuilt alternators at \$24 per alternator

$$\begin{array}{r}
 65 \\
 \times 24 \\
 \hline
 260 \\
 130 \\
 \hline
 1560
 \end{array}$$

The total cost is \$1560.

94. 62 wheelchair cushions at \$44 per cushion

$$\begin{array}{r}
 62 \\
 \times 44 \\
 \hline
 248 \\
 248 \\
 \hline
 2728
 \end{array}$$

The total cost is \$2728.

95. 206 desktop computers at \$548 per computer

$$\begin{array}{r}
 548 \\
 \times 206 \\
 \hline
 3288 \\
 10960 \\
 \hline
 112,888
 \end{array}$$

The total cost is \$112,888.

96. 520 printers at \$219 per printer

$$\begin{array}{r}
 520 \\
 \times 219 \\
 \hline
 4680 \\
 520 \\
 1040 \\
 \hline
 \$113,880
 \end{array}$$

The total cost is \$113,880.

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97. $21 \cdot 43 \cdot 56 = (21 \cdot 43) \cdot 56$

$$\begin{array}{r} 21 \quad 903 \\ \times 43 \quad \times 56 \\ \hline 63 \quad 5418 \\ 84 \quad 4515 \\ \hline 903 \quad 50,568 \end{array}$$

98. $(600)(8)(75)(40)$

$$\begin{array}{r} 600 \quad 4800 \quad 360,000 \\ \times 8 \quad \times 75 \quad \times 40 \\ \hline 4800 \quad 24000 \quad 14,400,000 \\ \hline 33600 \\ \hline 360,000 \end{array}$$

99. 450 trees per acre

$$\begin{array}{r} \times 85 \text{ acres} \\ \hline 2250 \\ 3600 \\ \hline 38,250 \text{ trees} \end{array}$$

38,250 trees are needed to plant 85 acres.

100. $15,225$

$$\begin{array}{r} \times 28 \\ \hline 121800 \\ 30450 \\ \hline 426,300 \end{array}$$

The blue whale weighs 426,300 pounds.

101. $8,214,426$ population of New York City

$$\begin{array}{r} - 590,763 \text{ population of Boston} \\ \hline 7,623,663 \text{ more people} \end{array}$$

7,623,663 more people live in New York City than in Boston.

102. $3,849,378$ population of Los Angeles

$$\begin{array}{r} - 1,232,940 \text{ population of Dallas} \\ \hline 2,616,438 \text{ more people} \end{array}$$

2,616,438 more people live in Los Angeles than in Dallas.

103. $880 \quad 235 \quad 140$

$$\begin{array}{r} \times 6 \quad \times 6 \quad \times 5 \\ \hline 5280 \quad 1410 \quad 700 \end{array}$$

The total cost is the sum of these values:

$$\$5280 + \$1410 + \$700 = \$7390$$

104. 640 miles on Saturday

438 miles on Sunday

$+ 535$ miles on Monday

$$\begin{array}{r} \hline 1613 \text{ total miles} \end{array}$$

The total number of miles traveled is 1613.

105. (a) $189 + 263 = 452$

(b) $263 + 189 = 452$

106. commutative

107. (a) $(65 + 81) + 135 = 146 + 135 = 281$

(b) $65 + (81 + 135) = 65 + 216 = 281$

108. associative

109. (a) $220 \times 72 = 15,840$

(b) $72 \times 220 = 15,840$

110. commutative

111. (a) $(26 \times 18) \times 14 = 468 \times 14 = 6552$

(b) $26(18 \times 14) = 26 \times 252 = 6552$

112. associative

113. No. Some examples are

1. $7 - 5 = 2$, but $5 - 7$ does not equal 2.

2. $12 - 6 = 6$, but $6 - 12$ does not equal 6.

3. $(8 - 2) - 5 = 1$, but $8 - (2 - 5)$ does not equal 1.

114. No. Some examples are

1. $10 \div 2 = 5$, but $2 \div 10$ does not equal 5.

2. $(16 \div 8) \div 2 = 1$, but $16 \div (8 \div 2)$ does not equal 1.

1.5 Dividing Whole Numbers

1.5 Margin Exercises

1. (a) $24 \div 6 = 4$: $6 \overline{)24}^4$ or $\frac{24}{6} = 4$

(b) $9 \overline{)36}^4$: $36 \div 9 = 4$ or $\frac{36}{9} = 4$

(c) $48 \div 6 = 8$: $6 \overline{)48}^8$ or $\frac{48}{6} = 8$

(d) $\frac{42}{6} = 7$: $42 \div 6 = 7$ or $6 \overline{)42}^7$

2. (a) $15 \div 3 = 5$
dividend: 15; divisor: 3; quotient: 5

(b) $18 \div 6 = 3$
dividend: 18; divisor: 6; quotient: 3

(c) $\frac{28}{7} = 4$
dividend: 28; divisor: 7; quotient: 4

$$(d) \ 9 \overline{)27}^3$$

dividend: 27; divisor: 9; quotient: 3

3. (a) $0 \div 5 = 0$

(b) $\frac{0}{9} = 0$

(c) $\frac{0}{24} = 0$

(d) $37 \overline{)0}$

4. (a) $5 \overline{)15}^3; 5 \cdot 3 = 15 \text{ or } 3 \cdot 5 = 15$

(b) $\frac{32}{4} = 8; 4 \cdot 8 = 32 \text{ or } 8 \cdot 4 = 32$

(c) $45 \div 9 = 5; 9 \cdot 5 = 45 \text{ or } 5 \cdot 9 = 45$

5. (a) $\frac{4}{0}$; undefined

(b) $\frac{0}{4} = 0$

(c) $0 \overline{)36}$; undefined

(d) $36 \overline{)0}$

(e) $100 \div 0$; undefined

(f) $0 \div 100 = 0$

6. (a) $8 \div 8 = 1$

(b) $15 \overline{)15}^1$

(c) $\frac{37}{37} = 1$

7. (a) $9 \div 1 = 9$

(b) $1 \overline{)18}^{18}$

(c) $\frac{43}{1} = 43$

8. (a) $2 \overline{)24}^{\frac{12}{2}}; \frac{12}{2} = 1, \frac{4}{2} = 2$

(b) $3 \overline{)93}^{\frac{31}{3}}; \frac{9}{3} = 3, \frac{3}{3} = 1$

(c) $4 \overline{)88}^{\frac{22}{4}}; \frac{8}{4} = 2, \frac{8}{4} = 2$

(d) $2 \overline{)624}^{\frac{312}{2}}; \frac{6}{2} = 3, \frac{2}{2} = 1, \frac{4}{2} = 2$

9. (a) $2 \overline{)125}^{\frac{62}{2}} \text{ R1}; \frac{12}{2} = 6, \frac{5}{2} = 2 \text{ R1}$

(b) $3 \overline{)215}^{\frac{71}{3}}; \frac{21}{3} = 7, \frac{5}{3} = 1 \text{ R2}$

(c) $4 \overline{)51318}^{\frac{134}{4}}; \frac{5}{4} = 1 \text{ R1}, \frac{13}{4} = 3 \text{ R1},$

$\frac{18}{4} = 4 \text{ R2}$

(d) $\frac{819}{5}$

$5 \overline{)8319}^{\frac{163}{5}}; \frac{8}{5} = 1 \text{ R3}, \frac{31}{5} = 6 \text{ R1},$

$\frac{19}{5} = 3 \text{ R4}$

10. (a) $4 \overline{)5123}^{\frac{130}{4}} \text{ R3}$

(b) $7 \overline{)5125}^{\frac{73}{7}} \text{ R4}$

(c) $3 \overline{)18825}^{\frac{628}{3}} \text{ R1}$

(d) $6 \overline{)142135}^{\frac{235}{6}} \text{ R5}$

11. (a) $2 \overline{)65}^{\frac{32}{2}} \text{ R1}$

divisor $\times$ *quotient* + *remainder* = *dividend*

$$\begin{array}{rccccccc} \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 2 & \times & 32 & + & 1 & & \\ & 64 & & + & 1 & = & 65 \end{array}$$

The answer is correct.

(b) $7 \overline{)586}^{\frac{83}{7}} \text{ R4}$

divisor $\times$ *quotient* + *remainder* = *dividend*

$$\begin{array}{rccccccc} \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 7 & \times & 83 & + & 4 & & \\ & 581 & & + & 4 & = & 585 \\ & & & & & & \uparrow \\ & & & & & & \text{incorrect} \end{array}$$

Rework.

$7 \overline{)5826}^{\frac{835}{7}}$

Now check:

continued

$$\text{divisor} \times \text{quotient} + \text{remainder} = \text{dividend}$$

$$\begin{array}{rccccccccc} \downarrow & & \downarrow & & \downarrow & & \downarrow & & \\ 7 & \times & 83 & + & 5 & & & & \\ & 581 & & + & 5 & = & 586 & & \\ & & & & & & \uparrow & & \\ & & & & & & \text{correct} & & \end{array}$$

The correct answer is 83 R5.

(c) $\begin{array}{r} 407 \text{ R2} \\ 3 \overline{)1223} \end{array}$

$$\text{divisor} \times \text{quotient} + \text{remainder} = \text{dividend}$$

$$\begin{array}{rccccccccc} \downarrow & & \downarrow & & \downarrow & & \downarrow & & \\ 3 & \times & 407 & + & 2 & & & & \\ & 1221 & & + & 2 & = & 1223 & & \end{array}$$

The answer is correct.

(d) $\begin{array}{r} 476 \text{ R3} \\ 5 \overline{)2383} \end{array}$

$$\text{divisor} \times \text{quotient} + \text{remainder} = \text{dividend}$$

$$\begin{array}{rccccccccc} \downarrow & & \downarrow & & \downarrow & & \downarrow & & \\ 5 & \times & 476 & + & 3 & & & & \\ & 2380 & & + & 3 & = & 2383 & & \end{array}$$

The answer is correct.

12. (a) 258: ends in 8, divisible by 2
 (b) 307: ends in 7, not divisible by 2
 (c) 4216: ends in 6, divisible by 2
 (d) 73,000: ends in 0, divisible by 2
13. (a) 743: $7 + 4 + 3 = 14$, not divisible by 3
 (b) 5325: $5 + 3 + 2 + 5 = 15$, divisible by 3
 (c) 374,214: $3 + 7 + 4 + 2 + 1 + 4 = 21$, divisible by 3
 (d) 205,633: $2 + 0 + 5 + 6 + 3 + 3 = 19$, not divisible by 3
14. (a) 180: ends in 0, divisible by 5
 (b) 635: ends in 5, divisible by 5
 (c) 8364: does not end in 0 or 5, not divisible by 5
 (d) 206,105: ends in 5, divisible by 5
15. (a) 270: ends in 0, divisible by 10
 (b) 495: does not end in 0, not divisible by 10
 (c) 5030: ends in 0, divisible by 10
 (d) 14,380: ends in 0, divisible by 10

1.5 Section Exercises

1. $24 \div 4 = 6$: $\begin{array}{r} 6 \\ 4 \overline{)24} \end{array}$ or $\frac{24}{4} = 6$

2. $36 \div 3 = 12$: $\begin{array}{r} 12 \\ 3 \overline{)36} \end{array}$ or $\frac{36}{3} = 12$

3. $\frac{45}{9} = 5$: $\begin{array}{r} 5 \\ 9 \overline{)45} \end{array}$ or $45 \div 9 = 5$

4. $\frac{56}{8} = 7$: $\begin{array}{r} 7 \\ 8 \overline{)56} \end{array}$ or $56 \div 8 = 7$

5. $\begin{array}{r} 8 \\ 2 \overline{)16} \end{array}$: $16 \div 2 = 8$ or $\frac{16}{2} = 8$

6. $\begin{array}{r} 6 \\ 8 \overline{)48} \end{array}$: $48 \div 8 = 6$ or $\frac{48}{8} = 6$

7. $9 \div 9 = 1$

Any nonzero number divided by itself is 1.

8. $36 \div 9 = 4$

9. $\frac{14}{2} = 7$

10. $\frac{10}{0}$ is undefined

11. $22 \div 0$ is undefined

12. $6 \div 6 = 1$

13. $\frac{24}{1} = 24$

14. $\frac{12}{1} = 12$

15. $\begin{array}{r} 0 \\ 15 \overline{)0} \end{array}$

Zero divided by any nonzero number is zero.

16. $\frac{0}{12} = 0$

17. $0 \overline{)43}$ is undefined

18. $\frac{8}{0}$ is undefined

19. $\frac{15}{1} = 15$

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

21. $\frac{8}{1} = 8$

22. $\frac{0}{5} = 0$

$$23. \quad \begin{array}{r} 2 \ 5 \\ 3 \overline{) 7 \ 1 \ 5} \end{array} \quad \text{Check: } \begin{array}{r} 25 \\ \times 3 \\ \hline 75 \end{array}$$

$$24. \quad \begin{array}{r} 17 \\ 5 \overline{) 85} \end{array} \quad \text{Check: } 5 \times 17 = 85$$

$$25. \quad \begin{array}{r} 1 \ 8 \\ 7 \overline{) 12 \ 5 \ 6} \end{array} \quad \text{Check: } \begin{array}{r} 18 \\ \times 7 \\ \hline 126 \end{array}$$

$$26. \quad \begin{array}{r} 2 \ 8 \\ 6 \overline{) 16 \ 8} \end{array} \quad \text{Check: } 6 \times 28 = 168$$

$$27. \quad \begin{array}{r} 304 \\ 4 \overline{) 1216} \end{array} \quad \text{Check: } \begin{array}{r} 304 \\ \times 4 \\ \hline 1216 \end{array}$$

$$28. \quad \begin{array}{r} 4 \ 61 \\ 5 \overline{) 23 \ 0 \ 5} \end{array} \quad \text{Check: } 5 \times 461 = 2305$$

$$29. \quad \begin{array}{r} 6 \ 2 \ 7 \ \text{R}1 \\ 4 \overline{) 25 \ 10 \ 2 \ 9} \end{array} \quad \text{Check: } 4 \times 627 + 1 = 2508 + 1 = 2509$$

$$30. \quad \begin{array}{r} 1 \ 6 \ 6 \ \text{R}7 \\ 8 \overline{) 13 \ 5 \ 3 \ 5} \end{array} \quad \text{Check: } 8 \times 166 + 7 = 1328 + 7 = 1335$$

$$31. \quad \begin{array}{r} 1 \ 5 \ 2 \ 2 \ \text{R}5 \\ 6 \overline{) 9 \ 3 \ 1 \ 1 \ 3 \ 7} \end{array} \quad \text{Check: } 6 \times 1522 + 5 = 9132 + 5 = 9137$$

$$32. \quad \begin{array}{r} 9 \ 30 \ \text{R}1 \\ 9 \overline{) 83 \ 2 \ 7 \ 1} \end{array} \quad \text{Check: } 9 \times 930 + 1 = 8370 + 1 = 8371$$

$$33. \quad \begin{array}{r} 309 \\ 6 \overline{) 1854} \end{array} \quad \text{Check: } 6 \times 309 = 1854$$

$$34. \quad \begin{array}{r} 10 \ 7 \\ 8 \overline{) 85 \ 6} \end{array} \quad \text{Check: } 8 \times 107 = 856$$

$$35. \quad 12,020 \div 4 \quad \begin{array}{r} 3 \ 005 \\ 4 \overline{) 12,020} \end{array} \quad \text{Check: } 4 \times 3005 = 12,020$$

$$36. \quad 8012 \div 4 \quad \begin{array}{r} 200 \ 3 \\ 4 \overline{) 801 \ 2} \end{array} \quad \text{Check: } 4 \times 2003 = 8012$$

$$37. \quad 30,036 \div 6 \quad \begin{array}{r} 5 \ 006 \\ 6 \overline{) 30,036} \end{array} \quad \text{Check: } 6 \times 5006 = 30,036$$

$$38. \quad 32,008 \div 8 \quad \begin{array}{r} 4 \ 001 \\ 8 \overline{) 32,008} \end{array} \quad \text{Check: } 8 \times 4001 = 32,008$$

$$39. \quad 2434 \div 3 \quad \begin{array}{r} 8 \ 11 \ \text{R}1 \\ 3 \overline{) 2434} \end{array} \quad \text{Check: } 3 \times 811 + 1 = 2433 + 1 = 2434$$

$$40. \quad 5993 \div 7 \quad \begin{array}{r} 8 \ 5 \ 6 \ \text{R}1 \\ 7 \overline{) 59 \ 3 \ 9 \ 3} \end{array} \quad \text{Check: } 7 \times 856 + 1 = 5992 + 1 = 5993$$

$$41. \quad 12,947 \div 5 \quad \begin{array}{r} 2 \ 5 \ 8 \ 9 \ \text{R}2 \\ 5 \overline{) 12, \ 9 \ 4 \ 7} \end{array} \quad \text{Check: } 5 \times 2589 + 2 = 12,945 + 2 = 12,947$$

$$42. \quad 33,285 \div 9 \quad \begin{array}{r} 3 \ 6 \ 9 \ 8 \ \text{R}3 \\ 9 \overline{) 33, \ 2 \ 8 \ 5} \end{array} \quad \text{Check: } 9 \times 3698 + 3 = 33,282 + 3 = 33,285$$

$$43. \quad 29,298 \div 4 \quad \begin{array}{r} 7 \ 32 \ 4 \ \text{R}2 \\ 4 \overline{) 29, \ 12 \ 9 \ 8} \end{array} \quad \text{Check: } 4 \times 7324 + 2 = 29,296 + 2 = 29,298$$

$$44. \quad 17,937 \div 6 \quad \begin{array}{r} 2 \ 9 \ 8 \ 9 \ \text{R}3 \\ 6 \overline{) 17, \ 9 \ 3 \ 7} \end{array} \quad \text{Check: } 6 \times 2989 + 3 = 17,934 + 3 = 17,937$$

$$45. \quad 12,630 \div 4 \quad \begin{array}{r} 3 \ 1 \ 5 \ 7 \ \text{R}2 \\ 4 \overline{) 12, \ 6 \ 3 \ 0} \end{array} \quad \text{Check: } 4 \times 3157 + 2 = 12,628 + 2 = 12,630$$

$$46. \quad 46,560 \div 7 \quad \begin{array}{r} 6 \ 6 \ 5 \ 1 \ \text{R}3 \\ 7 \overline{) 46, \ 5 \ 6 \ 0} \end{array} \quad \text{Check: } 7 \times 6651 + 3 = 46,557 + 3 = 46,560$$

$$47. \quad 21,040 \div 8 \quad \begin{array}{r} 2 \ 6 \ 30 \\ 8 \overline{) 21, \ 0 \ 4 \ 0} \end{array} \quad \text{Check: } 8 \times 2630 = 21,040$$

$$48. \quad \frac{8199}{9} \quad \begin{array}{r} 911 \\ 9 \overline{) 8199} \end{array} \quad \text{Check: } 9 \times 911 = 8199$$

$$49. \quad \frac{74,751}{6} \quad \begin{array}{r} 1 \ 2, \ 4 \ 5 \ 8 \ \text{R}3 \\ 6 \overline{) 7 \ 4, \ 2 \ 7 \ 5 \ 1} \end{array} \quad \text{Check: } 6 \times 12,458 + 3 = 74,748 + 3 = 74,751$$

$$50. \quad \frac{72,543}{5} \quad \begin{array}{r} 1 \ 4, \ 50 \ 8 \ \text{R}3 \\ 5 \overline{) 7 \ 2, \ 2 \ 5 \ 4 \ 3} \end{array} \quad \text{Check: } 5 \times 14,508 + 3 = 72,540 + 3 = 72,543$$

$$51. \quad \begin{array}{r} 71,776 \\ 7 \end{array} \quad \begin{array}{r} 10, 2 \ 5 \ 3 \ \mathbf{R5} \\ 7 \overline{) 71,17^3 7^2 6} \end{array}$$

Check: $7 \times 10,253 + 5 = 71,771 + 5 = 71,776$

$$52. \quad \begin{array}{r} 77,621 \\ 3 \end{array} \quad \begin{array}{r} 2 \ 5, \ 8 \ 7 \ 3 \ \mathbf{R2} \\ 3 \overline{) 71^1 7,^2 6^2 2^1 1} \end{array}$$

Check: $3 \times 25,873 + 2 = 77,619 + 2 = 77,621$

$$53. \quad \begin{array}{r} 128,645 \\ 7 \end{array} \quad \begin{array}{r} 1 \ 8, \ 3 \ 7 \ 7 \ \mathbf{R6} \\ 7 \overline{) 12^5 8,^2 6^5 4^5 5} \end{array}$$

Check: $7 \times 18,377 + 6 = 128,639 + 6 = 128,645$

$$54. \quad \begin{array}{r} 172,255 \\ 4 \end{array} \quad \begin{array}{r} 4 \ 3,0 \ 6 \ 3 \ \mathbf{R3} \\ 4 \overline{) 17^1 2,2^2 5^1 5} \end{array}$$

Check: $4 \times 43,063 + 3 = 172,252 + 3 = 172,255$

$$55. \quad \begin{array}{r} 375 \ \mathbf{R2} \\ 5 \overline{) 1877} \end{array}$$

Check: $5 \times 375 + 2 = 1875 + 2 = 1877$ correct

$$56. \quad \begin{array}{r} 427 \ \mathbf{R1} \\ 3 \overline{) 1282} \end{array}$$

Check: $3 \times 427 + 1 = 1281 + 1 = 1282$ correct

$$57. \quad \begin{array}{r} 1908 \ \mathbf{R2} \\ 3 \overline{) 5725} \end{array}$$

Check: $3 \times 1908 + 2 = 5724 + 2 = 5726$
incorrect

Rework.

$$\begin{array}{r} 1 \ 90 \ 8 \ \mathbf{R1} \\ 3 \overline{) 5^2 72^2 5} \end{array}$$

Check: $3 \times 1908 + 1 = 5724 + 1 = 5725$

$$58. \quad \begin{array}{r} 432 \ \mathbf{R3} \\ 5 \overline{) 2158} \end{array}$$

Check: $5 \times 432 + 3 = 2160 + 3 = 2163$
incorrect

Rework.

$$\begin{array}{r} 4 \ 31 \ \mathbf{R3} \\ 5 \overline{) 21^1 58} \end{array}$$

Check: $5 \times 431 + 3 = 2155 + 3 = 2158$ correct

$$59. \quad \begin{array}{r} 650 \ \mathbf{R2} \\ 7 \overline{) 4692} \end{array}$$

Check: $7 \times 650 + 2 = 4550 + 2 = 4552$
incorrect

Rework.

$$\begin{array}{r} 6 \ 70 \ \mathbf{R2} \\ 7 \overline{) 46^4 92} \end{array}$$

Check: $7 \times 670 + 2 = 4690 + 2 = 4692$
correct

$$60. \quad \begin{array}{r} 663 \ \mathbf{R5} \\ 9 \overline{) 5974} \end{array}$$

Check: $9 \times 663 + 5 = 5967 + 5 = 5972$
incorrect

Rework.

$$\begin{array}{r} 6 \ 6 \ 3 \ \mathbf{R7} \\ 9 \overline{) 59^5 7^3 4} \end{array}$$

Check: $9 \times 663 + 7 = 5967 + 7 = 5974$ correct

$$61. \quad \begin{array}{r} 3 \ 568 \ \mathbf{R2} \\ 6 \overline{) 21,409} \end{array}$$

Check: $6 \times 3568 + 2 = 21,408 + 2 = 21,410$
incorrect

Rework.

$$\begin{array}{r} 3 \ 5 \ 6 \ 8 \ \mathbf{R1} \\ 6 \overline{) 21,^3 4^4 0^4 9} \end{array}$$

Check: $6 \times 3568 + 1 = 21,408 + 1 = 21,409$

$$62. \quad \begin{array}{r} 532 \\ 6 \overline{) 3192} \end{array}$$

Check: $6 \times 532 = 3192$ correct

$$63. \quad \begin{array}{r} 2 \ 002 \ \mathbf{R3} \\ 8 \overline{) 16,019} \end{array}$$

Check: $8 \times 2002 + 3 = 16,016 + 3 = 16,019$
correct

$$64. \quad \begin{array}{r} 4 \ 208 \\ 8 \overline{) 33,664} \end{array}$$

Check: $8 \times 4208 = 33,664$ correct

$$65. \quad \begin{array}{r} 11,523 \ \mathbf{R2} \\ 6 \overline{) 69,140} \end{array}$$

Check: $6 \times 11,523 + 2 = 69,138 + 2 = 69,140$
correct

$$66. \quad \begin{array}{r} 27,532 \ \mathbf{R1} \\ 3 \overline{) 82,598} \end{array}$$

Check: $3 \times 27,532 + 1 = 82,596 + 1 = 82,597$
incorrect

Rework.

$$\begin{array}{r} 2 \ 7, \ 532 \ \mathbf{R2} \\ 3 \overline{) 8^2 2,^1 598} \end{array}$$

Check: $3 \times 27,532 + 2 = 82,596 + 2 = 82,598$

$$67. \quad \begin{array}{r} 9 \ 628 \ \mathbf{R7} \\ 9 \overline{) 86,655} \end{array}$$

Check: $9 \times 9628 + 7 = 86,652 + 7 = 86,659$
incorrect

Rework.

$$\begin{array}{r} 9 \ 6 \ 2 \ 8 \ \text{R}3 \\ 9 \overline{)86,562575} \end{array}$$

Check: $9 \times 9628 + 3 = 86,652 + 3 = 86,655$

68.
$$\begin{array}{r} 7 \ 2 \ 5 \ 8 \ \text{R}4 \\ 7 \overline{)50,809} \end{array}$$

Check: $7 \times 7258 + 4 = 50,806 + 4 = 50,810$
incorrect

Rework.

$$\begin{array}{r} 7 \ 2 \ 5 \ 8 \ \text{R}3 \\ 7 \overline{)50,184059} \end{array}$$

Check: $7 \times 7258 + 3 = 50,806 + 3 = 50,809$

69.
$$\begin{array}{r} 27,822 \\ 8 \overline{)222,576} \end{array}$$

Check: $8 \times 27,822 = 222,576$ *correct*

70.
$$\begin{array}{r} 77,804 \\ 4 \overline{)311,216} \end{array}$$

Check: $4 \times 77,804 = 311,216$ *correct*

71. Multiply the quotient by the divisor and add any remainder. The result should be the dividend.

72. Three choices might be:

1. A number is divisible by 2 if it ends in a 0, 2, 4, 6, or 8.
2. A number is divisible by 5 if it ends in 0 or 5.
3. A number is divisible by 10 if it ends in 0.

73.
$$\begin{array}{r} 3 \ 2 \ 8 \\ 8 \overline{)26224} \end{array}$$

328 tables can be set.

74.
$$\begin{array}{r} 1 \ 3 \ 5 \\ 12 \overline{)164260} \end{array}$$

Each school will receive 135 books.

75.
$$\begin{array}{r} 9 \ 600 \\ 8 \overline{)76,4800} \end{array}$$

9600 drumsticks are produced each hour.

76.
$$\begin{array}{r} 8 \ 3,000,000 \\ 5 \overline{)4115,000,000} \end{array}$$

83,000,000 or 83 million Tootsie Rolls are produced each day.

77.
$$\begin{array}{r} 4 \ 8, \ 500 \\ 9 \overline{)4376,4500} \end{array}$$

Each employee received \$48,500.

78.
$$\begin{array}{r} 3 \ 4 \ 3 \ 5 \\ 5 \overline{)17,211725} \end{array}$$

3435 5-pound bags of flour can be filled.

79.
$$\begin{array}{r} 1 \ 3 \ 5 \\ 8 \overline{)102840} \end{array}$$

135 acres can be fertilized.

80. Each cabin needs 9 squares. Divide to find the number of cabins that can be roofed.

$$\begin{array}{r} 1 \ 2 \ 6 \\ 9 \overline{)112354} \end{array}$$

126 cabins can be roofed.

81.
$$\begin{array}{r} 1,1 \ 3 \ 7, \ 500 \\ 6 \overline{)6,82245,3000} \end{array}$$

Each person received \$1,137,500.

82.
$$\begin{array}{r} 5, \ 6 \ 2 \ 5,000 \\ 8 \overline{)45,502040,000} \end{array}$$

Each payment is \$5,625,000.

83. There are 12 months in a year, so divide \$65,148 by 12.

$$\begin{array}{r} 5 \ 4 \ 2 \ 9 \\ 12 \overline{)65,5134108} \end{array}$$

The annual median household income in Maryland is \$5429 per month.

84.
$$\begin{array}{r} 5, \ 4 \ 8 \ 4, \ 3 \ 7 \ 5 \\ 4 \overline{)21,193317,153020} \end{array}$$

Assuming the salary each year was the same, the salary was \$5,484,375.

85. 60 ends in 0, so it is divisible by 2, 5, and 10. The sum of its digits, 6, is divisible by 3, so 60 is divisible by 3.

86. 35 ends in 5, so it is divisible by 5, but not divisible by 2 or 10. The sum of its digits, 8, is not divisible by 3, so 35 is not divisible by 3.

87. 92 ends in 2, so it is divisible by 2, but not divisible by 5 or 10. The sum of its digits, 11, is not divisible by 3, so 92 is not divisible by 3.

88. 96 ends in 6, so it is divisible by 2, but not divisible by 5 or 10. The sum of its digits, 15, is divisible by 3, so 96 is divisible by 3.

89. 445 ends in 5, so it is divisible by 5, but not divisible by 2 or 10. The sum of its digits, 13, is not divisible by 3, so 445 is not divisible by 3.
90. 897 ends in 7, so it is not divisible by 2, 5, or 10. The sum of its digits, 24, is divisible by 3, so 897 is divisible by 3.
91. 903 ends in 3, so it is not divisible by 2, 5, or 10. The sum of its digits, 12, is divisible by 3, so 903 is divisible by 3.
92. 500 ends in 0, so it is divisible by 2, 5, and 10. The sum of its digits, 5, is not divisible by 3, so 500 is not divisible by 3.
93. 5166 ends in 6, so it is divisible by 2, but not divisible by 5 or 10. The sum of its digits, 18, is divisible by 3, so 5166 is divisible by 3.
94. 8302 ends in 2, so it is divisible by 2, but not divisible by 5 or 10. The sum of its digits, 13, is not divisible by 3, so 8302 is not divisible by 3.
95. 21,763 ends in 3, so it is not divisible by 2, 5, or 10. The sum of its digits, 19, is not divisible by 3, so 21,763 is not divisible by 3.
96. 32,472 ends in 2, so it is divisible by 2, but not divisible by 5 or 10. The sum of its digits, 18, is divisible by 3, so 32,472 is divisible by 3.

1.6 Long Division

1.6 Margin Exercises

1. (a)
$$\begin{array}{r} 82 \\ 28 \overline{) 2296} \\ \underline{224} \leftarrow 8 \times 28 \\ 56 \\ \underline{56} \leftarrow 2 \times 28 \\ 0 \end{array}$$
- (b)
$$\begin{array}{r} 64 \\ 16 \overline{) 1024} \\ \underline{96} \leftarrow 6 \times 16 \\ 64 \\ \underline{64} \leftarrow 4 \times 16 \\ 0 \end{array}$$
- (c)
$$\begin{array}{r} 144 \\ 61 \overline{) 8784} \\ \underline{61} \leftarrow 1 \times 61 \\ 268 \\ \underline{244} \leftarrow 4 \times 61 \\ 244 \\ \underline{244} \leftarrow 4 \times 61 \\ 0 \end{array}$$

(d)
$$\begin{array}{r} 29 \\ 93 \overline{) 2697} \\ \underline{186} \leftarrow 2 \times 93 \\ 837 \\ \underline{837} \leftarrow 9 \times 93 \\ 0 \end{array}$$

2. (a)
$$\begin{array}{r} 56 \\ 24 \overline{) 1344} \\ \underline{120} \leftarrow 5 \times 24 \\ 144 \\ \underline{144} \leftarrow 6 \times 24 \\ 0 \end{array}$$

(b)
$$\begin{array}{r} 62 \text{ R8} \\ 72 \overline{) 4472} \\ \underline{432} \leftarrow 6 \times 72 \\ 152 \\ \underline{144} \leftarrow 2 \times 72 \\ 8 \end{array}$$

(c)
$$\begin{array}{r} 83 \text{ R21} \\ 65 \overline{) 5416} \\ \underline{520} \leftarrow 8 \times 65 \\ 216 \\ \underline{195} \leftarrow 3 \times 65 \\ 21 \end{array}$$

(d)
$$\begin{array}{r} 74 \text{ R63} \\ 89 \overline{) 6649} \\ \underline{623} \leftarrow 7 \times 89 \\ 419 \\ \underline{356} \leftarrow 4 \times 89 \\ 63 \end{array}$$

3. (a)
$$\begin{array}{r} 107 \text{ R4} \\ 17 \overline{) 1823} \\ \underline{17} \leftarrow 1 \times 17 \\ 123 \\ \underline{119} \leftarrow 7 \times 17 \\ 4 \end{array}$$

(b)
$$\begin{array}{r} 208 \text{ R7} \\ 23 \overline{) 4791} \\ \underline{46} \leftarrow 2 \times 23 \\ 191 \\ \underline{184} \leftarrow 8 \times 23 \\ 7 \end{array}$$

(c)
$$\begin{array}{r} 408 \text{ R21} \\ 39 \overline{) 15,933} \\ \underline{156} \leftarrow 4 \times 39 \\ 333 \\ \underline{312} \leftarrow 8 \times 39 \\ 21 \end{array}$$

$$\begin{array}{r} \text{(d)} \quad \begin{array}{r} 300 \text{ R}62 \\ 78 \overline{) 23,462} \\ \underline{234} \leftarrow 3 \times 78 \\ 62 \end{array} \end{array}$$

4. (a) $70 \div 10 = 7$

One zero is dropped.

(b) $2600 \div 100 = 26$

Two zeros are dropped.

(c) $505,000 \div 1000 = 505$

Three zeros are dropped.

5. (a) $50 \overline{) 6250}$

Drop 1 zero from the divisor and the dividend.

$$\begin{array}{r} 125 \\ 5 \overline{) 625} \\ \underline{5} \\ 12 \\ \underline{10} \\ 25 \\ \underline{25} \\ 0 \end{array}$$

The quotient is 125.

(b) $130 \overline{) 131,040}$

Drop 1 zero from the divisor and the dividend.

$$\begin{array}{r} 1008 \\ 13 \overline{) 13,104} \\ \underline{13} \\ 104 \\ \underline{104} \\ 0 \end{array}$$

The quotient is 1008.

(c) $3400 \overline{) 190,400}$

Drop 2 zeros from the divisor and the dividend.

$$\begin{array}{r} 56 \\ 34 \overline{) 1904} \\ \underline{170} \\ 204 \\ \underline{204} \\ 0 \end{array}$$

The quotient is 56.

6. (a) $\begin{array}{r} 38 \\ 16 \overline{) 608} \\ \underline{48} \\ 128 \\ \underline{128} \\ 0 \end{array}$ $\begin{array}{r} 38 \\ \times 16 \\ \hline 228 \\ 608 \\ \hline \end{array}$ *Multiply the quotient and the divisor. correct*

(b) $\begin{array}{r} 42 \text{ R}178 \\ 426 \overline{) 19,170} \\ \underline{1704} \\ 1130 \\ \underline{952} \\ 178 \end{array}$ $\begin{array}{r} 426 \\ \times 42 \\ \hline 852 \\ 1704 \\ \hline 17,892 \\ + 178 \\ \hline 18,070 \end{array}$

The result does not match the dividend.

Rework.

$$\begin{array}{r} 45 \\ 426 \overline{) 19,170} \\ \underline{1704} \\ 2130 \\ \underline{2130} \\ 0 \end{array}$$

(c) $\begin{array}{r} 57 \text{ R}18 \\ 514 \overline{) 29,316} \\ \underline{2570} \\ 3616 \\ \underline{3598} \\ 18 \end{array}$

$$\begin{array}{r} 514 \text{ Multiply the} \\ \times 57 \text{ quotient and} \\ \hline 3598 \text{ the divisor.} \\ \underline{2570} \\ 29,298 \\ + 18 \text{ Add the remainder} \\ \hline 29,316 \leftarrow \text{correct} \end{array}$$

1.6 Section Exercises

1. $\begin{array}{r} 5 \\ 50 \overline{) 2650} \end{array}$ 5; 53; 530

5 goes over the 5, because $\frac{265}{50}$ is about 5. The answer must then be a two-digit number or 53.

2. $\begin{array}{r} 3 \\ 14 \overline{) 476} \end{array}$ 3; 34; 304

3 goes over the 7, because $\frac{47}{14}$ is about 3. The answer must then be a two-digit number or 34.

3. $\begin{array}{r} 2 \\ 18 \overline{) 4500} \end{array}$ 2; 25; 250

2 goes over the 5, because $\frac{45}{18}$ is about 2. The answer must then be a three-digit number or 250.

4. $\begin{array}{r} 1 \\ 35 \overline{) 5600} \end{array}$ 16; 160; 1600

1 goes over the 6, because $\frac{56}{35}$ is about 1. The answer must then be a three-digit number or 160.

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5. $86 \overline{)10,327}$ 12; 120 **R7**; 1200
1 goes over the 3, because $\frac{103}{86}$ is about 1. The answer must then be a three-digit number or 120 **R7**.

6. $46 \overline{)24,026}$ 5; 52; 522 **R14**
5 goes over the 0, because $\frac{240}{46}$ is about 5. The answer must then be a three-digit number or 522 **R14**.

7. $26 \overline{)28,735}$ 11; 110; 1105 **R5**
1 goes over the 8, because $\frac{28}{26}$ is about 1. The answer must then be a four-digit number or 1105 **R5**.

8. $12 \overline{)116,953}$ 974 **R2**; 9746 **R1**; 97,460
9 goes over the 6, because $\frac{116}{12}$ is about 9. The answer must then be a four-digit number or 9746 **R1**.

9. $21 \overline{)149,826}$ 71; 713; 7134 **R12**
7 goes over the 9, because $\frac{149}{21}$ is about 7. The answer must then be a four-digit number or 7134 **R12**.

10. $64 \overline{)208,138}$ 325 **R2**; 3252 **R10**; 32,521
3 goes over the 8, because $\frac{208}{64}$ is about 3. The answer must then be a four-digit number or 3252 **R10**.

11. $523 \overline{)470,800}$ 9 **R100**; 90 **R100**; 900 **R100**
9 goes over the 8, because $\frac{4708}{523}$ is about 9. The answer must then be a three-digit number or 900 **R100**.

12. $230 \overline{)253,230}$ 11; 110; 1101
1 goes over the 3, because $\frac{253}{230}$ is about 1. The answer must then be a four-digit number or 1101.

13. $18 \overline{)1319}$ 73 **R5** **Check:** $\begin{array}{r} 73 \\ \times 18 \\ \hline 584 \\ 73 \\ \hline 1314 \\ + 5 \\ \hline 1319 \end{array}$

14. $58 \overline{)3654}$ **Check:** $\begin{array}{r} 63 \\ \times 58 \\ \hline 504 \\ 315 \\ \hline 3654 \end{array}$

15. $23 \overline{)10,963}$ 476 **R15** **Check:** $\begin{array}{r} 476 \\ \times 23 \\ \hline 1428 \\ 952 \\ \hline 10,948 \\ + 15 \\ \hline 10,963 \end{array}$

16. $83 \overline{)39,692}$ 478 **R18** **Check:** $\begin{array}{r} 478 \\ \times 83 \\ \hline 1434 \\ 3824 \\ \hline 39,674 \\ + 18 \\ \hline 39,692 \end{array}$

17. $26 \overline{)62,583}$ 2407 **R1** **Check:** $\begin{array}{r} 2407 \\ \times 26 \\ \hline 14442 \\ 4814 \\ \hline 62,582 \\ + 1 \\ \hline 62,583 \end{array}$

18. $28 \overline{)84,249}$ 3008 **R25** **Check:** $\begin{array}{r} 3008 \\ \times 28 \\ \hline 24,064 \\ 6016 \\ \hline 84,224 \\ + 25 \\ \hline 84,249 \end{array}$

19. $74 \overline{)84,819}$ 1146 **R15** **Check:** $\begin{array}{r} 1146 \\ \times 74 \\ \hline 4584 \\ 8022 \\ \hline 84,804 \\ + 15 \\ \hline 84,819 \end{array}$

20.
$$\begin{array}{r} 785 \\ 238 \overline{) 186,948} \\ \underline{1666} \\ 2034 \\ \underline{1904} \\ 1308 \\ \underline{1190} \\ 118 \end{array}$$
 R118 *Check:*
$$\begin{array}{r} 785 \\ \times 238 \\ \hline 6280 \\ 2355 \\ 1570 \\ \hline 186,830 \\ + 118 \\ \hline 186,948 \end{array}$$

21.
$$\begin{array}{r} 3331 \\ 153 \overline{) 509,725} \\ \underline{459} \\ 507 \\ \underline{459} \\ 482 \\ \underline{459} \\ 235 \\ \underline{153} \\ 82 \end{array}$$
 R82 *Check:*
$$\begin{array}{r} 3331 \\ \times 153 \\ \hline 9993 \\ 16655 \\ 3331 \\ \hline 509,643 \\ + 82 \\ \hline 509,725 \end{array}$$

22.
$$\begin{array}{r} 87 \\ 308 \overline{) 26,796} \\ \underline{2464} \\ 2156 \\ \underline{2156} \\ 0 \end{array}$$
 Check:
$$\begin{array}{r} 308 \\ \times 87 \\ \hline 2156 \\ 2464 \\ \hline 26,796 \end{array}$$

23.
$$\begin{array}{r} 850 \\ 420 \overline{) 357,000} \\ \underline{3360} \\ 2100 \\ \underline{2100} \\ 0 \end{array}$$
 Check:
$$\begin{array}{r} 850 \\ \times 420 \\ \hline 17000 \\ 3400 \\ \hline 357,000 \end{array}$$

24.
$$\begin{array}{r} 170 \\ 900 \overline{) 153,000} \\ \underline{900} \\ 6300 \\ \underline{6300} \\ 0 \end{array}$$
 Check:
$$\begin{array}{r} 170 \\ \times 900 \\ \hline 153,000 \end{array}$$

25.
$$\begin{array}{r} 101 \\ 35 \overline{) 3549} \end{array}$$
 R4 *Check:*
$$\begin{array}{r} 101 \\ \times 35 \\ \hline 505 \\ 303 \\ \hline 3535 \\ + 4 \\ \hline 3539 \text{ incorrect} \end{array}$$

Rework.

$$\begin{array}{r} 101 \\ 35 \overline{) 3549} \\ \underline{35} \\ 049 \\ \underline{35} \\ 14 \end{array}$$

The correct answer is 101 **R14**.

26.
$$\begin{array}{r} 42 \\ 64 \overline{) 2712} \end{array}$$
 R26 *Check:*
$$\begin{array}{r} 64 \\ \times 42 \\ \hline 128 \\ 256 \\ \hline 2688 \\ + 26 \\ \hline 2714 \text{ incorrect} \end{array}$$

Rework.

$$\begin{array}{r} 42 \\ 64 \overline{) 2712} \\ \underline{256} \\ 152 \\ \underline{128} \\ 24 \end{array}$$

The correct answer is 42 **R24**.

27.
$$\begin{array}{r} 658 \\ 28 \overline{) 18,424} \end{array}$$
 R9 *Check:*
$$\begin{array}{r} 658 \\ \times 28 \\ \hline 5264 \\ 1316 \\ \hline 18,424 \\ + 9 \\ \hline 18,433 \text{ incorrect} \end{array}$$

Rework.

$$\begin{array}{r} 658 \\ 28 \overline{) 18,424} \\ \underline{168} \\ 162 \\ \underline{140} \\ 224 \\ \underline{224} \\ 0 \end{array}$$

The correct answer is 658.

28.
$$\begin{array}{r} 239 \\ 145 \overline{) 34,776} \end{array}$$
 R121 *Check:*
$$\begin{array}{r} 239 \\ \times 145 \\ \hline 1195 \\ 956 \\ 239 \\ \hline 34,655 \\ + 121 \\ \hline 34,776 \text{ correct} \end{array}$$

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29.
$$\begin{array}{r} 62 \text{ R}3 \text{ Check: } 614 \\ 614 \overline{) 38,068} \\ \underline{368} \\ 1228 \\ \underline{1228} \\ 0 \end{array}$$

$$\begin{array}{r} 614 \\ \times 62 \\ \hline 1228 \\ 3684 \\ \hline 38,068 \\ + 3 \\ \hline 38,071 \text{ incorrect} \end{array}$$

Rework.

$$\begin{array}{r} 62 \\ 614 \overline{) 38,068} \\ \underline{368} \\ 1228 \\ \underline{1228} \\ 0 \end{array}$$

The correct answer is 62.

30.
$$\begin{array}{r} 174 \text{ R}368 \text{ Check: } 174 \\ 557 \overline{) 97,286} \\ \underline{557} \\ 4186 \\ \underline{4186} \\ 0 \end{array}$$

$$\begin{array}{r} 174 \\ \times 557 \\ \hline 1218 \\ 870 \\ 870 \\ \hline 96,918 \\ + 368 \\ \hline 97,286 \text{ correct} \end{array}$$

31. When dividing by 10, 100, or 1000, drop the same number of zeros from the dividend as there are in the divisor to get the quotient. One example is $2500 \div 100 = 25 \div 1 = 25$.

32. Multiply the quotient and the divisor and add any remainder. One example is $18 \div 5 = 3 \text{ R}3$.
Check: $(3 \times 5) + 3 = 15 + 3 = 18$

33.
$$\begin{array}{r} 50 \\ 99 \overline{) 4950} \\ \underline{495} \\ 0 \end{array}$$

The shark averaged 50 miles each day.

34. Divide.
$$\begin{array}{r} 25,454 \\ 2200 \overline{) 55,998,800} \\ \underline{4400} \\ 11998 \\ \underline{11000} \\ 9988 \\ \underline{8800} \\ 11880 \\ \underline{11000} \\ 8800 \\ \underline{8800} \\ 0 \end{array}$$

The construction cost was \$25,454 per foot.

35. First, add the number of wall and table clocks.

$$\begin{array}{r} 272 \text{ wall clocks} \\ + 308 \text{ table clocks} \\ \hline 580 \text{ wall and table sum} \end{array}$$

Subtract the sum from the total number of clocks.

$$\begin{array}{r} 636 \text{ total number of clocks} \\ - 580 \text{ wall and table sum} \\ \hline 56 \text{ standing floor clocks} \end{array}$$

He worked on 56 floor clocks this year.

36.
$$\begin{array}{r} 24,000,000 \text{ total businesses} \\ - 7,000 \text{ larger businesses} \\ \hline 23,993,000 \text{ remaining} \end{array}$$

There are 23,993,000 small to mid-size businesses.

37. Divide.

$$\begin{array}{r} 355 \\ 96 \overline{) 34,080} \\ \underline{288} \\ 528 \\ \underline{480} \\ 480 \\ \underline{480} \\ 0 \end{array}$$

Judy's monthly payment is \$355.

38.
$$\begin{array}{r} 58 \\ 225 \overline{) 13,050} \\ \underline{1125} \\ 1800 \\ \underline{1800} \\ 0 \end{array}$$

The consultant charged \$58 per hour.

39. If one ring is sold each minute, then 60 rings are sold each hour.

$$\begin{array}{r} 60 \text{ rings per hour} \\ \times 24 \text{ hours per day} \\ \hline 1440 \text{ rings per day} \\ \times 30 \text{ days} \\ \hline 43,200 \text{ rings} \end{array}$$

There are 43,200 diamond rings sold in 30 days.

40. If he ate one Twinkie each day, then he ate 365 Twinkies each year.

$$\begin{array}{r} 365 \text{ Twinkies per year} \\ \times 60 \text{ years} \\ \hline 21,900 \text{ Twinkies} \end{array}$$

He ate 21,900 Twinkies in 60 years.

41. Divide the yearly amount spent for eating away from home by 52 (the number of weeks in one year).

$$\begin{array}{r} 39 \\ 52 \overline{) 2028} \\ \underline{156} \\ 468 \\ \underline{468} \\ 0 \end{array}$$

The average weekly amount spent for eating away from home is \$39 per household.

42.
$$\begin{array}{r} 34 \\ 120 \overline{) 4080} \\ \underline{360} \\ 480 \\ \underline{480} \\ 0 \end{array}$$

The average number of employees at each restaurant is 34 people.

43. $\frac{\$0}{3} = \0

44. When 0 is divided by any nonzero number, the result is 0.

45. $8 \div 0$ is undefined.

46. It is *impossible*. If you have 6 cookies, it is not possible to divide them among zero people.

47. (a) $14 \div 1 = 14$

(b)
$$\begin{array}{r} 17 \\ 1 \overline{) 17} \end{array}$$

(c) $\frac{38}{1} = 38$

48. Yes. Some examples are $18 \cdot 1 = 18$; $26 \cdot 1 = 26$; and $43 \cdot 1 = 43$.

49. (a) $32,000 \div 10 = 3200$

Drop 1 zero from the dividend and 1 zero from the divisor.

(b) $32,000 \div 100 = 320$

Drop 2 zeros from the dividend and 2 zeros from the divisor.

(c) $32,000 \div 1000 = 32$

Drop 3 zeros from the dividend and 3 zeros from the divisor.

50. Drop the same number of zeros that appear in the divisor. The result is the quotient. With a divisor of 10, drop one zero; with 100, drop two zeros; with 1000, drop three zeros.

1.7 Rounding Whole Numbers

1.7 Margin Exercises

1. (a) 373 (nearest ten)

Underline the tens place: 373

373 is closer to 370.

- (b) 1482 (nearest thousand)

Underline the thousands place: 1482

1482 is closer to 1000.

- (c) 89,512 (nearest hundred)

Underline the hundreds place: 89,512

89,512 is closer to 89,500.

- (d) 546,325 (nearest ten-thousand)

Underline the ten-thousands place: 546,325

546,325 is closer to 500,000.

2. (a) 62

Underline the tens place. Next digit is 4 or less. Change the digit to the right of the underlined place to zero.

62 rounded to the nearest ten is 60.

- (b) 94

Underline the tens place. Next digit is 4 or less. Change the digit to the right of the underlined place to zero.

94 rounded to the nearest ten is 90.

- (c) 134

Underline the tens place. Next digit is 4 or less. Change the digit to the right of the underlined place to zero.

134 rounded to the nearest ten is 130.

- (d) 7543

Underline the tens place. Next digit is 4 or less. Change the digit to the right of the underlined place to zero.

7543 rounded to the nearest ten is 7540.

3. (a)
- 3
- 683 Next digit is 5 or more.

Change 3 to 4. All digits to the right of the underlined place are changed to zero.

3683 rounded to the nearest thousand is 4000.

- (b)
- 6
- 502 Next digit is 5 or more.

Change 6 to 7. All digits to the right of the underlined place are changed to zero.

6502 rounded to the nearest thousand is 7000.

- (c)
- 84
- ,621 Next digit is 5 or more.

Change 4 to 5. All digits to the right of the underlined place are changed to zero.

84,621 rounded to the nearest thousand is 85,000.

- (d)
- 55
- ,960 Next digit is 5 or more.

Change 5 to 6. All digits to the right of the underlined place are changed to zero.

55,960 rounded to the nearest thousand is 56,000.

4. (a) 34
- 5
- 8 to the nearest ten

3458 Next digit is 5 or more.

Change 5 to 6. All digits to the right of the underlined place are changed to zeros.

3458 rounded to the nearest ten is 3460.

- (b) 64
- 4
- 8 to the nearest hundred

6448 Next digit is 4 or less.

Leave 4 as 4.

All digits to the right of the underlined place are changed to zeros.

6448 rounded to the nearest hundred is 6400.

- (c) 73,
- 0
- 77 to the nearest hundred

73,077 Next digit is 5 or more.

Change 0 to 1. All digits to the right of the underlined place are changed to zeros.

73,077 rounded to the nearest hundred is 73,100.

- (d) 85,
- 9
- 72 to the nearest hundred

85,972 Next digit is 5 or more.

Change 9 to 10. Write zero and carry the 1.

All digits to the right of the underlined place are changed to zeros.

85,972 rounded to the nearest hundred is 86,000.

5. (a) 14,
- 5
- 98 to the nearest ten-thousand

14,598

The ten-thousands place does not change because the digit to the right is 4 or less.

All digits to the right of the underlined place are changed to zeros.

14,598 rounded to the nearest ten-thousand is 10,000.

- (b) 724,
- 5
- 18,715 to the nearest million

724,518,715

Change 4 to 5 because the digit to the right is 5 or more.

All digits to the right of the underlined place are changed to zeros.

724,518,715 rounded to the nearest million is 725,000,000.

6. (a)
- To the nearest ten:**
- 45
- 8

Next digit is 5 or more.

Tens place ($5 + 1 = 6$) changes.

458 rounded to the nearest ten is 460.

To the nearest hundred: 458

Next digit is 5 or more.

Hundreds place ($4 + 1 = 5$) changes. All digits to the right of the underlined place are changed to zeros.

458 rounded to the nearest hundred is 500.

- (b)
- To the nearest ten:**
- 54
- 9

Next digit is 5 or more.

Tens place ($4 + 1 = 5$) changes.

549 rounded to the nearest ten is 550.

To the nearest hundred: 549

Next digit is 4 or less.

Hundreds place stays the same.

549 rounded to the nearest hundred is 500.

- (c)
- To the nearest ten:**
- 93
- 0
- 8

Next digit is 5 or more.

Tens place ($0 + 1 = 1$) changes.

9308 rounded to the nearest ten is 9310.

To the nearest hundred: 9308

Next digit is 4 or less.

Hundreds place stays the same.

9308 rounded to the nearest hundred is 9300.

7. (a) **To the nearest ten:** 4078

Next digit is 5 or more.

Tens place ($7 + 1 = 8$) changes.

4078 rounded to the nearest ten is 4080.

- To the nearest hundred:** 4078

Next digit is 5 or more.

Hundreds place ($0 + 1 = 1$) changes.

4078 rounded to the nearest hundred is 4100.

- To the nearest thousand:** 4078

Next digit is 4 or less.

Thousands place stays the same.

4078 rounded to the nearest thousand is 4000.

- (b) **To the nearest ten:** $46,3\text{64}$

Next digit is 4 or less.

Tens place stays the same.

46,364 rounded to the nearest ten is 46,360.

- To the nearest hundred:** $46,3\text{64}$

Next digit is 5 or more.

Hundreds place ($3 + 1 = 4$) changes.

46,364 rounded to the nearest hundred is 46,400.

- To the nearest thousand:** $46,3\text{64}$

Next digit is 4 or less.

Thousands place stays the same.

46,364 rounded to the nearest thousand is 46,000.

- (c) **To the nearest ten:** $268,3\text{28}$

Next digit is 5 or more.

Tens place ($2 + 1 = 3$) changes.

268,328 rounded to the nearest ten is 268,330.

- To the nearest hundred:** $268,3\text{28}$

Next digit is 4 or less.

Hundreds place stays the same.

268,328 rounded to the nearest hundred is 268,300.

- To the nearest thousand:** $268,3\text{28}$

Next digit is 4 or less.

Thousands place stays the same.

268,328 rounded to the nearest thousand is 268,000.

8. (a) $\begin{array}{r} 16 \\ 74 \\ 58 \\ + 31 \\ \hline \end{array}$ $\begin{array}{r} 20 \\ 70 \\ 60 \\ + 30 \\ \hline \end{array}$ rounded to the nearest ten

180 estimated answer

- (b) $\begin{array}{r} 53 \\ - 19 \\ \hline \end{array}$ $\begin{array}{r} 50 \\ - 20 \\ \hline \end{array}$ rounded to the nearest ten

30 estimated answer

- (c) $\begin{array}{r} 46 \\ \times 74 \\ \hline \end{array}$ $\begin{array}{r} 50 \\ \times 70 \\ \hline \end{array}$ rounded to the nearest ten

3500 estimated answer

9. (a) $\begin{array}{r} 358 \\ 743 \\ 822 \\ + 978 \\ \hline \end{array}$ $\begin{array}{r} 400 \\ 700 \\ 800 \\ + 1000 \\ \hline \end{array}$ rounded to the nearest

hundred

2900 estimated answer

- (b) $\begin{array}{r} 842 \\ - 475 \\ \hline \end{array}$ $\begin{array}{r} 800 \\ - 500 \\ \hline \end{array}$ rounded to the nearest

hundred

300 estimated answer

- (c) $\begin{array}{r} 723 \\ \times 478 \\ \hline \end{array}$ $\begin{array}{r} 700 \\ \times 500 \\ \hline \end{array}$ rounded to the nearest

hundred

350,000 estimated answer

10. (a) $\begin{array}{r} 36 \\ 3852 \\ 749 \\ + 5474 \\ \hline \end{array}$ $\begin{array}{r} 40 \\ 4000 \\ 700 \\ + 5000 \\ \hline \end{array}$ first digit rounded; all

others changed to zero

9740 estimated answer

- (b) $\begin{array}{r} 2583 \\ - 765 \\ \hline \end{array}$ $\begin{array}{r} 3000 \\ - 800 \\ \hline \end{array}$ first digit rounded; all

others changed to zero

2200 estimated answer

- (c) $\begin{array}{r} 648 \\ \times 67 \\ \hline \end{array}$ $\begin{array}{r} 600 \\ \times 70 \\ \hline \end{array}$ first digit rounded; all

others changed to zero

42,000 estimated answer

1.7 Section Exercises

1. 624 rounded to the nearest ten: 620

624 Next digit is 4 or less. Tens place does not change. All digits to the right of the underlined place change to zero.

2. 509 rounded to the nearest ten: 510

509 Next digit is 5 or more. Tens place changes ($0 + 1 = 1$). The digit to the right of the underlined place changes to zero.

3. 855 rounded to the nearest ten: 860
855 Next digit is 5 or more. Tens place changes ($5 + 1 = 6$). All digits to the right of the underlined place change to zero.
4. 946 rounded to the nearest ten: 950
946 Next digit is 5 or more. Tens place changes ($4 + 1 = 5$). The digit to the right of the underlined place changes to zero.
5. 6771 rounded to the nearest hundred: 6800
6771 Next digit is 5 or more. Hundreds place changes ($7 + 1 = 8$). All digits to the right of the underlined place change to zero.
6. 5847 rounded to the nearest hundred: 5800
5847 Next digit is 4 or less. Hundreds place does not change. All digits to the right of the underlined place change to zero.
7. 86,813 rounded to the nearest hundred: 86,800
86,813 Next digit is 4 or less. Hundreds place does not change. All digits to the right of the underlined place change to zero.
8. 17,211 rounded to the nearest hundred: 17,200
17,211 Next digit is 4 or less. Hundreds place does not change. All digits to the right of the underlined place change to zero.
9. 28,472 rounded to the nearest hundred: 28,500
28,472 Next digit is 5 or more. Hundreds place changes ($4 + 1 = 5$). All digits to the right of the underlined place change to zero.
10. 18,273 rounded to the nearest hundred: 18,300
18,273 Next digit is 5 or more. Hundreds place changes ($2 + 1 = 3$). All digits to the right of the underlined place change to zero.
11. 5996 rounded to the nearest hundred: 6000
5996 Next digit is 5 or more. Hundreds place changes ($9 + 1 = 10$). Write 0 and carry 1. All digits to the right of the underlined place change to zero.
12. 4452 rounded to the nearest hundred: 4500
4452 Next digit is 5 or more. Hundreds place changes ($4 + 1 = 5$). All digits to the right of the underlined place change to zero.
13. 15,758 rounded to the nearest thousand: 16,000
15,758 Next digit is 5 or more. Thousands place changes ($5 + 1 = 6$). All digits to the right of the underlined place change to zero.
14. 28,465 rounded to the nearest thousand: 28,000
28,465 Next digit is 4 or less. Thousands place does not change. All digits to the right of the underlined place change to zero.
15. 78,499 rounded to the nearest thousand: 78,000
78,499 Next digit is 4 or less. Thousands place does not change. All digits to the right of the underlined place change to zero.
16. 14,314 rounded to the nearest thousand: 14,000
14,314 Next digit is 4 or less. Thousands place does not change. All digits to the right of the underlined place change to zero.
17. 7,760,058,721 rounded to the nearest billion: 8,000,000,000
7,760,058,721 Next digit is 5 or more. Billions place changes ($7 + 1 = 8$). All digits to the right of the underlined place change to zero.
18. 44,706,892 rounded to the nearest ten-million: 40,000,000
44,706,892 Next digit is 4 or less. Ten-millions place does not change. All digits to the right of the underlined place change to zero.
19. 12,987 rounded to the nearest ten-thousand: 10,000
12,987 Next digit is 4 or less. Ten-thousands place does not change. All digits to the right of the underlined place change to zero.
20. 6599 rounded to the nearest ten-thousand: 10,000
6599 Next digit is 5 or more. Ten-thousands place changes ($0 + 1 = 1$). All digits to the right of the underlined place change to zero.
21. 595,008 rounded to the nearest ten-thousand: 600,000
595,008 Next digit is 5 or more. Ten-thousands place changes ($9 + 1 = 10$). Write 0 and carry 1. All digits to the right of the underlined place change to zero.
22. 725,182 rounded to the nearest ten-thousand: 730,000
725,182 Next digit is 5 or more. Ten-thousands place changes ($2 + 1 = 3$). All digits to the right of the underlined place change to zero.
23. 4,860,220 rounded to the nearest million: 5,000,000
4,860,220 Next digit is 5 or more. Millions place changes ($4 + 1 = 5$). All digits to the right of the underlined place change to zero.

24. 13,713,409 rounded to the nearest million:
14,000,000

13,713,409 Next digit is 5 or more. Millions place changes ($3 + 1 = 4$). All digits to the right of the underlined place change to zero.

25. **To the nearest ten:** 4476

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 7. **4480**

To the nearest hundred: 4476

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 4. **4500**

To the nearest thousand: 4476

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 4 as 4. **4000**

26. **To the nearest ten:** 6483

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 8 as 8. **6480**

To the nearest hundred: 6483

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 4. **6500**

To the nearest thousand: 6483

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 6 as 6. **6000**

27. **To the nearest ten:** 3374

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 7 as 7. **3370**

To the nearest hundred: 3374

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 3. **3400**

To the nearest thousand: 3374

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 3 as 3. **3000**

28. **To the nearest ten:** 7632

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 3 as 3. **7630**

To the nearest hundred: 7632

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 6 as 6. **7600**

To the nearest thousand: 7632

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 7. **8000**

29. **To the nearest ten:** 6048

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 4. **6050**

To the nearest hundred: 6048

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 0 as 0. **6000**

To the nearest thousand: 6048

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 6 as 6. **6000**

30. **To the nearest ten:** 7065

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 6. **7070**

To the nearest hundred: 7065

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 0. **7100**

To the nearest thousand: 7065

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 7 as 7. **7000**

31. **To the nearest ten:** 5343

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 4 as 4. **5340**

To the nearest hundred: 5343

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 3 as 3. **5300**

To the nearest thousand: 5343

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 5 as 5. **5000**

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32. To the nearest ten: 7456

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 5. **7460**

To the nearest hundred: 7456

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 4. **7500**

To the nearest thousand: 7456

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 7 as 7. **7000**

33. To the nearest ten: 19,539

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 3. **19,540**

To the nearest hundred: 19,539

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 5 as 5. **19,500**

To the nearest thousand: 19,539

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 9. Write 0 and carry 1. **20,000**

34. To the nearest ten: 59,806

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 0. **59,810**

To the nearest hundred: 59,806

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 8 as 8. **59,800**

To the nearest thousand: 59,806

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 9. Write 0 and carry 1. **60,000**

35. To the nearest ten: 26,292

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 9 as 9. **26,290**

To the nearest hundred: 26,292

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 2. **26,300**

To the nearest thousand: 26,292

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 6 as 6. **26,000**

36. To the nearest ten: 78,519

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 1. **78,520**

To the nearest hundred: 78,519

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 5 as 5. **78,500**

To the nearest thousand: 78,519

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 8. **79,000**

37. To the nearest ten: 93,706

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 0. **93,710**

To the nearest hundred: 93,706

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 7 as 7. **93,700**

To the nearest thousand: 93,706

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 3. **94,000**

38. To the nearest ten: 84,639

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 3. **84,640**

To the nearest hundred: 84,639

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. Leave 6 as 6. **84,600**

To the nearest thousand: 84,639

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 4. **85,000**

39. Step 1 Locate the place to be rounded and underline it.

Step 2 Look only at the next digit to the right. If this digit is 5 or more, increase the underlined digit by 1.

Step 3 Change all digits to the right of the underlined place to zeros.

- 40.** *Step 1* Locate the place to be rounded and underline it.

Step 2 Look only at the next digit to the right. If this digit is 4 or less, do not change the underlined digit.

Step 3 Change all digits to the right of the underlined place to zeros.

- 41.** *Estimate:* *Exact:*

$$\begin{array}{r} 30 \quad 25 \\ 60 \quad 63 \\ 50 \quad 47 \\ + 80 \quad + 84 \\ \hline 220 \quad 219 \end{array}$$

- 42.** *Estimate:* *Exact:*

$$\begin{array}{r} 60 \quad 56 \\ 20 \quad 24 \\ 90 \quad 85 \\ + 70 \quad + 71 \\ \hline 240 \quad 236 \end{array}$$

- 43.** *Estimate:* *Exact:*

$$\begin{array}{r} 80 \quad 78 \\ - 40 \quad - 43 \\ \hline 40 \quad 35 \end{array}$$

- 44.** *Estimate:* *Exact:*

$$\begin{array}{r} 60 \quad 57 \\ - 20 \quad - 24 \\ \hline 40 \quad 33 \end{array}$$

- 45.** *Estimate:* *Exact:*

$$\begin{array}{r} 70 \quad 67 \\ \times 30 \quad \times 34 \\ \hline 2100 \quad 268 \\ 201 \\ \hline 2278 \end{array}$$

- 46.** *Estimate:* *Exact:*

$$\begin{array}{r} 50 \quad 53 \\ \times 80 \quad \times 75 \\ \hline 4000 \quad 265 \\ 371 \\ \hline 3975 \end{array}$$

- 47.** *Estimate:* *Exact:*

$$\begin{array}{r} 900 \quad 863 \\ 700 \quad 735 \\ 400 \quad 438 \\ + 800 \quad + 792 \\ \hline 2800 \quad 2828 \end{array}$$

- 48.** *Estimate:* *Exact:*

$$\begin{array}{r} 600 \quad 623 \\ 400 \quad 362 \\ 200 \quad 189 \\ + 700 \quad + 736 \\ \hline 1900 \quad 1910 \end{array}$$

- 49.** *Estimate:* *Exact:*

$$\begin{array}{r} 900 \quad 883 \\ - 400 \quad - 448 \\ \hline 500 \quad 435 \end{array}$$

- 50.** *Estimate:* *Exact:*

$$\begin{array}{r} 600 \quad 614 \\ - 300 \quad - 276 \\ \hline 300 \quad 338 \end{array}$$

- 51.** *Estimate:* *Exact:*

$$\begin{array}{r} 800 \quad 752 \\ \times 400 \quad \times 375 \\ \hline 320,000 \quad 3760 \\ 5264 \\ 2256 \\ \hline 282,000 \end{array}$$

- 52.** *Estimate:* *Exact:*

$$\begin{array}{r} 800 \quad 845 \\ \times 400 \quad \times 396 \\ \hline 320,000 \quad 5070 \\ 7605 \\ 2535 \\ \hline 334,620 \end{array}$$

- 53.** *Estimate:* *Exact:*

$$\begin{array}{r} 8000 \quad 8215 \\ 60 \quad 56 \\ 700 \quad 729 \\ + 4000 \quad + 3605 \\ \hline 12,760 \quad 12,605 \end{array}$$

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54. *Estimate:* *Exact:*

$$\begin{array}{r} 3000 \\ 70 \\ 600 \\ + 7000 \\ \hline 10,670 \end{array} \quad \begin{array}{r} 2685 \\ 73 \\ 592 \\ + 7183 \\ \hline 10,533 \end{array}$$

55. *Estimate:* *Exact:*

$$\begin{array}{r} 700 \\ - 500 \\ \hline 200 \end{array} \quad \begin{array}{r} 687 \\ - 529 \\ \hline 158 \end{array}$$

56. *Estimate:* *Exact:*

$$\begin{array}{r} 500 \\ - 200 \\ \hline 300 \end{array} \quad \begin{array}{r} 543 \\ - 174 \\ \hline 369 \end{array}$$

57. *Estimate:* *Exact:*

$$\begin{array}{r} 900 \\ \times 30 \\ \hline 27,000 \end{array} \quad \begin{array}{r} 939 \\ \times 29 \\ \hline 8451 \\ 1878 \\ \hline 27,231 \end{array}$$

58. *Estimate:* *Exact:*

$$\begin{array}{r} 900 \\ \times 70 \\ \hline 63,000 \end{array} \quad \begin{array}{r} 864 \\ \times 74 \\ \hline 3456 \\ 6048 \\ \hline 63,936 \end{array}$$

59. Perhaps the best explanation is that 3492 is closer to 3500 than 3400, but 3492 is closer to 3000 than to 4000.

60. Rounding numbers usually allows for faster calculation and results in an estimated answer prior to getting an exact answer. One example is:

Estimate: *Exact:*

$$\begin{array}{r} 400 \\ - 200 \\ \hline 200 \end{array} \quad \begin{array}{r} 432 \\ - 209 \\ \hline 223 \end{array}$$

61. 76,000,000 Next digit is 5 or more. Change digit to the right of the underlined place to zero. Add 1 to 7. **80 million people**

303,000,000 Next digit is 4 or less. Change digit to the right of the underlined place to zero.

300 million people

62. 59 Next digit is 5 or more. Change digit to the right of the underlined place to zero. Add 1 to 5. **60 hours**

38 Next digit is 5 or more. Change digit to the right of the underlined place to zero. Add 1 to 3.

40 hours

63. **To the nearest thousand:** 348,900

Next digit is 5 or more. Change digit to the right of the underlined place to zero. Add 1 to 8.

349,000

To the nearest ten-thousand: 348,900

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 4.

350,000

64. **To the nearest ten-thousand:** 235,000

Next digit is 5 or more, so add 1 to 3. Change digits to the right of the underlined place to zeros.

\$240,000

To the nearest hundred-thousand: 235,000

Next digit is 4 or less. All digits to the right of the underlined place are changed to zero. **\$200,000**

65. **To the nearest ten-thousand:** 1,667,300

Next digit is 5 or more, so add 1 to 6. Change digits to the right of the underlined place to zeros.

1,670,000 pounds

To the nearest hundred-thousand: 1,667,300

Next digit is 5 or more, so add 1 to 6. Change digits to the right of the underlined place to zeros.

1,700,000 pounds

To the nearest million: 1,667,300

Next digit is 5 or more, so add 1 to 1. Change digits to the right of the underlined place to zeros.

2,000,000 pounds

66. **To the nearest ten-thousand:** 1,129,866,154

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 6.

1,129,870,000

To the nearest hundred-thousand:

1,129,866,154

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 8.

1,129,900,000

To the nearest million: 1,129,866,154

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 9. Write 0 and carry 1.

1,130,000,000

67. To the nearest hundred-thousand:

\$25,765,475,000

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 4. **\$25,765,500,000**

To the nearest hundred-million:

\$25,765,475,000

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 7. **\$25,800,000,000**

To the nearest billion: \$25,765,475,000

Next digit is 5 or more. All digits to the right of the underlined place are changed to zero. Add 1 to 5. **\$26,000,000,000**

68. To the nearest hundred-thousand:

\$18,915,762,568

Next digit is 5 or more. Hundred-thousands place changes ($7 + 1 = 8$). Digits to the right of the underlined place are changed to zero.

\$18,915,800,000

To the nearest hundred-million:

\$18,915,762,568

Next digit is 4 or less. Hundred-millions place doesn't change. All digits to the right of the underlined place are changed to zero.

\$18,900,000,000

To the nearest ten-billion: \$18,915,762,568

Next digit is 5 or more. Ten-billion place changes ($1 + 1 = 2$). Digits to the right of the underlined place are changed to zero. **\$20,000,000,000**

69. 71,499 would round to 71,000, so the smallest whole number it could have been is 71,500.

70. 72,500 would round to 73,000, so the largest whole number it could have been is 72,499.

71. 7500 is the smallest possible whole number that will round to 8000 using front end rounding.

72. 8499 is the largest possible whole number that will round to 8000 using front end rounding.

73. Exact: Rounding to the nearest ten:

3925	3930
11,243	11,240
15,974	15,970
17,916	17,920
534,883	534,880
2,788,000	2,788,000

74. Exact: Front end rounded:

3925	4000
11,243	10,000
15,974	20,000
17,916	20,000
534,883	500,000
2,788,000	3,000,000

75. (a) When using front end rounding, all digits are 0 except the first digit. These numbers are easier to work with when estimating answers.

(b) Sometimes when using front end rounding, the estimated answer can vary greatly from the exact answer.

1.8 Exponents, Roots, and Order of Operations

1.8 Margin Exercises

1. (a) 4^2 : exponent is 2; base is 4.

$$4^2 = 4 \times 4 = 16$$

(b) 5^3 : exponent is 3; base is 5.

$$5^3 = 5 \times 5 \times 5 = 125$$

(c) 3^4 : exponent is 4; base is 3.

$$3^4 = 3 \times 3 \times 3 \times 3 = 81$$

(d) 2^6 : exponent is 6; base is 2.

$$2^6 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$$

2. (a) Because $2^2 = 4$, $\sqrt{4} = 2$.

(b) Because $5^2 = 25$, $\sqrt{25} = 5$.

(c) Because $6^2 = 36$, $\sqrt{36} = 6$.

(d) Because $15^2 = 225$, $\sqrt{225} = 15$.

(e) Because $1^2 = 1$, $\sqrt{1} = 1$.

3. (a) $4 + 5 + 2^2$ Evaluate exponent

$$4 + 5 + 2 \cdot 2 \text{ Multiply}$$

$$4 + 5 + 4 \text{ Add from left to right}$$

$$9 + 4 = 13$$

(b) $3^2 + 2^3$ Evaluate exponent

$$3 \cdot 3 + 2 \cdot 2 \cdot 2 \text{ Multiply from left to right}$$

$$9 + 8 = 17 \text{ Add}$$

- (c) $4 \cdot 6 \div 12 - 2$ *Multiply*
 $24 \div 12 - 2$ *Divide*
 $2 - 2 = 0$ *Subtract*
- (d) $60 \div \sqrt{36} \div 2$ *Square root*
 $60 \div 6 \div 2$ *Divide*
 $10 \div 2 = 5$ *Divide*
- (e) $8 + 6(14 \div 2)$ *Work inside parentheses*
 $8 + 6(7)$ *Multiply*
 $8 + 42 = 50$ *Add*

4. (a) $12 - 6 + 4^2$ *Evaluate exponent*
 $12 - 6 + 16$ *Subtract*
 $6 + 16 = 22$ *Add*
- (b) $2^3 + 3^2 - (5 \cdot 3)$ *Work inside parentheses*
 $2^3 + 3^2 - 15$ *Evaluate exponents*
 $8 + 9 - 15$ *Add*
 $17 - 15 = 2$ *Subtract*
- (c) $2 \cdot \sqrt{64} - 5 \cdot 3$ *Square root*
 $2 \cdot 8 - 5 \cdot 3$ *Multiply*
 $16 - 15 = 1$ *Subtract*
- (d) $20 \div 2 + (7 - 5)$ *Parentheses*
 $20 \div 2 + 2$ *Divide*
 $10 + 2 = 12$ *Add*
- (e) $15 \cdot \sqrt{9} - 8 \cdot \sqrt{4}$ *Square roots*
 $15 \cdot 3 - 8 \cdot 2$ *Multiply*
 $45 - 16 = 29$ *Subtract*

1.8 Section Exercises

- 3^2 : exponent is 2, base is 3.
 $3^2 = 3 \cdot 3 = 9$
- Exponent is 3, base is 2.
 $2^3 = 2 \cdot 2 \cdot 2 = 4 \cdot 2 = 8$
- 5^2 : exponent is 2, base is 5.
 $5^2 = 5 \cdot 5 = 25$
- Exponent is 2, base is 4.
 $4^2 = 4 \cdot 4 = 16$
- 8^2 : exponent is 2, base is 8.
 $8^2 = 8 \cdot 8 = 64$
- Exponent is 3, base is 10.
 $10^3 = 10 \cdot 10 \cdot 10 = 100 \cdot 10 = 1000$
- 15^2 : exponent is 2, base is 15.
 $15^2 = 15 \cdot 15 = 225$
- Exponent is 3, base is 11.
 $11^3 = 11 \cdot 11 \cdot 11 = 121 \cdot 11 = 1331$
- From the table, $4^2 = 16$, so $\sqrt{16} = 4$.
- From the table, $5^2 = 25$, so $\sqrt{25} = 5$.
- From the table, $8^2 = 64$, so $\sqrt{64} = 8$.
- From the table, $6^2 = 36$, so $\sqrt{36} = 6$.
- From the table, $10^2 = 100$, so $\sqrt{100} = 10$.
- From the table, $7^2 = 49$, so $\sqrt{49} = 7$.
- From the table, $12^2 = 144$, so $\sqrt{144} = 12$.
- From the table, $15^2 = 225$, so $\sqrt{225} = 15$.
- $6^2 = \underline{36}$, so $\sqrt{36} = 6$.
- $9^2 = \underline{81}$, so $\sqrt{81} = 9$.
- $20^2 = \underline{400}$, so $\sqrt{400} = 20$.
- $30^2 = \underline{900}$, so $\sqrt{900} = 30$.
- $35^2 = \underline{1225}$, so $\sqrt{1225} = 35$.
- $38^2 = \underline{1444}$, so $\sqrt{1444} = 38$.
- $25^2 = \underline{625}$, so $\sqrt{625} = 25$.
- $50^2 = \underline{2500}$, so $\sqrt{2500} = 50$.
- $100^2 = \underline{10,000}$, so $\sqrt{10,000} = 100$.
- $60^2 = \underline{3600}$, so $\sqrt{3600} = 60$.
- A perfect square is the square of a whole number.
The number 25 is the square of 5 because $5 \cdot 5 = 25$.
The number 50 is not a perfect square. There is no whole number that can be squared to get 50.
- (1) Do all operations inside parentheses or other grouping symbols.
(2) Simplify any expressions with exponents and find any square roots.
(3) Multiply or divide, proceeding from left to right.
(4) Add or subtract, proceeding from left to right.
- $3^2 + 8 - 5$ *Exponent*
 $9 + 8 - 5$ *Add*
 $17 - 5 = 12$ *Subtract*
- $5^2 + 5 - 6$ *Exponent*
 $25 + 5 - 6$ *Add*
 $30 - 6 = 24$ *Subtract*

31. $3 \cdot 7 - 6$ *Multiply*
 $21 - 6 = 15$ *Subtract*
32. $5 \cdot 7 - 7$ *Multiply*
 $35 - 7 = 28$ *Subtract*
33. $8 \cdot 5 \div 10$ *Multiply*
 $40 \div 10 = 4$ *Divide*
34. $6 \cdot 8 \div 8$ *Multiply*
 $48 \div 8 = 6$ *Divide*
35. $25 \div 5(8 - 4)$ *Parentheses*
 $25 \div 5(4)$ *Divide*
 $5(4) = 20$ *Multiply*
36. $36 \div 18(7 - 3)$ *Parentheses*
 $36 \div 18 \cdot 4$ *Divide*
 $2 \cdot 4 = 8$ *Multiply*
37. $5 \cdot 3^2 + \frac{0}{8}$ *Exponent*
 $5 \cdot 9 + \frac{0}{8}$ *Multiply*
 $45 + \frac{0}{8}$ *Divide*
 $45 + 0 = 45$ *Add*
38. $8 \cdot 3^2 - \frac{10}{2}$ *Exponent*
 $8 \cdot 9 - \frac{10}{2}$ *Multiply*
 $72 - \frac{10}{2}$ *Divide*
 $72 - 5 = 67$ *Subtract*
39. $4 \cdot 1 + 8(9 - 2) + 3$ *Parentheses*
 $4 \cdot 1 + 8 \cdot 7 + 3$ *Multiply*
 $4 + 56 + 3$ *Add*
 $60 + 3 = 63$ *Add*
40. $3 \cdot 2 + 7(3 + 1) + 5$ *Parentheses*
 $3 \cdot 2 + 7 \cdot 4 + 5$ *Multiply*
 $6 + 28 + 5$ *Add*
 $34 + 5 = 39$ *Add*
41. $2^2 \cdot 3^3 + (20 - 15) \cdot 2$ *Parentheses*
 $2^2 \cdot 3^3 + 5 \cdot 2$ *Exponents*
 $4 \cdot 27 + 5 \cdot 2$ *Multiply*
 $108 + 10 = 118$ *Add*
42. $4^2 \cdot 5^2 + (20 - 9) \cdot 3$ *Parentheses*
 $4^2 \cdot 5^2 + 11 \cdot 3$ *Exponents*
 $16 \cdot 25 + 11 \cdot 3$ *Multiply*
 $400 + 33 = 433$ *Add*
43. $5 \cdot \sqrt{36} - 2(4)$ *Square root*
 $5 \cdot 6 - 2(4)$ *Multiply*
 $30 - 8 = 22$ *Subtract*
44. $2 \cdot \sqrt{100} - 3(4)$ *Square root*
 $2 \cdot 10 - 3(4)$ *Multiply*
 $20 - 12 = 8$ *Subtract*
45. $8(2) + 3 \cdot 7 - 7$ *Multiply*
 $16 + 21 - 7$ *Add*
 $37 - 7 = 30$ *Subtract*
46. $10(3) + 6 \cdot 5 - 20$ *Multiply*
 $30 + 30 - 20$ *Add*
 $60 - 20 = 40$ *Subtract*
47. $2^3 \cdot 3^2 + 3(14 - 4)$ *Parentheses*
 $2^3 \cdot 3^2 + 3(10)$ *Exponents*
 $8 \cdot 9 + 3(10)$ *Multiply*
 $72 + 30 = 102$ *Add*
48. $3^2 \cdot 4^2 + 2(15 - 6)$ *Parentheses*
 $3^2 \cdot 4^2 + 2(9)$ *Exponents*
 $9 \cdot 16 + 2(9)$ *Multiply*
 $144 + 18 = 162$ *Add*
49. $7 + 8 \div 4 + \frac{0}{7}$ *Divide*
 $7 + 2 + \frac{0}{7}$ *Divide*
 $7 + 2 + 0$ *Add*
 $9 + 0 = 9$ *Add*
50. $6 + 8 \div 2 + \frac{0}{8}$ *Divide*
 $6 + 4 + \frac{0}{8}$ *Divide*
 $6 + 4 + 0$ *Add*
 $10 + 0 = 10$ *Add*
51. $3^2 + 6^2 + (30 - 21) \cdot 2$ *Parentheses*
 $3^2 + 6^2 + 9 \cdot 2$ *Exponents*
 $9 + 36 + 9 \cdot 2$ *Multiply*
 $9 + 36 + 18$ *Add*
 $45 + 18 = 63$ *Add*
52. $4^2 + 5^2 + (25 - 9) \cdot 3$ *Parentheses*
 $4^2 + 5^2 + 16 \cdot 3$ *Exponents*
 $16 + 25 + 16 \cdot 3$ *Multiply*
 $16 + 25 + 48$ *Add*
 $41 + 48 = 89$ *Add*
53. $7 \cdot \sqrt{81} - 5 \cdot 6$ *Square root*
 $7 \cdot 9 - 5 \cdot 6$ *Multiply*
 $63 - 30 = 33$ *Subtract*
54. $6 \cdot \sqrt{64} - 6 \cdot 5$ *Square root*
 $6 \cdot 8 - 6 \cdot 5$ *Multiply*
 $48 - 30 = 18$ *Subtract*

55. $8 \cdot 2 + 5(3 \cdot 4) - 6$ *Parentheses*
 $8 \cdot 2 + 5(12) - 6$ *Multiply*
 $16 + 60 - 6$ *Add*
 $76 - 6 = 70$ *Subtract*

56. $5 \cdot 2 + 3(5 + 3) - 6$ *Parentheses*
 $5 \cdot 2 + 3(8) - 6$ *Multiply*
 $10 + 24 - 6$ *Add*
 $34 - 6 = 28$ *Subtract*

57. $4 \cdot \sqrt{49} - 7(5 - 2)$ *Parentheses*
 $4 \cdot \sqrt{49} - 7 \cdot 3$ *Square root*
 $4 \cdot 7 - 7 \cdot 3$ *Multiply*
 $28 - 21 = 7$ *Subtract*

58. $3 \cdot \sqrt{25} - 6(3 - 1)$ *Parentheses*
 $3 \cdot \sqrt{25} - 6 \cdot 2$ *Square root*
 $3 \cdot 5 - 6 \cdot 2$ *Multiply*
 $15 - 12 = 3$ *Subtract*

59. $7(4 - 2) + \sqrt{9}$ *Parentheses*
 $7(2) + \sqrt{9}$ *Square root*
 $7(2) + 3$ *Multiply*
 $14 + 3 = 17$ *Add*

60. $5(4 - 3) + \sqrt{9}$ *Parentheses*
 $5(1) + \sqrt{9}$ *Square root*
 $5(1) + 3$ *Multiply*
 $5 + 3 = 8$ *Add*

61. $7^2 + 3^2 - 8 + 5$ *Exponents*
 $49 + 9 - 8 + 5$ *Add*
 $58 - 8 + 5$ *Subtract*
 $50 + 5 = 55$ *Add*

62. $3^2 - 2^2 + 3 - 2$ *Exponents*
 $9 - 4 + 3 - 2$ *Subtract*
 $5 + 3 - 2$ *Add*
 $8 - 2 = 6$ *Subtract*

63. $5^2 \cdot 2^2 + (8 - 4) \cdot 2$ *Parentheses*
 $5^2 \cdot 2^2 + 4 \cdot 2$ *Exponents*
 $25 \cdot 4 + 4 \cdot 2$ *Multiply*
 $100 + 8 = 108$ *Add*

64. $5^2 \cdot 3^2 + (30 - 20) \cdot 2$ *Parentheses*
 $5^2 \cdot 3^2 + 10 \cdot 2$ *Exponents*
 $25 \cdot 9 + 10 \cdot 2$ *Multiply*
 $225 + 20 = 245$ *Add*

65. $5 + 9 \div 3 + 6 \cdot 3$ *Divide*
 $5 + 3 + 6 \cdot 3$ *Multiply*
 $5 + 3 + 18$ *Add*
 $8 + 18 = 26$ *Add*

66. $8 + 3 \div 3 + 6 \cdot 3$ *Divide*
 $8 + 1 + 6 \cdot 3$ *Multiply*
 $8 + 1 + 18$ *Add*
 $9 + 18 = 27$ *Add*

67. $8 \cdot \sqrt{49} - 6(9 - 4)$ *Parentheses*
 $8 \cdot \sqrt{49} - 6(5)$ *Square root*
 $8 \cdot 7 - 6(5)$ *Multiply*
 $56 - 30 = 26$ *Subtract*

68. $8 \cdot \sqrt{49} - 6(5 + 3)$ *Parentheses*
 $8 \cdot \sqrt{49} - 6(8)$ *Square root*
 $8 \cdot 7 - 6(8)$ *Multiply*
 $56 - 48 = 8$ *Subtract*

69. $5^2 - 4^2 + 3 \cdot 6$ *Exponent*
 $25 - 16 + 3 \cdot 6$ *Multiply*
 $25 - 16 + 18$ *Subtract*
 $9 + 18 = 27$ *Add*

70. $3^2 + 6^2 - 5 \cdot 8$ *Exponent*
 $9 + 36 - 5 \cdot 8$ *Multiply*
 $9 + 36 - 40$ *Add*
 $45 - 40 = 5$ *Subtract*

71. $8 + 8 \div 8 + 6 + \frac{5}{5}$ *Divide*
 $8 + 1 + 6 + 1$ *Add*
 $9 + 6 + 1$ *Add*
 $15 + 1 = 16$ *Add*

72. $3 + 14 \div 2 + 7 + \frac{8}{8}$ *Divide*
 $3 + 7 + 7 + 1$ *Add*
 $10 + 7 + 1$ *Add*
 $17 + 1 = 18$ *Add*

73. $6 \cdot \sqrt{25} - 7(2)$ *Square root*
 $6 \cdot 5 - 7 \cdot 2$ *Multiply*
 $30 - 14 = 16$ *Subtract*

74. $8 \cdot \sqrt{36} - 4(6)$ *Square root*
 $8 \cdot 6 - 4(6)$ *Multiply*
 $48 - 24 = 24$ *Subtract*

75. $9 \cdot \sqrt{16} - 3 \cdot \sqrt{25}$ *Square roots*
 $9 \cdot 4 - 3 \cdot 5$ *Multiply*
 $36 - 15 = 21$ *Subtract*

76. $6 \cdot \sqrt{81} - 3 \cdot \sqrt{49}$ *Square roots*
 $6 \cdot 9 - 3 \cdot 7$ *Multiply*
 $54 - 21 = 33$ *Subtract*

- 77.** $7 \div 1 \cdot 8 \cdot 2 \div (21 - 5)$ *Parentheses*
 $7 \div 1 \cdot 8 \cdot 2 \div 16$ *Divide*
 $7 \cdot 8 \cdot 2 \div 16$ *Multiply*
 $56 \cdot 2 \div 16$ *Multiply*
 $112 \div 16 = 7$ *Divide*
- 78.** $12 \div 4 \cdot 5 \cdot 4 \div (15 - 13)$ *Parentheses*
 $12 \div 4 \cdot 5 \cdot 4 \div 2$ *Divide*
 $3 \cdot 5 \cdot 4 \div 2$ *Multiply*
 $15 \cdot 4 \div 2$ *Multiply*
 $60 \div 2 = 30$ *Divide*
- 79.** $15 \div 3 \cdot 2 \cdot 6 \div (14 - 11)$ *Parentheses*
 $15 \div 3 \cdot 2 \cdot 6 \div 3$ *Divide*
 $5 \cdot 2 \cdot 6 \div 3$ *Multiply*
 $10 \cdot 6 \div 3$ *Multiply*
 $60 \div 3 = 20$ *Divide*
- 80.** $9 \div 1 \cdot 4 \cdot 2 \div (11 - 5)$ *Parentheses*
 $9 \div 1 \cdot 4 \cdot 2 \div 6$ *Divide*
 $9 \cdot 4 \cdot 2 \div 6$ *Multiply*
 $36 \cdot 2 \div 6$ *Multiply*
 $72 \div 6 = 12$ *Divide*
- 81.** $6 \cdot \sqrt{25} - 4 \cdot \sqrt{16}$ *Square roots*
 $6 \cdot 5 - 4 \cdot 4$ *Multiply*
 $30 - 16 = 14$ *Subtract*
- 82.** $10 \cdot \sqrt{49} - 4 \cdot \sqrt{64}$ *Square roots*
 $10 \cdot 7 - 4 \cdot 8$ *Multiply*
 $70 - 32 = 38$ *Subtract*
- 83.** $5 \div 1 \cdot 10 \cdot 4 \div (17 - 9)$ *Parentheses*
 $5 \div 1 \cdot 10 \cdot 4 \div 8$ *Divide*
 $5 \cdot 10 \cdot 4 \div 8$ *Multiply*
 $50 \cdot 4 \div 8$ *Multiply*
 $200 \div 8 = 25$ *Divide*
- 84.** $15 \div 3 \cdot 8 \cdot 9 \div (12 - 8)$ *Parentheses*
 $15 \div 3 \cdot 8 \cdot 9 \div 4$ *Divide*
 $5 \cdot 8 \cdot 9 \div 4$ *Multiply*
 $40 \cdot 9 \div 4$ *Multiply*
 $360 \div 4 = 90$ *Divide*
- 85.** $8 \cdot 9 \div \sqrt{36} - 4 \div 2 + (14 - 8)$ *Parentheses*
 $8 \cdot 9 \div \sqrt{36} - 4 \div 2 + 6$ *Square root*
 $8 \cdot 9 \div 6 - 4 \div 2 + 6$ *Multiply*
 $72 \div 6 - 4 \div 2 + 6$ *Divide*
 $12 - 2 + 6$ *Subtract*
 $10 + 6 = 16$ *Add*
- 86.** $3 - 2 + 5 \cdot 4 \cdot \sqrt{144} \div \sqrt{36}$ *Square roots*
 $3 - 2 + 5 \cdot 4 \cdot 12 \div 6$ *Multiply*
 $3 - 2 + 20 \cdot 12 \div 6$ *Multiply*
 $3 - 2 + 240 \div 6$ *Divide*
 $3 - 2 + 40$ *Subtract*
 $1 + 40 = 41$ *Add*
- 87.** $2 + 1 - 2 \cdot \sqrt{1} + 4 \cdot \sqrt{81} - 7 \cdot 2$ *Square roots*
 $2 + 1 - 2 \cdot 1 + 4 \cdot 9 - 7 \cdot 2$ *Multiply*
 $2 + 1 - 2 + 36 - 14$ *Add*
 $3 - 2 + 36 - 14$ *Subtract*
 $1 + 36 - 14$ *Add*
 $37 - 14 = 23$ *Subtract*
- 88.** $6 - 4 + 2 \cdot 9 - 3 \cdot \sqrt{225} \div \sqrt{25}$ *Square roots*
 $6 - 4 + 2 \cdot 9 - 3 \cdot 15 \div 5$ *Multiply*
 $6 - 4 + 18 - 45 \div 5$ *Divide*
 $6 - 4 + 18 - 9$ *Subtract*
 $2 + 18 - 9$ *Add*
 $20 - 9 = 11$ *Subtract*
- 89.** $5 \cdot \sqrt{36} \cdot \sqrt{100} \div 4 \cdot \sqrt{9} + 8$ *Square roots*
 $5 \cdot 6 \cdot 10 \div 4 \cdot 3 + 8$ *Multiply*
 $30 \cdot 10 \div 4 \cdot 3 + 8$ *Multiply*
 $300 \div 4 \cdot 3 + 8$ *Divide*
 $75 \cdot 3 + 8$ *Multiply*
 $225 + 8 = 233$ *Add*
- 90.** $9 \cdot \sqrt{36} \cdot \sqrt{81} \div 2 + 6 - 3 - 5$ *Square roots*
 $9 \cdot 6 \cdot 9 \div 2 + 6 - 3 - 5$ *Multiply*
 $54 \cdot 9 \div 2 + 6 - 3 - 5$ *Multiply*
 $486 \div 2 + 6 - 3 - 5$ *Divide*
 $243 + 6 - 3 - 5$ *Add*
 $249 - 3 - 5$ *Subtract*
 $246 - 5 = 241$ *Subtract*

1.9 Reading Pictographs, Bar Graphs, and Line Graphs

1.9 Margin Exercises

- (a) The Rock and Roll/Rhythm and Blues stamp had the second greatest number of sales since that row has the second most stamp symbols.

(b) There is about one more stamp in the Rock and Roll/Rhythm and Blues row than in the Art of Disney Romance row. Since one stamp represents 20 million stamps, there were about 20,000,000 more Rock and Roll/Rhythm and Blues stamps sold.
- (a) College football: 10 out of 100

(b) Pro baseball: 17 out of 100

(c) Pro basketball: 13 out of 100

(d) College basketball: 6 out of 100

(e) Golf: 6 out of 100

3. (a) For the year 2050, the dot is very close to the horizontal line marked 4, so the predicted population is about 400,000,000 people in 2050.
 (b) About 475,000,000 people in 2075
 (c) About 575,000,000 people in 2100

1.9 Section Exercises

- There are 9 symbols, so the number of retail stores for Family Dollar is about $9 \cdot 500 = 4500$ stores.
- There are $10\frac{1}{2}$ symbols, so the number of retail stores for 7-Eleven is about
 $10 \cdot 500 + \frac{1}{2} \cdot 500 = 5000 + 250 = 5250$.
- From the pictograph, Dollar General has the greatest number of retail stores.
 There are $11\frac{1}{2}$ symbols, so the number of retail stores for Dollar General is about
 $11 \cdot 500 + \frac{1}{2} \cdot 500 = 5500 + 250 = 5750$.
- According to the pictograph, the two companies that have the least number of retail stores are Rite-Aid and Wal-Mart.
 There are 7 symbols, so the number of retail stores for Rite-Aid and Wal-Mart is about
 $7 \cdot 500 = 3500$.
- Using the results from Exercises 1 and 3, we see that Family Dollar has about
 $5750 - 4500 = 1250$ fewer stores
 than does Dollar General.
- Walgreens has one more symbol than Wal-Mart, so Walgreens has 500 more stores than Wal-Mart.
- From the bar graph, 9 people out of 100 found their career as a result of training for a job.
- From the bar graph, 18 people out of 100 found their careers because they studied for the career in school.
- (a) According to the bar graph, the greatest number of people found their job by seeing an ad.
 (b) From the bar graph, 25 people out of 100 found their career as a result of seeing an ad.
- (a) From the bar graph, the least number of people found their career by being promoted from within.
 (b) From the bar graph, 6 people out of 100 found their career as a result of being promoted from within.
- According to the bar graph, $18 - 9 = 9$ more people out of 100 found their career as a result of "Studied in school" than "Luck or chance."
- From the bar graph, $18 + 9 = 27$ people out of 100 found their career as a result of either "Studied in school" or "Trained for a job."
- According to the line graph, the year with the greatest number of trees planted is 2011, with 7000 trees.
- From the line graph, 2006 and 2010 were the two years with the least number of trees planted. There were 2500 trees planted in each of these years.
- According to the line graph the increase in the number of trees planted from 2010 to 2011 is $7000 - 2500 = 4500$.
- | | |
|---------------|---------------------------|
| 4000 | trees planted in 2009 |
| <u>- 2500</u> | trees planted in 2010 |
| 1500 | decrease in trees planted |

The decrease in the number of trees planted from 2009 to 2010 is 1500.
- Possible answers are
 - shortage of trees to plant
 - lack of qualified workers
 - poor economy
 - less demand for planting.
- Possible answers are
 - greater demand
 - more trees available
 - many qualified workers
 - availability of money for reforestation projects.
- We want to insert parentheses in $7 - 2 \cdot 3 - 6$ so that it simplifies to 9. There isn't a method to use, so just use trial and error.

$$(7 - 2) \cdot 3 - 6 = 5 \cdot 3 - 6 = 15 - 6 = 9$$
- $(4 + 2) \cdot (5 + 1) = 6 \cdot 6 = 36$
- $36 \div (3 \cdot 3) \cdot 4 = 36 \div 9 \cdot 4 = 4 \cdot 4 = 16$
- $56 \div (2 \cdot 2 \cdot 2) + \frac{0}{6} = 56 \div 8 + 0 = 7 + 0 = 7$
- (a) Start with the top and work counterclockwise:

$$7920 + 1320 + 2640 + (5280 - 1320 - 1320) + 2640 + 1320 + 7920 + 5280$$
 (b) $(5280 - 1320 - 1320) = 2640$, so we can add as follows:

$$\begin{array}{r}
 \overset{42}{7}920 \text{ top measurement} \\
 1320 \\
 2640 \\
 2640 \text{ from parentheses} \\
 2640 \\
 1320 \\
 7920 \\
 + 5280 \text{ right measurement} \\
 \hline
 31,680 \text{ total}
 \end{array}$$

So 31,680 feet are needed for one strand and thus, $3 \times 31,680 = 95,040$ feet are needed for a three-strand barbed wire fence.

(c) Divide the answer from part (b) by 5280.

$$\begin{array}{r}
 18 \\
 5280 \overline{) 95,040} \\
 \underline{5280} \\
 42240 \\
 \underline{42240} \\
 0
 \end{array}$$

18 miles of barbed wire are needed for the fence.

1.10 Solving Application Problems

1.10 Margin Exercises

- (a) A grocery clerk's hourly wage: \$1.40; $\boxed{\$14}$; \$140

(b) The total length of five sports-utility vehicles: 8 feet; 18 feet; $\boxed{80 \text{ feet}}$; 800 feet

(c) The cost of heart bypass surgery: \$1000; $\boxed{\$100,000}$; \$10,000,000

- (a) *Step 1*
The total number of fossils is given, and the number each person receives must be found.

Step 2
"Divided equally" indicates division should be used.

Step 3
80 fossils divided equally among 4 people gives an estimate of 20 fossils per person.

Step 4

$$\begin{array}{r}
 21 \\
 4 \overline{) 84}
 \end{array}$$

Step 5
Each person receives 21 fossils.

Step 6

$$\begin{array}{r}
 21 \text{ amount received by each person} \\
 \times 4 \text{ number of people} \\
 \hline
 84 \text{ total fossils; matches}
 \end{array}$$

(b) *Step 1*

The total number of children and the number of children assigned to each counselor is given. The number of counselors needed must be found.

Step 2

"12 children are assigned to *each* camp counselor" indicates division should be used.

Step 3

If we replace 408 and 12 with 400 and 10, our estimate is $400 \div 10 = 40$.

Step 4

$$\begin{array}{r}
 34 \\
 12 \overline{) 408} \\
 \underline{36} \\
 48 \\
 \underline{48} \\
 0
 \end{array}$$

Step 5

There are 34 counselors needed.

Step 6

$$\begin{array}{r}
 34 \text{ counselors} \\
 \times 12 \text{ children per counselor} \\
 \hline
 408 \text{ total children; matches}
 \end{array}$$

- (a) *Step 1*

The number of points on examinations and quizzes is given. The total number of points must be found.

Step 2

"Her total points" indicates addition should be used.

Step 3

Rounding each score to the nearest ten gives 90, 80, 80, 100, 20, 10, 20, and 10. The sum of these scores gives an estimate of 410 points.

Step 4

$$\begin{array}{r}
 3 \\
 92 \\
 81 \\
 83 \\
 98 \\
 15 \\
 14 \\
 15 \\
 + 12 \\
 \hline
 410 \text{ matches estimate}
 \end{array}$$

Step 5

Her total is 410 points.

Step 6

The answer is the same as the estimate, so it is reasonable. Add the numbers again to check.

(b) Step 1

The customer contacts for each day are given. The total number of contacts for the week must be found.

Step 2

Adding the daily numbers to find the weekly total seems reasonable.

Step 3

Rounding each day's contacts to the nearest ten gives 80, 60, 120, 100, and 200. The sum gives an estimate of 560 customer contacts.

Step 4

$$\begin{array}{r} 22 \\ 78 \\ 64 \\ 118 \\ 102 \\ + 196 \\ \hline 558 \end{array}$$

Step 5

Stephanie had 558 customer contacts for the week.

Step 6

The answer is reasonable. A check shows that the answer is correct.

4. (a) Step 1

The number of square feet for the home and the apartment is given. The difference must be found.

Step 2

"Difference" indicates subtraction should be used.

Step 3

Rounding each number of square feet to the nearest hundred gives $1500 - 1000 = 500$ square feet.

Step 4

$$\begin{array}{r} 1450 \\ - 980 \\ \hline 470 \end{array}$$

Step 5

The difference in the number of square feet is 470 square feet.

Step 6

The answer is reasonable.

Check:

$$\begin{array}{r} 980 \\ + 470 \\ \hline 1450 \text{ matches} \end{array}$$

(b) Step 1

We know the beginning balance and the check amount, and need to find the new balance.

Step 2

Subtracting the numbers seems reasonable.

Step 3

Using the values \$14,900 and \$1200 in place of \$14,863 and \$1180 gives us $\$14,900 - \$1200 = \$13,700$ as an estimate.

Step 4

$$\begin{array}{r} 14,863 \\ - 1,180 \\ \hline 13,683 \end{array}$$

Step 5

The amount remaining in the club account is \$13,683.

Step 6

The answer is reasonable.

Check:

$$\begin{array}{r} 13,683 \\ + 1,180 \\ \hline 14,863 \text{ matches} \end{array}$$

5. (a) Step 1

The amount per job, number of jobs, and expenses are given. The amount made is to be found.

Step 2

Use multiplication to find the amount received for all jobs, and then use subtraction to find the amount made.

Step 3

An estimate would be $6 \cdot \$700 - \$300 = \$4200 - \$300 = \$3900$.

Step 4

$$\begin{array}{r} 53 \\ \$685 \quad \$4110 \\ \times 6 \quad - 320 \\ \hline \$4110 \quad \$3790 \end{array}$$

Step 5

Brenda will make \$3790 after deducting her expenses.

Step 6

The answer is close to the estimate, so it is reasonable. Check by adding the expenses to the amount made and then dividing by 6.

$$\$3790 + \$320 = \$4110$$

$$\begin{array}{r} 685 \\ 6 \overline{)4110} \\ \underline{36} \\ 51 \\ \underline{48} \\ 30 \end{array}$$

\$685 matches the amount per job given in the problem.

(b) Step 1

The number of books sold and the number of those returned is given. The profit for each book sold is also given. The total profit on the books sold and not returned must be found.

Step 2

"Remaining" indicates subtraction. The number of books returned should be subtracted from the number sold and that number multiplied by the profit per book.

Step 3

Estimate that 13,000 books are sold, and 1000 of those are returned. A reasonable estimate is $13,000 - 1000 = 12,000$. Each book has a profit of \$6, so $12,000 \times \$6 = \$72,000$.

Step 4

$$\begin{array}{r} 12,628 \\ - 863 \\ \hline 11,765 \end{array} \quad \begin{array}{r} 11,765 \\ \times 6 \\ \hline \$70,590 \end{array}$$

Step 5

The total profit for the books remaining after the returns is \$70,590.

Step 6

The answer is reasonable since it is close to the estimate.

Check:
$$\begin{array}{r} 11,765 \\ 6 \overline{) 70,590} \\ \hline 12,628 \end{array}$$

1.10 Section Exercises**1. Step 1**

Given the number of five types of sandwiches sold, find the total number of sandwiches sold.

Step 2

Addition seems reasonable since we want a total.

Step 3

The total number of sandwiches should be about $600 + 900 + 1000 + 800 + 2000 = 5300$ sandwiches.

Step 4

$$\begin{array}{r} 322 \\ 602 \\ 935 \\ 1328 \\ 757 \\ + 1586 \\ \hline 5208 \end{array}$$

Step 5

The total number of sandwiches sold is 5208.

Step 6

The answer is reasonably close to the estimate. Check by adding the values again.

2. Step 1

Given the number of five types of units manufactured, find the total.

Step 2

Addition seems reasonable to use.

Step 3

$$30,000 + 5000 + 2000 + 20,000 + 10,000 = 67,000 \text{ is an estimate.}$$

Step 4

$$\begin{array}{r} 2312 \\ 32,815 \\ 4875 \\ 1975 \\ 15,308 \\ + 9815 \\ \hline 64,788 \end{array}$$

Step 5

The total number of units manufactured is 64,788.

Step 6

The answer is reasonably close to the estimate. Check by adding the values again.

3. Step 1

Given the number of meat recalls in two years, find the difference.

Step 2

"How many more" indicates subtraction could be used.

Step 3

An estimate is $70 - 60 = 10$.

Step 4

$$\begin{array}{r} 68 \\ - 55 \\ \hline 13 \end{array}$$

Step 5

There were 13 more recalls in 2003 than in 2007.

Step 6

The answer is reasonably close to the estimate.

Check: $13 + 55 = 68$

4. Step 1

Given the number of meat recalls in two years, find the difference.

Step 2

"How many fewer" indicates subtraction could be used.

*Step 3*An estimate is $60 - 40 = 20$.*Step 4*

$$\begin{array}{r} 57 \\ - 37 \\ \hline 20 \end{array}$$

Step 5

There were 20 fewer recalls in 2006 than in 2008.

Step 6

The answer is reasonably close to the estimate.

Check: $20 + 37 = 57$ 5. *Step 1*

The number of kits packaged in one hour is given and the total number of kits packaged in 24 hours must be found.

Step 2

Multiply the number of kits packaged in 1 hour by 24.

*Step 3*A reasonable answer would be $200 \times 20 = 4000$.*Step 4*

$$\begin{array}{r} 236 \\ \times 24 \\ \hline 944 \\ 472 \\ \hline 5664 \end{array}$$

Step 5

5664 kits are packaged in 24 hours.

Step 6

The answer is reasonably close to the estimate, which is clearly low.

Check: $\begin{array}{r} 236 \\ 24 \overline{)5664} \end{array}$

6. *Step 1*

Find the number of tickets sold in a 12-day period.

Step 2

The number of tickets sold in one day is given. To find "how many in a 12-day period," multiply.

Step 3

10 times 500 gives an estimate of 5000 tickets.

Step 4

$$\begin{array}{r} 450 \\ \times 12 \\ \hline 900 \\ 450 \\ \hline 5400 \end{array}$$

Step 5

In a 12-day period, 5400 tickets are sold.

Step 6

Check: $\begin{array}{r} 450 \\ 12 \overline{)5400} \end{array}$

7. *Step 1*

Find the number of toys each child will receive.

Step 2

"Same number of toys to each" indicates division should be used.

Step 3

3000 divided by 700 gives an estimate of about 4 toys.

Step 4

$$\begin{array}{r} 4 \\ 657 \overline{)2628} \\ \underline{2628} \\ 0 \end{array}$$

Step 5

Each child will receive 4 toys.

Step 6

$$4 \times 657 = 2628$$

8. *Step 1*

Find the amount each employee will receive.

Step 2

"Divide evenly" indicates division.

Step 3\$700,000 $\div$ 1000 gives an estimate of \$700.*Step 4*

$$1000 \overline{)680,000} \rightarrow \begin{array}{r} 680 \\ 1 \overline{)680} \end{array}$$

Step 5

Each employee will receive \$680.

Step 6

Check: $680 \times 1000 = 680,000$

9. *Step 1*

The number of people at the lake on Friday is higher than that on Wednesday. The number on Friday and the number higher is given. The number of people on Wednesday must be found.

Step 2

Subtract the number higher from the number on Friday.

*Step 3*A reasonable answer would be $8000 - 4000 = 4000$ people.

$$\begin{array}{r} \text{Step 4} \\ 8392 \\ - 4218 \\ \hline 4174 \end{array}$$

Step 5
4174 people were at the lake on Wednesday.

Step 6
The answer is reasonably close to the estimate.

Check:

$$\begin{array}{r} 4218 \\ + 4174 \\ \hline 8392 \text{ matches} \end{array}$$

10. **Step 1**
Find the amount of money that needs to be collected.

Step 2
Since the amount collected is less than the amount needed, subtract.

Step 3
\$80,000 – \$50,000 gives an estimate of \$30,000.

$$\begin{array}{r} \text{Step 4} \\ \$75,650 \\ - 52,882 \\ \hline \$22,768 \end{array}$$

Step 5
The community needs to raise \$22,768.

$$\begin{array}{r} \text{Step 6} \\ 52,882 \\ + 22,768 \\ \hline 75,650 \text{ matches} \end{array}$$

11. **Step 1**
Find the amount saved for five months.

Step 2
Use multiplication to find the amount.

Step 3
The amount saved is about \$30 per month, making the total $\$30 \times 5 = \150 .

$$\begin{array}{r} \text{Step 4} \\ \$34 \\ \times 5 \\ \hline \$170 \end{array}$$

Step 5
The amount saved in 5 months is \$170.

Step 6
The answer is reasonably close to the estimate.

Check:

$$\begin{array}{r} 34 \\ 5 \overline{)170} \end{array}$$

12. **Step 1**
The cost of tuition for 1 quarter is given. Find the amount needed for 5 quarters.

Step 2
Multiply to find the total amount.

Step 3
An estimate is $\$800 \times 5 = \4000 .

$$\begin{array}{r} \text{Step 4} \\ \$785 \\ \times 5 \\ \hline \$3925 \end{array}$$

Step 5
\$3925 is needed for 5 quarters.

Step 6
The answer is reasonably close to the estimate.
 $\$3925 \div 5 = \785

13. **Step 1**
Find how much more a dental hygienist earns than a flight attendant.

Step 2
"How much more" indicates subtraction.

Step 3
An estimate is $\$50,000 - \$40,000 = \$10,000$.

$$\begin{array}{r} \text{Step 4} \\ \$54,700 \text{ dental hygienist} \\ - 40,600 \text{ flight attendant} \\ \hline \$14,100 \text{ difference} \end{array}$$

Step 5
A dental hygienist earns \$14,100 more than a flight attendant.

Step 6
The answer is reasonably close to the estimate.
Check: $\$14,100 + \$40,600 = \$54,700$

14. **Step 1**
Find how much more an air traffic controller earns than a court reporter.

Step 2
"How much more" indicates subtraction.

Step 3
An estimate is $\$90,000 - \$40,000 = \$50,000$.

$$\begin{array}{r} \text{Step 4} \\ \$87,930 \text{ air traffic controller} \\ - 40,410 \text{ court reporter} \\ \hline \$47,520 \text{ difference} \end{array}$$

Step 5

An air traffic controller earns \$47,520 more than a court reporter.

Step 6

The answer is reasonably close to the estimate.

Check: $\$47,520 + \$40,410 = \$87,930$

15. Step 1

Find which couple has higher earnings and the difference in their earnings.

Step 2

Add the salaries of each couple to find the total for each. Then subtract to find the "difference."

Step 3

Estimate:

$$\$50,000 + \$40,000 = \$90,000 \quad \text{White}$$

$$\$40,000 + \$50,000 = \$90,000 \quad \text{Easterly}$$

$$\begin{array}{r} \$90,000 \quad \text{White} \\ - 90,000 \quad \text{Easterly} \\ \hline \$0 \quad \text{difference} \end{array}$$

Step 4

$$\begin{array}{r} \text{White:} \quad \$46,540 \quad \text{Easterly:} \quad \$41,990 \\ + 40,410 \quad \quad + 51,380 \\ \hline \$86,950 \quad \quad \$93,370 \end{array}$$

$$\begin{array}{r} \$93,370 \quad \text{Easterly} \\ - 86,950 \quad \text{White} \\ \hline \$6,420 \quad \text{difference} \end{array}$$

Step 5

(a) Mr. and Mrs. Easterly have higher earnings.

(b) The difference between the couples' earnings is \$6420.

Step 6

The answers are reasonably close to the estimates. Check the couples' earnings by adding again. Check the difference by adding \$6420 to \$86,950 to get \$93,370.

16. Step 1

Find which couple has higher earnings and the difference in their earnings.

Step 2

Add the salaries of each couple to find the total for each. Then subtract to find the "difference."

Step 3

Estimate:

$$\$40,000 + \$40,000 = \$80,000 \quad \text{Means}$$

$$\$40,000 + \$50,000 = \$90,000 \quad \text{Strong}$$

$$\begin{array}{r} \$90,000 \quad \text{Strong} \\ - 80,000 \quad \text{Means} \\ \hline \$10,000 \quad \text{difference} \end{array}$$

Step 4

$$\begin{array}{r} \text{Means:} \quad \$42,010 \quad \text{Strong:} \quad \$40,970 \\ + 40,770 \quad \quad + 47,410 \\ \hline \$82,780 \quad \quad \$88,380 \end{array}$$

$$\begin{array}{r} \$88,380 \quad \text{Strong} \\ - 82,780 \quad \text{Means} \\ \hline \$5,600 \quad \text{difference} \end{array}$$

Step 5

(a) Mr. and Mrs. Strong have higher earnings.

(b) The difference between the couples' earnings is \$5600.

Step 6

The answers are reasonably close to the estimates. Check the couples' earnings by adding again. Check the difference by adding \$5600 to \$82,780 to get \$88,380.

17. Step 1

Find her monthly savings.

Step 2

Her monthly take home pay and expenses are given. "Remainder" indicates subtraction may be used.

Step 3

Estimate:

$$\begin{aligned} \$2000 - \$700 - \$300 - \$400 - \$200 - \$200 \\ = \$200 \end{aligned}$$

Step 4

$$\begin{array}{r} \$695 \quad \$2240 \\ 340 \quad - 1890 \\ \hline 435 \quad \$350 \\ 240 \\ + 180 \\ \hline 1890 \end{array}$$

Step 5

Her monthly savings are \$350.

Step 6

The answer seems reasonable for the given estimate.

Check: $\$350 + \$1890 = \$2240$. Re-add the expenses to check the sum of \$1890.

18. Step 1

Find the amount remaining in the checking account.

Step 2

Add to find the total amount of the checks written.
Subtract that total from the balance in the account.

Step 3

About $\$300 + \$600 + \$800 = \1700 was spent.
His balance is about $\$3000 - \$1700 = \$1300$.

Step 4

$$\begin{array}{r} \$308 \quad \$2874 \\ 580 \quad - 1666 \\ + 778 \quad \underline{\$1208} \\ \hline \$1666 \end{array}$$

Step 5

$\$1208$ remains in the account.

Step 6

The answer is reasonably close to the estimate.

Check: $\$1208 + \$1666 = \$2874$. Re-add the check amounts to check the sum of $\$1666$.

19. *Step 1*

The square feet in one acre is given and the square feet in the given number of acres must be found.

Step 2

Multiply the square feet in one acre by the total acres.

Step 3

An estimate is $40,000 \times 100 = 4,000,000 \text{ ft}^2$.

Step 4

$$\begin{array}{r} 43,560 \\ \times 138 \\ \hline 348,480 \\ 1,306,800 \\ 4,356,000 \\ \hline 6,011,280 \end{array}$$

Step 5

There are 6,011,280 square feet in 138 acres.
The answer is reasonable considering the rounding.

Step 6

Check:
$$138 \overline{) 6,011,280} \begin{array}{r} 43,560 \end{array}$$

20. *Step 1*

Find the number of gallons polluted in a year.

Step 2

Multiply by 365 to find the amount polluted in a year.

Step 3

$200,000 \times 400$ gives an estimate of 80,000,000 gallons.

Step 4

$$\begin{array}{r} 209,670 \\ \times 365 \\ \hline 1,048,350 \\ 12,580,200 \\ 62,901,000 \\ \hline 76,529,550 \end{array}$$

Step 5

Each year 76,529,550 gallons are polluted.

Step 6

The answer is reasonably close to the estimate.

Check: $76,529,550 \div 209,670 = 365$

21. *Step 1*

Find the total cost of all Safety and Security Items.

Step 2

Add the costs of the options to find the total cost.

Step 3

Estimate:

$$\begin{array}{r} \$400 + \$1000 + \$200 + \$400 + \$200 + \$200 \\ = \$2400 \end{array}$$

Step 4

$$\begin{array}{r} 131 \\ \$400 \\ 1395 \\ 170 \\ 360 \\ 195 \\ + 160 \\ \hline \$2680 \end{array}$$

Step 5

The total cost is $\$2680$.

Step 6

The answer is reasonably close to the estimate.
Check by re-adding the costs.

22. *Step 1*

The total cost of all Convenience and Comfort Options must be found.

Step 2

Add the costs of the options to find the total cost.

Step 3

Estimate:

$$\begin{array}{r} \$400 + \$400 + \$300 + \$300 + \$200 + \$400 \\ = \$2000 \end{array}$$

Step 4

$$\begin{array}{r}
 21 \\
 \$400 \\
 395 \\
 250 \\
 315 \\
 150 \\
 + 350 \\
 \hline
 \$1860
 \end{array}$$

Step 5

The total cost is \$1860.

Step 6

The answer is reasonably close to the estimate.
Check by re-adding the costs.

23. *Step 1*

An option package is offered. We must find how much can be saved if the customer buys the option package instead of paying for each option separately.

Step 2

First, add the costs of the options. Then subtract the cost of the option package from this total.

Step 3

Estimate:

$$\begin{aligned}
 \$400 + \$200 + \$200 + \$400 &= \$1200 \\
 \$1200 - \$1000 &= \$200
 \end{aligned}$$

Step 4

$$\begin{array}{r}
 \text{Add.} \quad \begin{array}{r} 1 \\ \$400 \end{array} \text{ Child seats} \\
 170 \text{ Security alarm} \\
 150 \text{ Keyless entry} \\
 + 400 \text{ Power sliding door} \\
 \hline
 \$1120 \text{ Total cost}
 \end{array}$$

$$\begin{array}{r}
 \text{Subtract.} \quad \$1120 \text{ Total cost} \\
 - 980 \text{ Option package} \\
 \hline
 \$140 \text{ Amount saved}
 \end{array}$$

Step 5

Jill can save \$140 by buying the option package.

Step 6

The answer is reasonably close to the estimate.

$$\begin{array}{r}
 \text{Check:} \quad \$980 \\
 + 140 \\
 \hline
 \$1120
 \end{array}$$

24. *Step 1*

An option package is offered. We must find how much can be saved if the customer buys the option package instead of paying for each option separately.

Step 2

First, add the costs of the options. Then subtract the cost of the option package from this total.

Step 3

Estimate:

$$\begin{aligned}
 \$400 + \$200 + \$200 + \$300 + \$400 + \$300 \\
 = \$1800 \\
 \$1800 - \$1600 = \$200
 \end{aligned}$$

Step 4

$$\begin{array}{r}
 \text{Add.} \quad \begin{array}{r} 21 \\ \$400 \end{array} \text{ Child seats} \\
 170 \text{ Security alarm} \\
 160 \text{ Full-size spare} \\
 315 \text{ Power door locks} \\
 395 \text{ 8-way power seat} \\
 + 250 \text{ Roof rack} \\
 \hline
 \$1690 \text{ Total cost}
 \end{array}$$

$$\begin{array}{r}
 \text{Subtract.} \quad \$1690 \text{ Total cost} \\
 - 1550 \text{ Option package} \\
 \hline
 \$140 \text{ Amount saved}
 \end{array}$$

Step 5

Samuel can save \$140 by buying the option package.

Step 6

The answer is reasonably close to the estimate.

$$\begin{array}{r}
 \text{Check:} \quad \$1550 \\
 + 140 \\
 \hline
 \$1690
 \end{array}$$

25. *Step 1*

The number and cost of wheelchairs and recorder-players are given and the total cost of all items must be found.

Step 2

Find the cost of all wheelchairs and the cost of all recorder-players. Then add these costs to get the total cost.

Step 3

The cost of the wheelchairs is about
 $\$1000 \times 6 = \6000 .

The cost of the recorder-players is about
 $\$900 \times 20 = \$18,000$.

Estimate: $\$6000 + \$18,000 = \$24,000$

Step 4

$$\begin{array}{r}
 \text{cost of wheelchairs:} \quad \$1256 \\
 \times 6 \\
 \hline
 \$7536
 \end{array}$$

$$\begin{array}{r}
 \text{cost of recorder-players:} \quad \$895 \\
 \times 15 \\
 \hline
 4475 \\
 895 \\
 \hline
 \$13,425
 \end{array}$$

Step 5

The total cost is $\$13,425 + \$7536 = \$20,961$.

Step 6

The answer is reasonably close to the estimate.
Check by repeating Step 4.

26. Step 1

Find the total cost.

Step 2

To find the cost of the computers use multiplication. The cost of the printers must also be found using multiplication. Finally, the two totals must be added.

Step 3

Estimate: $(\$500 \times 20) + (\$500 \times 10)$
 $= \$10,000 + \$5000 = \$15,000$

Step 4

$$\begin{array}{r}
 506 \quad 482 \quad 8602 \\
 \times 17 \quad \times 13 \quad + 6266 \\
 \hline
 3542 \quad 1446 \quad 14,868 \\
 506 \quad 482 \\
 \hline
 8602 \quad 6266
 \end{array}$$

Step 5

The total cost is \$14,868.

Step 6

The answer is reasonably close to the estimate.
Check by repeating Step 4.

27. Possible answers are

Addition: more; total; gain of
 Subtraction: less; loss of; decreased by
 Multiplication: twice; of; product
 Division: divided by; goes into; per
 Equals: is; are

28. (1) Read the problem carefully.

(2) Work out a plan.

(3) Estimate a reasonable answer.

(4) Solve the problem.

(5) State the answer.

(6) Check your work.

29. Estimating the answer can help you avoid careless mistakes like decimal or calculation errors. Examples of reasonable answers in daily life might be a \$35 bag of groceries, \$50 to fill the gas tank, or \$45 for a phone bill.

30. Estimate: $7000 + 6000 + 2000 = 15,000$

Exact: $7438 + 6493 + 2380 = 16,311$

Yes, the answers vary by more than 1000 as a result of the rounding. Yes, they usually do, however, in this example the estimated answer and the exact answer are close enough to give some assurance that the answer is reasonable.

31. Step 1

The daily sales figures are given and the weekly total must be found.

Step 2

Add the daily sales figures to get the weekly total.

Step 3

Estimate: $\$2000 + \$3000 + \$3000 + \$2000 + \$4000 + \$3000 + \$3000 = \$20,000$

Step 4

$$\begin{array}{r}
 \text{Add.} \quad \begin{array}{r} 334 \\ 2358 \end{array} \quad \text{Monday} \\
 3056 \quad \text{Tuesday} \\
 2515 \quad \text{Wednesday} \\
 1875 \quad \text{Thursday} \\
 3978 \quad \text{Friday} \\
 3219 \quad \text{Saturday} \\
 + 3008 \quad \text{Sunday} \\
 \hline
 \$20,009 \quad \text{Total cost}
 \end{array}$$

Step 5

The weekly total is \$20,009.

Step 6

The answer is reasonably close to the estimate.
Check by repeating Step 4.

32. Step 1

The daily number of visitors is given and the weekly total must be found. Assume the numbers correspond to Monday through Sunday.

Step 2

Add the daily figures to get the weekly total.

Step 3

Estimate: $5000 + 3000 + 5000 + 2000 + 4000 + 2000 + 7000 = 28,000$

Step 4

Add.	$\begin{array}{r} 444 \\ 5318 \\ 2865 \\ 4786 \\ 1998 \\ 3899 \\ 2343 \\ + 7221 \\ \hline 28,430 \end{array}$	Monday Tuesday Wednesday Thursday Friday Saturday Sunday Total cost
------	---	--

Step 5

The weekly total is 28,430 visitors.

Step 6

The answer is reasonably close to the estimate.
Check by repeating Step 4.

33. *Step 1*
Find the final weight of the car.

Step 2

The second engine weighs more than the first engine. Find the difference and add it to the weight of the car.

Step 3

582 and 634 both round to 600, so the difference is 0 and an estimate of the car is just its original weight, 2425 pounds.

Step 4

634	new engine	2425	original weight
– 582	old engine	+ 52	additional weight
52	difference	2477	new weight

Step 5

The car will weigh 2477 pounds.

Step 6

The answer is reasonable since it's just slightly more than the original weight.

Check:	$\begin{array}{r} 2425 \\ - 582 \\ \hline 1843 \end{array}$	$\begin{array}{r} 1843 \\ + 634 \\ \hline 2477 \end{array}$
---------------	---	---

34. *Step 1*
Find the balance in the preschool operating account.

Step 2

Subtract the expenses and add the amount raised by the parents to the account balance.

Step 3

Estimate: $\$2300 - \$700 + \$600 = \2200

Step 4

\$2324	\$1590
– 734	+ 568
$\hline$	$\hline$
\$1590	\$2158

Step 5

The balance in the account is \$2158.

Step 6

The answer is reasonably close to the estimate.
The expenses were $\$734 - \$568 = \$166$ more than the amount raised, so the balance is lowered.
 $\$2324 - \$166 = \$2158$.

35. *Step 1*
The costs of two hotels are given. Find the amount saved by staying at the less expensive hotel for seven nights.

Step 2

First subtract the cost of the least expensive hotel and then multiply this savings by seven.

Step 3

Estimate: $\$100 - \$50 = \$50$
 $\$50 \times 7 = \350

Step 4

Subtract.	\$99	Harrah's Lake Tahoe
	– 45	Harrah's Reno
	$\hline$	\$54 Savings for 1 night

Multiply.	\$54
	$\times 7$
	$\hline$
	\$378

Step 5

The savings for 7 nights is \$378.

Step 6

The answer is reasonably close to the estimate.

Check: Lake Tahoe cost: $7 \times \$99 = \693
Reno cost: $7 \times \$45 = \315
Difference: $\$693 - \$315 = \$378$

36. *Step 1*
The costs of two hotels are given. Find the amount saved by staying at the less expensive hotel for four nights.

Step 2

First subtract the cost of the least expensive hotel and then multiply this savings by four.

Step 3

Estimate: $\$600 - \$100 = \$500$
 $\$500 \times 4 = \2000

Step 4

Subtract.	\$645	Ritz-Carlton
	– 74	Motel 6
	$\hline$	\$571

Multiply.	\$571
	$\times 4$
	$\hline$
	\$2284

Step 5

The savings for 4 nights is \$2284.

Step 6

The answer is reasonably close to the estimate.

Check: Ritz-Carlton cost: $4 \times \$645 = \2580

Motel 6 cost: $4 \times \$74 = \296

Difference: $\$2580 - \$296 = \$2284$

37. Step 1

Find out how much money each team received given the amount of money raised, the expenses, and the number of teams.

Step 2

Subtract the expenses from the amount raised, then divide the result by the number of teams.

Step 3

Estimate: $\$8000 - \$800 = \$7200$

$\$7200 \div 20 = \360

Step 4

Subtract.

$$\begin{array}{r} \$7588 \\ - 838 \\ \hline \$6750 \end{array}$$

Divide.

$$\begin{array}{r} \$375 \\ 18 \overline{) \$6750} \\ \underline{54} \\ 135 \\ \underline{126} \\ 90 \\ \underline{90} \\ 0 \end{array}$$

Step 5

Each team will receive \$375.

Step 6

The answer is reasonably close to the estimate.

Check: $18 \times \$375 = \6750

$\$6750 + \$838 = \$7588$

38. Step 1

Find the total number of flats needed.

Step 2

Add the eggs collected in the morning to the eggs collected in the afternoon and divide the total by the number of eggs in each flat.

Step 3

Estimate: $4000 + 3000 = 7000$

$7000 \div 30 \approx 230$

Step 4

3545	morning		204
+ 2575	afternoon	30	$\overline{) 6120}$
	total		$\underline{60}$
			12
			$\underline{0}$
			120
			$\underline{120}$
			0

Step 5

204 flats are needed for packing.

Step 6

The answer is reasonably close to the estimate.

Check: $30 \times 204 = 6120$

$6120 - 2575 = 3545$

39. Step 1

The total seating is given along with the information to find the number of seats on the main floor. The number of rows of seats in the balcony is given and the number of seats in each row of the balcony must be found.

Step 2

First, the number of seats on the main floor must be found. Next, the number of seats on the main floor must be subtracted from the total number of seats to find the number of seats in the balcony. Finally, the number of seats in the balcony must be divided by the number of rows of seats in the balcony.

Step 3

Seats on main floor: $30 \times 25 = 750$

Seats in balcony: $1250 - 750 = 500$

Seats in each row in balcony: $500 \div 25 = 20$

Since we didn't round, our estimate matches our exact answer.

Step 4

See the calculations in Step 3.

Step 5

The number of seats in each row of the balcony is 20.

Step 6

The answer matches the estimate, as expected.

Check: Seats in balcony: $20 \times 25 = 500$

Seats on main floor: $30 \times 25 = 750$

Total seats: $500 + 750 = 1250$

40. *Step 1*

Find the number of boxes each store will receive.

Step 2

Use multiplication to find the total number of grapevine wreaths made per year. Use division to find the number of boxes per year and the number of boxes each store receives.

Step 3

Estimate:

$$24 \times 40 = 960 \text{ wreaths per year}$$

$$960 \div 6 = 160 \text{ boxes per year}$$

$$160 \div 5 = 32 \text{ boxes per store}$$

Since we didn't round, our estimate matches our exact answer.

Step 4

See the calculations in Step 3.

Step 5

Each store will receive 32 boxes.

Step 6

The answer matches the estimate, as expected.

Check:

$$\text{Total number of boxes: } 5 \times 32 = 160$$

$$\text{Boxed wreaths: } 6 \times 160 = 960$$

$$\text{Wreaths made: } 24 \times 40 = 960$$

$$\begin{array}{r} 12. \quad \begin{array}{r} 1 \\ 54 \\ + 67 \\ \hline 121 \end{array} \end{array}$$

$$\begin{array}{r} 13. \quad \begin{array}{r} 1 \quad 1 \\ 807 \\ 4606 \\ + \quad 51 \\ \hline 5464 \end{array} \end{array}$$

$$\begin{array}{r} 14. \quad \begin{array}{r} 8 \quad 2 \quad 1 \\ 15 \\ 9 \\ + 7 \quad 433 \\ \hline 15,657 \end{array} \end{array}$$

$$\begin{array}{r} 15. \quad \begin{array}{r} 1 \quad 1 \\ 2 \quad 130 \\ 453 \\ 8 \quad 107 \\ + \quad 296 \\ \hline 10,986 \end{array} \end{array}$$

$$\begin{array}{r} 16. \quad \begin{array}{r} 221 \\ 5684 \\ 218 \\ 2960 \\ + \quad 983 \\ \hline 9845 \end{array} \end{array}$$

$$\begin{array}{r} 17. \quad \begin{array}{r} 11 \quad 33 \\ 5 \quad 732 \\ 11,069 \\ 37 \end{array} \end{array}$$

$$\begin{array}{r} 1 \quad 595 \\ + 22,169 \\ \hline 40,602 \end{array}$$

$$\begin{array}{r} 18. \quad \begin{array}{r} 1 \quad 31 \\ 3 \quad 451 \\ 12,286 \\ 43 \\ 1 \quad 291 \\ + 32,784 \\ \hline 49,855 \end{array} \end{array}$$

$$\begin{array}{r} 19. \quad \begin{array}{r} 514 \\ 64 \\ - 28 \\ \hline 36 \end{array} \quad \text{Check:} \quad \begin{array}{r} 1 \\ 28 \\ + 36 \\ \hline 64 \end{array} \end{array}$$

$$\begin{array}{r} 20. \quad \begin{array}{r} 316 \\ 46 \\ - 19 \\ \hline 27 \end{array} \quad \text{Check:} \quad \begin{array}{r} 1 \\ 19 \\ + 27 \\ \hline 46 \end{array} \end{array}$$

$$\begin{array}{r} 21. \quad \begin{array}{r} 21615 \\ 375 \\ - 186 \\ \hline 189 \end{array} \quad \text{Check:} \quad \begin{array}{r} 11 \\ 186 \\ + 189 \\ \hline 375 \end{array} \end{array}$$

Chapter 1 Review Exercises

1. 6,573; thousands: 6; ones: 573
2. 36,215; thousands: 36; ones: 215
3. 105,724; thousands: 105; ones: 724
4. 1,768,710,618; billions: 1; millions: 768; thousands: 710; ones: 618
5. 728 is seven hundred twenty-eight.
6. 15,310 is fifteen thousand, three hundred ten.
7. 319,215 is three hundred nineteen thousand, two hundred fifteen.
8. 62,500,005 is sixty-two million, five hundred thousand, five.
9. Ten-thousand, eight is 10,008.
10. Two hundred million, four hundred fifty-five is 200,000,455.
11.
$$\begin{array}{r} 1 \\ 72 \\ + 38 \\ \hline 110 \end{array}$$

$$\begin{array}{r}
 22. \quad \begin{array}{r} 41613 \\ 573 \\ - 389 \\ \hline 184 \end{array} \quad \text{Check:} \quad \begin{array}{r} 11 \\ 389 \\ + 184 \\ \hline 573 \end{array}
 \end{array}$$

$$\begin{array}{r}
 23. \quad \begin{array}{r} 6131016 \\ 7416 \\ - 567 \\ \hline 6849 \end{array} \quad \text{Check:} \quad \begin{array}{r} 111 \\ 567 \\ + 6849 \\ \hline 7416 \end{array}
 \end{array}$$

$$\begin{array}{r}
 24. \quad \begin{array}{r} 4111010 \\ 5210 \\ - 883 \\ \hline 4327 \end{array} \quad \text{Check:} \quad \begin{array}{r} 111 \\ 4327 \\ + 883 \\ \hline 5210 \end{array}
 \end{array}$$

$$\begin{array}{r}
 25. \quad \begin{array}{r} 1111010 \\ 2210 \\ - 1986 \\ \hline 224 \end{array} \quad \text{Check:} \quad \begin{array}{r} 111 \\ 1986 \\ + 224 \\ \hline 2210 \end{array}
 \end{array}$$

$$\begin{array}{r}
 26. \quad \begin{array}{r} 9 \\ 8161014 \\ 99,704 \\ - 73,838 \\ \hline 25,866 \end{array} \quad \text{Check:} \quad \begin{array}{r} 111 \\ 25,866 \\ + 73,838 \\ \hline 99,704 \end{array}
 \end{array}$$

$$\begin{array}{r}
 27. \quad \begin{array}{r} 7 \\ \times 7 \\ \hline 49 \end{array}
 \end{array}$$

$$\begin{array}{r}
 28. \quad \begin{array}{r} 8 \\ \times 0 \\ \hline 0 \end{array}
 \end{array}$$

$$29. \quad 8(4) = 32$$

$$30. \quad 8(8) = 64$$

$$31. \quad (5)(9) = 45$$

$$32. \quad (6)(7) = 42$$

$$33. \quad 7 \cdot 8 = 56$$

$$34. \quad 9 \cdot 9 = 81$$

$$\begin{array}{l}
 35. \quad 5 \times 4 \times 2 \\
 (5 \times 4) \times 2 \\
 20 \times 2 = 40
 \end{array}$$

$$\begin{array}{l}
 36. \quad 9 \times 1 \times 5 \\
 (9 \times 1) \times 5 \\
 9 \times 5 = 45
 \end{array}$$

$$\begin{array}{l}
 37. \quad 4 \times 4 \times 3 \\
 (4 \times 4) \times 3 \\
 16 \times 3 = 48
 \end{array}$$

$$\begin{array}{l}
 38. \quad 2 \times 2 \times 2 \\
 (2 \times 2) \times 2 \\
 4 \times 2 = 8
 \end{array}$$

$$39. \quad (6)(0)(8) = 0 \quad \text{Any number times 0 equals 0.}$$

$$\begin{array}{l}
 40. \quad (7)(1)(6) \\
 (7 \cdot 1) \cdot 6 \\
 7 \cdot 6 = 42
 \end{array}$$

$$\begin{array}{l}
 41. \quad 6 \cdot 1 \cdot 8 \\
 (6 \cdot 1) \cdot 8 \\
 6 \cdot 8 = 48
 \end{array}$$

$$42. \quad 7 \cdot 7 \cdot 0 = 0 \quad \text{Any number times 0 equals 0.}$$

$$\begin{array}{r}
 43. \quad \begin{array}{r} 2 \\ 28 \\ \times 3 \\ \hline 84 \end{array}
 \end{array}$$

$$\begin{array}{r}
 44. \quad \begin{array}{r} 4 \\ 46 \\ \times 8 \\ \hline 368 \end{array}
 \end{array}$$

$$\begin{array}{r}
 45. \quad \begin{array}{r} 7 \\ 58 \\ \times 9 \\ \hline 522 \end{array}
 \end{array}$$

$$\begin{array}{r}
 46. \quad \begin{array}{r} 98 \\ \times 1 \\ \hline 98 \end{array}
 \end{array}$$

$$\begin{array}{r}
 47. \quad \begin{array}{r} 24 \\ 625 \\ \times 8 \\ \hline 5000 \end{array}
 \end{array}$$

$$\begin{array}{r}
 48. \quad \begin{array}{r} 53 \\ 374 \\ \times 8 \\ \hline 2992 \end{array}
 \end{array}$$

$$\begin{array}{r}
 49. \quad \begin{array}{r} 113 \\ 1349 \\ \times 4 \\ \hline 5396 \end{array}
 \end{array}$$

$$\begin{array}{r}
 50. \quad \begin{array}{r} 31 \\ 9163 \\ \times 5 \\ \hline 45,815 \end{array}
 \end{array}$$

$$\begin{array}{r}
 51. \quad \begin{array}{r} 11 \\ 7456 \\ \times 2 \\ \hline 14,912 \end{array}
 \end{array}$$

$$\begin{array}{r}
 52. \quad \begin{array}{r} 65 \\ 2880 \\ \times 7 \\ \hline 20,160 \end{array}
 \end{array}$$

$$\begin{array}{r}
 53. \quad \begin{array}{r} 1 \quad 2 \\ 93,105 \\ \times 5 \\ \hline 465,525 \end{array}
 \end{array}$$

60 Chapter 1 Whole Numbers

$$\begin{array}{r} 54. \quad \overset{16}{21}, \overset{52}{87}3 \\ \times \quad 8 \\ \hline 174,984 \end{array}$$

$$\begin{array}{r} 55. \quad \begin{array}{r} 35 \\ \times 25 \\ \hline 175 \\ 70 \\ \hline 875 \end{array} \quad \begin{array}{l} \leftarrow 5 \times 35 \\ \leftarrow 2 \times 35 \end{array} \end{array}$$

$$\begin{array}{r} 56. \quad \begin{array}{r} 74 \\ \times 32 \\ \hline 148 \\ 222 \\ \hline 2368 \end{array} \quad \begin{array}{l} \leftarrow 2 \times 74 \\ \leftarrow 3 \times 74 \end{array} \end{array}$$

$$\begin{array}{r} 57. \quad \begin{array}{r} 98 \\ \times 12 \\ \hline 196 \\ 98 \\ \hline 1176 \end{array} \quad \begin{array}{l} \leftarrow 2 \times 98 \\ \leftarrow 1 \times 98 \end{array} \end{array}$$

$$\begin{array}{r} 58. \quad \begin{array}{r} 68 \\ \times 75 \\ \hline 340 \\ 476 \\ \hline 5100 \end{array} \quad \begin{array}{l} \leftarrow 5 \times 68 \\ \leftarrow 7 \times 68 \end{array} \end{array}$$

$$\begin{array}{r} 59. \quad \begin{array}{r} 472 \\ \times 33 \\ \hline 1416 \\ 1416 \\ \hline 15,576 \end{array} \quad \leftarrow 3 \times 472 \end{array}$$

$$\begin{array}{r} 60. \quad \begin{array}{r} 392 \\ \times 77 \\ \hline 2744 \\ 2744 \\ \hline 30,184 \end{array} \quad \leftarrow 7 \times 392 \end{array}$$

$$\begin{array}{r} 61. \quad \begin{array}{r} 4051 \\ \times 219 \\ \hline 887,169 \end{array} \end{array}$$

$$\begin{array}{r} 62. \quad \begin{array}{r} 1527 \\ \times 328 \\ \hline 500,856 \end{array} \end{array}$$

$$\begin{array}{r} 63. \quad \begin{array}{r} \$12 \\ \times 30 \\ \hline \$360 \end{array} \quad \begin{array}{l} \text{cost per calculator} \\ \text{calculators} \\ \text{total cost} \end{array} \end{array}$$

$$\begin{array}{r} 64. \quad \begin{array}{r} \$14 \\ \times 76 \\ \hline 84 \\ 98 \\ \hline \$1064 \end{array} \quad \begin{array}{l} \text{cost of subscription} \\ \text{subscribers} \\ \text{total cost} \end{array} \end{array}$$

$$\begin{array}{r} 65. \quad \begin{array}{r} \$64 \\ \times 318 \\ \hline 512 \\ 64 \\ 192 \\ \hline \$20,352 \end{array} \quad \begin{array}{l} \text{cost per set} \\ \text{sets} \\ \text{total cost} \end{array} \end{array}$$

$$\begin{array}{r} 66. \quad \begin{array}{r} 114 \\ \times \$6 \\ \hline \$684 \end{array} \quad \begin{array}{l} \text{ear plugs} \\ \text{cost per plug} \\ \text{total cost} \end{array} \end{array}$$

$$\begin{array}{r} 67. \quad \begin{array}{r} 280 \\ \times 50 \\ \hline \end{array} \quad \begin{array}{r} 28 \\ \times 5 \\ \hline 140 \end{array} \quad \begin{array}{r} 280 \\ \times 50 \\ \hline 14,000 \end{array} \quad \text{Attach 00.} \end{array}$$

$$\begin{array}{r} 68. \quad \begin{array}{r} 340 \\ \times 70 \\ \hline \end{array} \quad \begin{array}{r} 34 \\ \times 7 \\ \hline 238 \end{array} \quad \begin{array}{r} 340 \\ \times 70 \\ \hline 23,800 \end{array} \quad \text{Attach 00.} \end{array}$$

$$\begin{array}{r} 69. \quad \begin{array}{r} 517 \\ \times 400 \\ \hline \end{array} \quad \begin{array}{r} 517 \\ \times 4 \\ \hline 2068 \end{array} \quad \begin{array}{r} 517 \\ \times 400 \\ \hline 206,800 \end{array} \quad \text{Attach 00.} \end{array}$$

$$\begin{array}{r} 70. \quad \begin{array}{r} 637 \\ \times 500 \\ \hline \end{array} \quad \begin{array}{r} 637 \\ \times 5 \\ \hline 3185 \end{array} \quad \begin{array}{r} 637 \\ \times 500 \\ \hline 318,500 \end{array} \quad \text{Attach 00.} \end{array}$$

$$\begin{array}{r} 71. \quad \begin{array}{r} 16,000 \\ \times 8000 \\ \hline \end{array} \quad \begin{array}{r} 16 \\ \times 8 \\ \hline 128 \end{array} \quad \begin{array}{r} 16,000 \\ \times 8000 \\ \hline 128,000,000 \end{array} \quad \text{Attach 000000.} \end{array}$$

$$\begin{array}{r} 72. \quad \begin{array}{r} 43,000 \\ \times 2100 \\ \hline \end{array} \quad \begin{array}{r} 43 \\ \times 21 \\ \hline 903 \end{array} \quad \begin{array}{r} 43,000 \\ \times 2100 \\ \hline 90,300,000 \end{array} \quad \text{Attach 00000.} \end{array}$$

$$73. \quad 20 \div 4 = 5$$

$$74. \quad 35 \div 5 = 7$$

$$75. \quad 42 \div 7 = 6$$

$$76. \quad 18 \div 9 = 2$$

$$77. \quad \frac{54}{9} = 6$$

$$78. \quad \frac{36}{9} = 4$$

$$79. \quad \frac{49}{7} = 7$$

80. $\frac{0}{6} = 0$

81. $\frac{148}{0}$ is undefined.

82. $\frac{0}{23} = 0$

83. $\frac{64}{8} = 8$

84. $\frac{81}{9} = 9$

85. $4\overline{)328}$ **Check:** $\begin{array}{r} 82 \\ \times 4 \\ \hline 328 \end{array}$

86. $3\overline{)29^24}$ **Check:** $\begin{array}{r} 98 \\ \times 3 \\ \hline 294 \end{array}$

87. $6\overline{)26,^25^13^12}$ **Check:** $\begin{array}{r} 211 \\ 4422 \\ \times 6 \\ \hline 26,532 \end{array}$

88. $76\overline{)26,752}$ **Check:** $\begin{array}{r} 352 \\ \times 76 \\ \hline 2112 \\ 2464 \\ \hline 26,752 \end{array}$

89. $2704 \div 18$ $18\overline{)2704}$ **R4**

Check: $\begin{array}{r} 150 \\ \times 18 \\ \hline 1200 \\ 150 \\ \hline 2700 \\ + 4 \\ \hline 2704 \end{array}$

90. $15,525 \div 125$ $125\overline{)15,525}$ **R25**

Check: $\begin{array}{r} 124 \\ \times 125 \\ \hline 620 \\ 248 \\ 124 \\ \hline 15,500 \\ + 25 \\ \hline 15,525 \end{array}$

91. 817 rounded to the nearest ten: 820

817 Next digit is 5 or more. Tens place changes ($1 + 1 = 2$). The digit to the right of the underlined place changes to zero.

92. 15,208 rounded to the nearest hundred: 15,200

15,208 Next digit is 4 or less. Hundreds place does not change. All digits to the right of the underlined place change to zero.

93. 20,643 rounded to the nearest thousand: 21,000

20,643 Next digit is 5 or more. Thousands place changes ($0 + 1 = 1$). All digits to the right of the underlined place change to zero.

94. 67,485 rounded to the nearest ten-thousand: 70,000

67,485 Next digit is 5 or more. Ten-thousands place changes ($6 + 1 = 7$). All digits to the right of the underlined place change to zero.95. **To the nearest ten:** 3487Next digit is 5 or more. Tens place changes ($8 + 1 = 9$). The digit to the right of the underlined place changes to zero. **3490****To the nearest hundred:** 3487Next digit is 5 or more. Hundreds place changes ($4 + 1 = 5$). All digits to the right of the underlined place are changed to zero. **3500****To the nearest thousand:** 3487Next digit is 4 or less. Thousands place does not change. All digits to the right of the underlined place are changed to zero. **3000**

- 96. To the nearest ten: 20,065**

Next digit is 5 or more. Tens place changes
(6 + 1 = 7). The digit to the right of the
underlined place changes to zero. **20,070**

To the nearest hundred: 20,065

Next digit is 5 or more. Hundreds place changes
($0 + 1 = 1$). All digits to the right of the
underlined place are changed to zero. **20,100**

To the nearest thousand: 20,065

Next digit is 4 or less. Thousands place does not change. All digits to the right of the underlined place are changed to zero. **20,000**

- 97. To the nearest ten: 98,201**

Next digit is 4 or less. Tens place does not change.
The digit to the right of the underlined place
changes to zero. **98,200**

To the nearest hundred: 98,201

Next digit is 4 or less. Hundreds place does not change. All digits to the right of the underlined place are changed to zero. **98,200**

To the nearest thousand: 98,201

Next digit is 4 or less. Thousands place does not change. All digits to the right of the underlined place are changed to zero. **98,000**

- 98. To the nearest ten: 352,18**

Next digit is 5 or more. Tens place changes ($1 + 1 = 2$). The digit to the right of the underlined place changes to zero. **352,120**

To the nearest hundred: 352,118

Next digit is 4 or less. Hundreds place does not change. All digits to the right of the underlined place are changed to zero. **352,100**

To the nearest thousand: 352,118

Next digit is 4 or less. Thousands place does not change. All digits to the right of the underlined place are changed to zero. **352,000**

- 99.** From the table, $4^2 = 16$, so $\sqrt{16} = 4$.

- 100.** From the table, $7^2 = 49$, so $\sqrt{49} = 7$.

- 101.** From the table, $12^2 = 144$, so $\sqrt{144} = 12$.

- 102.** From the table, $14^2 = 196$, so $\sqrt{196} = 14$.

- 103.** 7^3 : exponent is 3; base is 7.
 $7^3 = 7 \cdot 7 \cdot 7 = 343$

- 104.** 3^6 : exponent is 6; base is 3.
 $3^6 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 729$

- 105.** 5^3 : exponent is 3; base is 5.
 $5^3 = 5 \cdot 5 \cdot 5 = 125$

- 106.** 4^5 : exponent is 5; base is 4.
 $4^5 = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 1024$

- 107.** $7^2 - 15$ *Exponent*
 $49 - 15 = 34$ *Subtract*

- 108.** $6^2 - 10$ *Exponent*
 $36 - 10 = 26$ *Subtract*

- 109.** $2 \cdot 3^2 \div 2$ *Exponent*
 $2 \cdot 9 \div 2$ *Multiply*
 $18 \div 2 = 9$ *Divide*

- 110.** $9 \div 1 \cdot 2 \cdot 2 \div (11 - 2)$ *Parentheses*
 $9 \div 1 \cdot 2 \cdot 2 \div 9$ *Divide*
 $9 \cdot 2 \cdot 2 \div 9$ *Multiply*
 $18 \cdot 2 \div 9$ *Multiply*
 $36 \div 9 = 4$ *Divide*

- 111.** $\sqrt{9} + 2(3)$ *Square root*
 $3 + 2 \cdot 3$ *Multiply*
 $3 + 6 = 9$ *Add*

- 112.** $6 \cdot \sqrt{16} - 6 \cdot \sqrt{9}$ *Square root*
 $6 \cdot 4 - 6 \cdot 3$ *Multiply*
 $24 - 18 = 6$ *Subtract*

- 113.** From the bar graph, 8 parents out of 100 nagged their children about washing hands after using the bathroom.

- 114.** From the bar graph, 5 parents out of 100 nagged their children about taking shoes off when coming inside.

- 115.** From the bar graph, the greatest number of parents, 25, nagged their children about keeping bedroom clean.

- 116.** From the bar graph, the least number of parents, 3, nagged their children about hanging up wet bath towels.

- 117. Estimate:** $40 \text{ million} \times 365$
- $$\begin{array}{r} 400 \\ \times 40 \\ \hline 16,000 \end{array}$$

40 million $\times$ 400 = 16,000 million or
16,000,000,000 checks (*Attach 000 000.*)

$$\begin{array}{r} \text{Exact: } 40 \text{ million} \times 365 \\ \phantom{\text{Exact: }} \times 40 \\ \hline 14,600 \end{array}$$

40 million $\times$ 365 = 14,600 million or
14,600,000,000 checks (*Attach 000 000.*)

The bank processes 14,600 million checks in a year.

118. Step 1

Find the total revolutions.

Step 2

We know the revolutions per minute and the number of minutes.

Number of revolutions $\times$ minutes = total revolutions.

Step 3

An estimate is $1000 \times 60 = 60,000$ revolutions.

Step 4

$1400 \times 60 = 84,000$ revolutions

Step 5

There were 84,000 revolutions.

Step 6

The answer is reasonably close to the estimate considering the rounding.

Check: $84,000 \div 60 = 1400$

119. Estimate: Exact:

$$\begin{array}{r} 100 \\ \times 20 \\ \hline 2000 \end{array} \begin{array}{l} \text{forks per box} \\ \text{boxes} \\ \text{forks} \end{array} \quad \begin{array}{r} 144 \\ \times 15 \\ \hline 2160 \end{array} \begin{array}{l} \text{forks per box} \\ \text{boxes} \\ \text{forks} \end{array}$$

There are 2160 plastic forks in 15 boxes.

120. Estimate and Exact:

$$\begin{array}{r} 6000 \\ \times 30 \\ \hline 180,000 \end{array} \begin{array}{l} \text{brackets per drum} \\ \text{drums} \\ \text{brackets} \end{array}$$

There are 180,000 brackets in 30 drums.

121. Estimate: Exact:

$$\begin{array}{r} 2000 \\ \times 10 \\ \hline 20,000 \end{array} \begin{array}{l} \text{hours per home} \\ \text{homes} \\ \text{hours} \end{array} \quad \begin{array}{r} 2000 \\ \times 12 \\ \hline 24,000 \end{array} \begin{array}{l} \text{hours per home} \\ \text{homes} \\ \text{hours} \end{array}$$

24,000 hours of work are needed to build 12 homes.

122. Estimate and Exact:

$$\begin{array}{r} 80 \\ \times 5 \\ \hline 400 \end{array} \begin{array}{l} \text{miles per hour} \\ \text{hours} \\ \text{miles} \end{array}$$

The train travels 400 miles in 5 hours.

123. Step 1

Find the total cost to buy the ovens.

Step 2

Multiply the number of baking ovens times the cost of each baking oven and the number of warming ovens times the cost of each warming oven. Add to find the total cost.

Step 3

Estimate:

Baking ovens: $30 \times \$2000 = \$60,000$
Warming ovens: $30 \times \$900 = \$27,000$
Total: $\$60,000 + \$27,000 = \$87,000$

Step 4

Exact:

Baking ovens: $32 \times \$1538 = \$49,216$
Warming ovens: $28 \times \$887 = \$24,836$
Total: $\$49,216 + \$24,836 = \$74,052$

Step 5

The total cost is \$74,052.

Step 6

The answer is reasonably close to the estimate. Check by repeating Step 4.

124. Step 1

Find the total monthly collections.

Step 2

We know the number of daily customers and the daily rate. We know the number of weekend-only customers and the rate. Number of customers $\times$ daily rate + number of customers $\times$ weekend rate = total collections.

Step 3

Estimate:

$(60 \times \$20) + (20 \times \$7) = \$1200 + \$140 = \$1340$

Step 4

$(62 \times \$16) + (21 \times \$7) = \$992 + \$147 = \$1139$

Step 5

The total monthly collections are \$1139.

Step 6

The answer is reasonably close to the estimate. Check by repeating Step 4.

125. Step 1

Find the difference in the amount spent on others and the amount spent on themselves.

Step 2

Difference indicates subtraction.

Step 3

An estimate is $\$600 - \$100 = \$500$.

Step 4

$$\begin{array}{r} \$620 \\ - \$107 \\ \hline \$513 \end{array}$$

Step 5

The difference in amount spent is \$513.

Step 6

The answer is reasonably close to the estimate.

Check: $\$513 + \$107 = \$620$

126. Step 1

Find how many hours it takes to produce all the plates.

Step 2

We know the total number of plates and we know how many are produced each hour.

$$\frac{\text{total number}}{\text{number per hour}} = \text{total hours}$$

Step 3

An estimate: $30,000 \div 1000 = 30$ hours

Step 4

$$\frac{32,538}{986} = 33 \text{ hours}$$

Step 5

It will take 33 hours.

Step 6

The answer is reasonably close to the estimate.

Check: $33 \cdot 986 = 32,538$

127. Step 1

Find out how many pounds of pork are needed.

Step 2

We know the total number of cans and we must divide that total by 175 since each group of 175 cans requires 1 pound of pork. The number of groups $\times$ 1 pound = total pounds.

Step 3

Estimate: $9000 \div 200 = 45$ pounds

Step 4

$$\frac{8750}{175} = 50 \text{ pounds}$$

Step 5

50 pounds of pork are needed.

Step 6

The answer is reasonably close to the estimate.

Check:

$(175 \text{ cans per pound}) \cdot (50 \text{ pounds}) = 8750 \text{ cans}$

128. Step 1

Find the new account balance.

Step 2

We know the amount of the checks and the old balance.

Old balance – check amounts = new balance.

Step 3

Estimate: $\$2000 - \$500 - \$400 = \1100

Step 4

$\$1924 - \$520 - \$385 = \1019

Step 5

She has \$1019 in her account.

Step 6

The answer is reasonably close to the estimate.

Check: $\$1019 + \$520 + \$385 = \1924

129. Step 1

Find the total acres fertilized.

Step 2

We know the total amount of fertilizer and how much each acre needs. Total pounds $\div$ pounds needed per acre = total acres.

Step 3

Estimate: $30,000 \div 600 = 50$

Step 4

$$\frac{32,500}{625} = 52 \text{ acres}$$

Step 5

52 acres can be spread with 32,500 pounds of nitrogen sulfate.

Step 6

The answer is reasonably close to the estimate.

Check: $52 \times 625 = 32,500$

130. Step 1

Find the number of homes that can be fenced.

Step 2

Divide the number of feet of fencing available by the number of feet needed for each home.

Step 3

Estimate: $6000 \div 200 = 30$ homes

Step 4

$$\frac{5760}{180} = 32 \text{ homes}$$

Step 5

32 homes can be fenced.

Step 6

The answer is reasonably close to the estimate.

Check: $(180 \text{ feet per home}) \cdot (32 \text{ homes}) = 5760 \text{ feet}$

$$\begin{array}{r} 131. [1.4] \quad 4(83) \quad \frac{1}{83} \\ \times 4 \\ \hline 332 \end{array}$$

$$\begin{array}{r} 132. [1.4] \quad 7(64) \quad \frac{2}{64} \\ \times 7 \\ \hline 448 \end{array}$$

$$\begin{array}{r} 133. \text{ [1.3]} \quad \begin{array}{r} 210 \\ 309 \\ - 56 \\ \hline 253 \end{array} \end{array}$$

$$\begin{array}{r} 134. \text{ [1.3]} \quad \begin{array}{r} 12 \\ 7215 \\ 835 \\ - 247 \\ \hline 588 \end{array} \end{array}$$

$$\begin{array}{r} 135. \text{ [1.2]} \quad \begin{array}{r} 11 \\ 662 \\ + 379 \\ \hline 1041 \end{array} \end{array}$$

$$\begin{array}{r} 136. \text{ [1.2]} \quad \begin{array}{r} 11 \\ 789 \\ + 872 \\ \hline 1661 \end{array} \end{array}$$

$$\begin{array}{r} 137. \text{ [1.3]} \quad \begin{array}{r} 13 \\ 0310 \\ 38,140 \\ - 6078 \\ \hline 32,062 \end{array} \quad \text{Check:} \quad \begin{array}{r} 11 \\ 32,062 \\ + 6078 \\ \hline 38,140 \end{array}$$

$$\begin{array}{r} 138. \text{ [1.3]} \quad \begin{array}{r} 811416 \\ 29,156 \\ - 4209 \\ \hline 24,947 \end{array} \quad \text{Check:} \quad \begin{array}{r} 11 \\ 24,947 \\ + 4209 \\ \hline 29,156 \end{array}$$

$$139. \text{ [1.5]} \quad 21 \div 7 = 3$$

$$140. \text{ [1.5]} \quad \frac{42}{6} = 7 \quad (7 \cdot 6 = 42)$$

$$\begin{array}{r} 141. \text{ [1.2]} \quad \begin{array}{r} 1222 \\ 7218 \\ 3 \\ 18 \\ 1791 \\ 82,623 \\ + 1982 \\ \hline 93,635 \end{array} \end{array}$$

$$\begin{array}{r} 142. \text{ [1.2]} \quad \begin{array}{r} 1212 \\ 3812 \\ 5 \\ 22 \\ 1836 \\ 75,134 \\ + 2369 \\ \hline 83,178 \end{array} \end{array}$$

$$143. \text{ [1.5]} \quad \frac{9}{0} \text{ is undefined.}$$

$$144. \text{ [1.5]} \quad \frac{7}{1} = 7 \quad (7 \cdot 1 = 7)$$

$$145. \text{ [1.5]} \quad 27,600 \div 4 = 6900$$

$$\begin{array}{r} 69 \\ 4 \overline{)2736} \quad \text{Attach 00.} \end{array}$$

$$146. \text{ [1.5]} \quad 18,480 \div 8$$

$$\begin{array}{r} 2310 \\ 8 \overline{)18,480} \end{array}$$

$$\begin{array}{r} 147. \text{ [1.4]} \quad \begin{array}{r} 8430 \\ \times 128 \\ \hline 67440 \leftarrow 8 \times 8430 \\ 16860 \leftarrow 2 \times 8430 \\ 8430 \\ \hline 1,079,040 \end{array} \end{array}$$

$$\begin{array}{r} 148. \text{ [1.4]} \quad \begin{array}{r} 141 \\ 21,702 \\ \times 6 \\ \hline 130,212 \end{array} \end{array}$$

$$149. \text{ [1.6]} \quad \text{Use a calculator to show that}$$

$$34 \overline{)3672} = 108.$$

$$150. \text{ [1.6]} \quad \text{Use a calculator to show that}$$

$$68 \overline{)14,076} = 207.$$

$$151. \text{ [1.1]} \quad 376,853 \text{ is three hundred seventy-six thousand, eight hundred fifty-three in words.}$$

$$152. \text{ [1.1]} \quad 408,610 \text{ is four hundred eight thousand, six hundred ten in words.}$$

$$153. \text{ [1.7]} \quad 8749 \text{ rounded to the nearest hundred: } \underline{87}49 \text{ Next digit is 4 or less. Hundreds place doesn't change. All digits to the right of the underlined place are changed to zero. } \mathbf{8700}$$

$$154. \text{ [1.7]} \quad 400,503 \text{ rounded to the nearest thousand: } \underline{400},503 \text{ Next digit is 5 or more. Thousands place changes } (0 + 1 = 1). \text{ All digits to the right of the underlined place are changed to zero. } \mathbf{401,000}$$

$$155. \text{ [1.8]} \quad \text{From the table, } 8^2 = 64, \text{ so } \sqrt{64} = 8.$$

$$156. \text{ [1.8]} \quad \text{From the table, } 9^2 = 81, \text{ so } \sqrt{81} = 9.$$

$$\begin{array}{r} 157. \text{ [1.4]} \quad \begin{array}{r} \$308 \text{ cost per pair} \\ \times 18 \text{ pairs} \\ \hline 2464 \\ 308 \\ \hline \$5544 \text{ total cost} \end{array} \end{array}$$

$$\begin{array}{r} 158. \text{ [1.4]} \quad \begin{array}{r} \$370 \text{ cost per dishwasher} \\ \times 84 \text{ dishwashers} \\ \hline 1480 \\ 2960 \\ \hline \$31,080 \text{ total cost} \end{array} \end{array}$$

$$\begin{array}{r}
 159. [1.4] \quad 208 \text{ baseball hats} \\
 \times \$11 \text{ cost of hat} \\
 \hline
 208 \\
 208 \\
 \hline
 \$2288 \text{ total cost}
 \end{array}$$

$$\begin{array}{r}
 160. [1.4] \quad 607 \text{ boxes of avocados} \\
 \times \$26 \text{ cost per box} \\
 \hline
 3642 \\
 1214 \\
 \hline
 \$15,782 \text{ total cost}
 \end{array}$$

$$\begin{array}{r}
 161. [1.4] \quad 52 \text{ cards per deck} \\
 \times 9 \text{ decks} \\
 \hline
 468 \text{ total cards}
 \end{array}$$

There are 468 cards in nine decks.

$$\begin{array}{r}
 162. [1.4] \quad 180 \text{ cartons} \\
 \times 20 \text{ books per carton} \\
 \hline
 3600 \text{ textbooks}
 \end{array}$$

There are 3600 textbooks in 180 cartons.

$$\begin{array}{r}
 163. [1.3] \quad \$380 \\
 - \$100 \\
 \hline
 \$280
 \end{array}$$

A "push-type" mower costs \$280.

$$\begin{array}{r}
 164. [1.3] \quad \$218,450 \text{ Amount needed} \\
 - \$103,815 \text{ Amount raised} \\
 \hline
 \$114,635 \text{ Amount left to be raised}
 \end{array}$$

\$114,635 more needs to be raised.

165. [1.10] Multiply the number of rentals times the sum of the rental fee and the launch fee.

4-person	$6 \times (\$28 + \$2) = 6(\$30)$	\$180
6-person	$15 \times (\$38 + \$2) = 15(\$40)$	600
10-person	$10 \times (\$70 + \$2) = 10(\$72)$	720
12-person	$3 \times (\$75 + \$2) = 3(\$77)$	231
16-person	$2 \times (\$85 + \$2) = 2(\$87)$	+ 174
		\$1905

Total receipts were \$1905.

166. [1.10] Multiply the number of rentals times the sum of the rental fee and the launch fee.

4-person	$38 \times (\$28 + \$2) = 38(\$30)$	\$1 140
6-person	$73 \times (\$38 + \$2) = 73(\$40)$	2 920
10-person	$58 \times (\$70 + \$2) = 58(\$72)$	4 176
12-person	$34 \times (\$75 + \$2) = 34(\$77)$	2 618
16-person	$18 \times (\$85 + \$2) = 18(\$87)$	+ 1 566
		\$12,420

Total receipts were \$12,420.

$$\begin{array}{r}
 167. [1.9] \quad \begin{array}{r} 19910 \\ 2000 \end{array} \text{ Chicago Spire} \\
 - \begin{array}{r} 1131 \\ 869 \end{array} \text{ Trump Tower in Chicago} \\
 \hline
 869 \text{ difference}
 \end{array}$$

The Chicago Spire will be 869 feet taller than the Trump Tower in Chicago.

$$\begin{array}{r}
 168. [1.9] \quad \begin{array}{r} 1362 \\ 1200 \end{array} \text{ Freedom Tower in New York} \\
 - \begin{array}{r} 1200 \\ 162 \end{array} \text{ San Francisco Towers} \\
 \hline
 162 \text{ difference}
 \end{array}$$

The Freedom Tower in New York is 162 feet taller than the planned San Francisco Towers.

$$\begin{array}{r}
 169. [1.9] \text{ (a)} \quad \begin{array}{r} 11 \\ 2000 \end{array} \text{ Chicago Spire} \\
 1450 \text{ Sears Tower in Chicago} \\
 1362 \text{ Freedom Tower in New York} \\
 1250 \text{ Empire State Building} \\
 1200 \text{ San Francisco Towers} \\
 + 1131 \text{ Trump Towers in Chicago} \\
 \hline
 8393 \text{ combined height in feet}
 \end{array}$$

$$\begin{array}{r}
 \text{(b)} \quad 8393 \text{ combined height} \\
 - 5280 \text{ feet in one mile} \\
 \hline
 3113 \text{ difference}
 \end{array}$$

The combined height of the six buildings is 3113 feet more than a mile.

170. [1.9] One yard is the same as three feet, so 100 yards is the same as 300 feet. The San Francisco Towers is 1200 feet tall, so divide 1200 by 300.

$$\begin{array}{r}
 4 \\
 300 \overline{) 1200} \\
 \underline{1200} \\
 0
 \end{array}$$

The height of the San Francisco Towers will be equivalent to the length of 4 football fields.

Chapter 1 Test

- 9205 is nine thousand, two hundred five.
- 25,065 is twenty-five thousand, sixty-five.
- Four hundred twenty-six thousand, five is 426,005.

$$\begin{array}{r}
 4. \quad \begin{array}{r} 122 \\ 853 \end{array} \\
 66 \\
 4022 \\
 + 3589 \\
 \hline
 8530
 \end{array}$$

$$\begin{array}{r}
 1112 \\
 17,063 \\
 7 \\
 12 \\
 1505 \\
 93,710 \\
 + 333 \\
 \hline
 112,630
 \end{array}$$

$$\begin{array}{r}
 9 \\
 8\cancel{10}10 \\
 9009 \\
 - 7964 \\
 \hline
 1045
 \end{array}$$

$$\begin{array}{r}
 810615 \\
 9075 \\
 - 2869 \\
 \hline
 6206
 \end{array}$$

$$8. \quad 7 \times 6 \times 4 = (7 \times 6) \times 4 = 42 \times 4 = 168$$

$$\begin{array}{r}
 57 \\
 \times 3 \\
 \hline
 171
 \end{array}$$

$$57 \cdot 3000 = 171,000 \quad \text{Attach 000.}$$

$$10. \quad 85(19)$$

$$\begin{array}{r}
 85 \\
 \times 19 \\
 \hline
 765 \\
 85 \\
 \hline
 1615
 \end{array}$$

$$\begin{array}{r}
 85 \\
 19 \overline{) 1615} \\
 \underline{152} \\
 95 \\
 \underline{95} \\
 0
 \end{array}$$

$$\begin{array}{r}
 7381 \\
 \times 603 \\
 \hline
 22143 \\
 442860 \\
 \hline
 4,450,743
 \end{array}$$

$$\begin{array}{r}
 7381 \\
 603 \overline{) 4,450,743} \\
 \underline{4221} \\
 2297 \\
 \underline{1809} \\
 4884 \\
 \underline{4824} \\
 603 \\
 \underline{603} \\
 0
 \end{array}$$

$$\begin{array}{r}
 7047 \\
 16 \overline{) 112,752} \\
 \underline{112} \\
 075 \\
 \underline{64} \\
 112 \\
 \underline{112} \\
 0
 \end{array}$$

$$\begin{array}{r}
 7047 \\
 \times 16 \\
 \hline
 42282 \\
 7047 \\
 \hline
 112,752
 \end{array}$$

$$13. \quad \frac{835}{0} \text{ is undefined}$$

$$\begin{array}{r}
 458 \text{ R5} \\
 42 \overline{) 19,241} \\
 \underline{168} \\
 244 \\
 \underline{210} \\
 341 \\
 \underline{336} \\
 5
 \end{array}$$

$$\begin{array}{r}
 160 \\
 280 \overline{) 44,800} \\
 \underline{280} \\
 1680 \\
 \underline{1680} \\
 00
 \end{array}$$

$$16. \quad 6347 \text{ rounded to the nearest ten: } 63\text{47}$$

Next digit is 5 or more. Tens place changes ($4 + 1 = 5$). The digit to the right of the underlined place changes to zero. **6350**

$$17. \quad 76,502 \text{ rounded to the nearest thousand: } 7\text{6,502}$$

Next digit is 5 or more. Thousands place changes ($6 + 1 = 7$). Digits to the right of the underlined place change to zero. **77,000**

$$\begin{array}{ll}
 18. \quad 5^2 + 8(2) & \text{Exponent} \\
 25 + 8(2) & \text{Multiply} \\
 25 + 16 = 41 & \text{Add}
 \end{array}$$

$$\begin{array}{ll}
 19. \quad 7 \cdot \sqrt{64} - 14 \cdot 2 & \text{Square root} \\
 7 \cdot 8 - 14 \cdot 2 & \text{Multiply} \\
 56 - 28 = 28 & \text{Subtract}
 \end{array}$$

$$20. \quad \text{Estimate: } \$500 + \$500 + \$500 + \$400 - \$800 = \$1100$$

Exact: Add the rent collected.

$$\begin{array}{r}
 \$485 \\
 500 \\
 515 \\
 + 425 \\
 \hline
 \$1925
 \end{array}$$

Subtract expenses.

$$\begin{array}{r}
 \$1925 \\
 - 785 \\
 \hline
 \$1140 \quad \text{amount left}
 \end{array}$$

21. Estimate: $90,000 \div 400 = 225$ acres

Exact: Divide the total number of gallons by the number of gallons produced from one acre.

$$\begin{array}{r}
 231 \\
 374 \overline{) 86,394} \\
 \underline{748} \\
 1159 \\
 \underline{1122} \\
 374 \\
 \underline{374} \\
 0
 \end{array}$$

It would take 231 acres.

22. Estimate: $\$2000 - \$500 - \$200 - \$200 = \$1100$
 Exact: $\$1906 - \$528 - \$195 - \$235 = \$948$

23. If we multiply the number of identifications each minute, 48, by the number of minutes in an hour, 60, and then multiply that number by the number of hours, 4, we'll get the total number of identifications in 4 hours.

$$\begin{aligned}
 \text{Estimate: } & (50 \times 60 \times 4) + (40 \times 60 \times 3) \\
 & = (3000 \times 4) + (2400 \times 3) \\
 & = 12,000 + 7200 = 19,200 \text{ chicks}
 \end{aligned}$$

$$\begin{aligned}
 \text{Exact: } & (48 \times 60 \times 4) + (36 \times 60 \times 3) \\
 & = (2880 \times 4) + (2160 \times 3) \\
 & = 11,520 + 6480 = 18,000 \text{ chicks}
 \end{aligned}$$

The total number of baby chicks identified is 18,000.

24. (1) Locate the place to which you are rounding and underline it.
 (2) Look only at the next digit to the right. If this digit is a 4 or less, do not change the underlined digit. If the digit is a 5 or more, increase the underlined digit by 1.

- (3) Change all digits to the right of the underlined place to zeros.

Each person's example will vary, but the following two examples illustrate the two general cases.

(A) $\underline{1}24,999$ rounds to 120,000

(B) $1\underline{2}5,000$ rounds to 130,000

25. (1) Read the problem carefully.
 (2) Work out a plan.
 (3) Estimate a reasonable answer.
 (4) Solve the problem.
 (5) State the answer.
 (6) Check your work.