Contents

Chapter 1: Whole Numbers

Prep Test

1. 8

2. 1 2 3 4 5 6 7 8 9 10

3. a and D; b and E; c and A; d and B; e and F; f and C

Section 1.1

Concept Check

1a. False

b. True

c. True

d. True

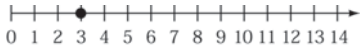
2a. Thousands

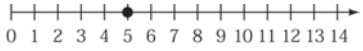
b. Millions

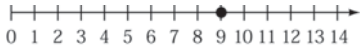
c. Ten-thousands

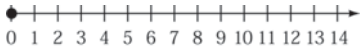
d. Hundred-thousands

Objective A Exercises

3. 

4. 

5. 

6. 

7. $37 < 49$

8. $58 > 21$

9. $101 > 87$

10. $245 > 158$

11. $2701 > 2071$

12. $0 < 45$

13. $107 > 0$

14. $815 < 928$

15. Yes

Objective B Exercises

16. Two thousand six hundred seventy-five

17. Three thousand seven hundred ninety

18. Forty-two thousand nine hundred twenty-eight

19. Fifty-eight thousand four hundred seventy-three

20. Three hundred fifty-six thousand nine hundred forty-three

21. Four hundred ninety-eight thousand five hundred twelve

22. Three million six hundred ninety-seven thousand four hundred eighty-three

23. Six million eight hundred forty-two thousand seven hundred fifteen

24. 85

25. 357

26. 3456

27. 63,780

28. 609,948

29. 7,024,709

30. Millions

Objective C Exercises

31. 5000 + 200 + 80 + 7

32. 6000 + 200 + 90 + 5

33. 50,000 + 8000 + 900 + 40 + 3

34. 400,000 + 50,000 + 3000 + 900 + 20 +1

35. 200,000 + 500 + 80 + 3

36. 300,000 + 1000 + 800 + 9

37. 400,000 + 3000 + 700 + 5

38. 3,000,000 + 600 + 40 + 2

39. No

Objective D Exercises

40. 930

41. 850

42. 1400

43. 4000

44. 44,000

45. 53,000

46. 390,000

47. 630,000

48. 650,000

49. 250,000

50. 37,000,000

51. 72,000,000

52. False

Critical Thinking

53. No. Round 3846 to the nearest hundred.

Projects or Group Activities

54. Lost: IA, MO, LA, IL, MI, OH, PA, NY, NJ, MA

Gained: WA, NV, UT, AZ, TX, GA, SC, FL

Section 1.2

Concept Check

1. Addition Property of Zero

2. Associative Property of Addition

3. Associative Property of Addition

4. Commutative Property of Addition

5. Commutative Property of Addition

6. Addition Property of Zero

Objective A Exercises

7. 28

8. 88

9. 125

10. 157

11. 102

12. 112

13. 154

14. 154

15. 1489

16. 1778

17. 828

18. 239

19.
$$\begin{array}{r} {\scriptstyle 1} \\ 859 \\ +\ 725 \\ \hline 1584 \end{array}$$

20.
$$\begin{array}{r} {\scriptstyle 1} \\ 637 \\ +\ 829 \\ \hline 1466 \end{array}$$

21.
$$\begin{array}{r} {\scriptstyle 1\,1\,1} \\ 36{,}925 \\ +\ 65{,}392 \\ \hline 102{,}317 \end{array}$$

22.
$$\begin{array}{r} {\scriptstyle 1\ 1\,1} \\ 56{,}772 \\ +\ 51{,}239 \\ \hline 108{,}011 \end{array}$$

23.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 50{,}873 \\ +\ 28{,}453 \\ \hline 79{,}326 \end{array}$$

24.
$$\begin{array}{r} {\scriptstyle 1\ \ 1\,1} \\ 34{,}872 \\ +\ 46{,}079 \\ \hline 80{,}951 \end{array}$$

25.
$$\begin{array}{r} {\scriptstyle 2\,2} \\ 878 \\ 737 \\ +\ 189 \\ \hline 1804 \end{array}$$

26.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 768 \\ 461 \\ +\ 669 \\ \hline 1898 \end{array}$$

27.
$$\begin{array}{r} {\scriptstyle 1} \\ 319 \\ 348 \\ +\ 912 \\ \hline 1579 \end{array}$$

28.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 292 \\ 579 \\ +\ 315 \\ \hline 1186 \end{array}$$

29.
$$\begin{array}{r} {\scriptstyle 1\,2} \\ 9409 \\ 3253 \\ +\ 7078 \\ \hline 19{,}740 \end{array}$$

30.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 8188 \\ 8020 \\ +\ 7104 \\ \hline 23{,}312 \end{array}$$

31.
$$\begin{array}{r} {\scriptstyle 1\,2} \\ 2038 \\ 2243 \\ +\ 3139 \\ \hline 7420 \end{array}$$

32.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 4252 \\ 6882 \\ +\ 5235 \\ \hline 16{,}369 \end{array}$$

33.
$$\begin{array}{r} {\scriptstyle 1\,1\,1\,1} \\ 67{,}428 \\ 32{,}171 \\ +\ 20{,}971 \\ \hline 120{,}570 \end{array}$$

34.
$$\begin{array}{r} {\scriptstyle 1\,2\ 1\,1} \\ 52{,}801 \\ 11{,}664 \\ +\ 89{,}638 \\ \hline 154{,}103 \end{array}$$

35.
$$\begin{array}{r} {\scriptstyle 1\,1\,1} \\ 76{,}290 \\ 43{,}761 \\ +\ 87{,}402 \\ \hline 207{,}453 \end{array}$$

36.
$$\begin{array}{r} {\scriptstyle 2\,2} \\ 43{,}901 \\ 98{,}301 \\ +\ 67{,}943 \\ \hline 210{,}145 \end{array}$$

37.
$$\begin{array}{r} {\scriptstyle 1\,1\,1} \\ 20{,}958 \\ 3{,}218 \\ +\ \ 42 \\ \hline 24{,}218 \end{array}$$

38.
$$\begin{array}{r} {\scriptstyle 1\ 1\,2} \\ 80{,}973 \\ 5{,}168 \\ +\ \ 29 \\ \hline 86{,}170 \end{array}$$

39.
$$\begin{array}{r} {\scriptstyle 1\,1\,1} \\ 392 \\ 37 \\ 10{,}924 \\ +\ 621 \\ \hline 11{,}974 \end{array}$$

40.
$$\begin{array}{r} {\scriptstyle 1\,2\,2} \\ 694 \\ 62 \\ 70{,}129 \\ +\ 217 \\ \hline 71{,}102 \end{array}$$

41.
$$\begin{array}{r} {\scriptstyle 1\,2\,2} \\ 294 \\ 1029 \\ 7935 \\ +\ 65 \\ \hline 9323 \end{array}$$

42.
$$\begin{array}{r} {\scriptstyle 1\,2\,1} \\ 692 \\ 2107 \\ 3196 \\ +\ 92 \\ \hline 6087 \end{array}$$

43.
$$\begin{array}{r} {\scriptstyle 1\,1\ 2\,1} \\ 97 \\ 7{,}234 \\ 69{,}532 \\ +\ 276 \\ \hline 77{,}139 \end{array}$$

44.
$$\begin{array}{r} {\scriptstyle 1\ 2\,2} \\ 87 \\ 1{,}698 \\ 27{,}317 \\ +\ 727 \\ \hline 29{,}829 \end{array}$$

45.
$$\begin{array}{r} {\scriptstyle 1\ \ 1} \\ 9874 \\ +\ 4509 \\ \hline 14{,}383 \end{array}$$

46.
$$\begin{array}{r} {\scriptstyle 1\,1\,1} \\ 7988 \\ +5678 \\ \hline 13{,}666 \end{array}$$

47.
$$\begin{array}{r} {\scriptstyle 1\,1\,1} \\ 3487 \\ +5986 \\ \hline 9473 \end{array}$$

48.
$$\begin{array}{r} {\scriptstyle 1\,1\ 1\,1} \\ 99{,}567 \\ +126{,}863 \\ \hline 226{,}430 \end{array}$$

49.
$$\begin{array}{r} {\scriptstyle 1\ \ 1\,1\,1} \\ 9678 \\ +23{,}569 \\ \hline 33{,}247 \end{array}$$

50.
$$\begin{array}{r} {\scriptstyle 1\,1\ 1} \\ 45{,}872 \\ +7894 \\ \hline 53{,}766 \end{array}$$

51.
$$\begin{array}{r} {\scriptstyle 1\,1\,1} \\ 4579 \\ +479 \\ \hline 5058 \end{array}$$

52.
$$\begin{array}{r} {\scriptstyle 1} \\ 23{,}885 \\ +23{,}902 \\ \hline 47{,}787 \end{array}$$

53.
$$\begin{array}{r} {\scriptstyle 1\,2} \\ 659 \\ 55 \\ +1278 \\ \hline 1992 \end{array}$$

54.
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 4561 \\ 56 \\ +2309 \\ \hline 6926 \end{array}$$

55.
$$\begin{array}{r} {\scriptstyle 1\,1\,2} \\ 34 \\ 329 \\ 8 \\ +67{,}892 \\ \hline 68{,}263 \end{array}$$

56.
$$\begin{array}{r} {\scriptstyle 1\ 2\ 2}\\ 45\\ 1289\\ 7\\ +32{,}876\\ \hline 34{,}217 \end{array}$$

57.
$$\begin{array}{rcr} 1234 & \approx & 1200\\ 9780 & \approx & 9800\\ +\ 6740 & \approx & +\ 6700\\ \hline \text{Cal.: } 17{,}754 & & \text{Est.: } 17{,}700 \end{array}$$

58.
$$\begin{array}{rcr} 919 & \approx & 900\\ 3642 & \approx & 3600\\ +\ 8796 & \approx & +\ 8800\\ \hline \text{Cal.: } 13{,}357 & & \text{Est.: } 13{,}300 \end{array}$$

59.
$$\begin{array}{rcr} 241 & \approx & 200\\ 569 & \approx & 600\\ 390 & \approx & 400\\ +\ 1672 & \approx & +\ 1700\\ \hline \text{Cal.: } 2872 & & \text{Est.: } 2900 \end{array}$$

60.
$$\begin{array}{rcr} 107 & \approx & 100\\ 984 & \approx & 1000\\ 1035 & \approx & 1000\\ +\ 2904 & \approx & +\ 2900\\ \hline \text{Cal.: } 5030 & & \text{Est.: } 5000 \end{array}$$

61.
$$\begin{array}{rcr} 32{,}461 & \approx & 32{,}000\\ 9{,}844 & \approx & 10{,}000\\ +\ 59{,}407 & \approx & +\ 59{,}000\\ \hline \text{Cal.: } 101{,}712 & & \text{Est.: } 101{,}000 \end{array}$$

62.
$$\begin{array}{rcr} 29{,}036 & \approx & 29{,}000\\ 22{,}904 & \approx & 23{,}000\\ +\ 7{,}903 & \approx & +\ 8{,}000\\ \hline \text{Cal.: } 59{,}843 & & \text{Est.: } 60{,}000 \end{array}$$

63.
$$\begin{array}{rcr} 25{,}432 & \approx & 25{,}000\\ 62{,}941 & \approx & 63{,}000\\ +\ 70{,}390 & \approx & +\ 70{,}000\\ \hline \text{Cal.: } 158{,}763 & & \text{Est.: } 158{,}000 \end{array}$$

64.
$$\begin{array}{rcr} 66{,}541 & \approx & 67{,}000\\ 29{,}365 & \approx & 29{,}000\\ +\ 98{,}742 & \approx & +\ 99{,}000\\ \hline \text{Cal.: } 194{,}648 & & \text{Est.: } 195{,}000 \end{array}$$

65.
$$\begin{array}{rcr} 67{,}421 & \approx & 70{,}000\\ 82{,}984 & \approx & 80{,}000\\ 66{,}361 & \approx & 70{,}000\\ 10{,}792 & \approx & 10{,}000\\ +\ 34{,}037 & \approx & +\ 30{,}000\\ \hline \text{Cal.: } 261{,}595 & & \text{Est.: } 260{,}000 \end{array}$$

66.
$$\begin{array}{rcr} 21{,}896 & \approx & 20{,}000\\ 4{,}235 & \approx & 0\\ 62{,}544 & \approx & 60{,}000\\ 21{,}892 & \approx & 20{,}000\\ +\ 1{,}334 & \approx & +\ 0\\ \hline \text{Cal.: } 111{,}901 & & \text{Est.: } 100{,}000 \end{array}$$

67.
$$\begin{array}{rcr} 281{,}421 & \approx & 280{,}000\\ 9{,}874 & \approx & 10{,}000\\ 34{,}394 & \approx & 30{,}000\\ 526{,}398 & \approx & 530{,}000\\ +\ 94{,}631 & \approx & +\ 90{,}000\\ \hline \text{Cal.: } 946{,}718 & & \text{Est.: } 940{,}000 \end{array}$$

68.
$$\begin{array}{rcr} 542{,}698 & \approx & 540{,}000\\ 97{,}327 & \approx & 100{,}000\\ 7{,}235 & \approx & 10{,}000\\ 73{,}667 & \approx & 70{,}000\\ +\ 173{,}201 & \approx & +\ 170{,}000\\ \hline \text{Cal.: } 894{,}128 & & \text{Est.: } 890{,}000 \end{array}$$

69. Commutative Property of Addition

Objective B Exercises

70. The sum represents the total square footage of Wal-Mart discount stores and Supercenters in the United States.

71. **Strategy** To find the total number of multiple births, add the four amounts (138,600 5877, 345, and 46).

Solution

$$\begin{array}{r} 138{,}660 \\ 5877 \\ 345 \\ +\quad 46 \\ \hline 144{,}928 \end{array}$$

There were 144,928 multiple births during the year.

72. **Strategy** To find the Census Bureau's estimate, add the amounts (296 and 281).

Solution

$$\begin{array}{r} 296 \\ +\,281 \\ \hline 577 \end{array}$$

The population estimate for 2100 is 577 million people.

73. **Strategy** To find the total gross income from the eight *Harry Potter* movies, add the eight amounts.

Solution

$$\begin{array}{r} 317{,}600{,}000 \\ 262{,}000{,}000 \\ 249{,}500{,}000 \\ 290{,}000{,}000 \\ 292{,}000{,}000 \\ 302{,}000{,}000 \\ 296{,}000{,}000 \\ +\ 381{,}000{,}000 \\ \hline 2{,}390{,}100{,}000 \end{array}$$

The total gross income from the eight *Harry Potter* movies was $2,390,100,000.

74. **Strategy** To find the total gross income from the two lowest-grossing *Harry Potter* movies, add the income from *Chamber of Secrets* ($262,000,000) and *Prisoner of Azkaban* ($249,500,000).

Solution

$$\begin{array}{r} 262{,}000{,}000 \\ +\ 249{,}500{,}000 \\ \hline 511{,}500{,}000 \end{array}$$

The total gross income was $511,500,000.

75. **Strategy** To find the total gross income from the two highest-grossing *Harry Potter* movies, add the income from *Sorcerer's Stone* ($317,600,000) and *Deathly Hollows: Part II* ($381,000,000).

Solution

$$\begin{array}{r} 317{,}600{,}000 \\ +\ 381{,}000{,}000 \\ \hline 698{,}600{,}000 \end{array}$$

The total gross income was $698,600,000.

76. **Strategy** To find the perimeter, add the lengths of the three sides (12, 14, and 17 inches).

Solution

$$\begin{array}{r} 12 \\ 14 \\ +\ 17 \\ \hline 43 \end{array}$$

The perimeter of the triangle is 43 inches.

77a. **Strategy** To find the total number of miles driven during the three days, add the three amounts (515, 492, and 278 miles).

Solution

$$\begin{array}{r} 515 \\ 492 \\ +\ 278 \\ \hline 1285 \end{array}$$

1285 miles will be driven during the three days.

b. Strategy To find what the odometer reading will be by the end of the trip, add the total number of miles driven during the three days (1285) to the original odometer reading (68,692).

Solution

$$\begin{array}{r} 68{,}692 \\ +\ 1285 \\ \hline 69{,}977 \end{array}$$

At the end of the trip, the odometer will read 69,977 miles.

78. Strategy To find the total number of households in the United States, add the number of households that do not have Internet access (37 million) to the number of households that do have Internet access (78 million).

Solution

$$\begin{array}{r} 37{,}000{,}000 \\ +78{,}000{,}000 \\ \hline 115{,}000{,}000 \end{array}$$

There are 115 million households in the United States.

79. Strategy To find the total number of barrels, add the number of barrels produced (5,633,000) to the number of barrels imported (9,003,300).

Solution

$$\begin{array}{r} 5{,}633{,}000 \\ +\ 9{,}003{,}300 \\ \hline 14{,}636{,}300 \end{array}$$

The total number of barrels produced and imported per day is 14,636,300.

Critical Thinking

80. There are 6 possible outcomes for each die (1, 2, 3, 4, 5, and 6).

The smallest sum on two dice is 1 + 1 = 2. The largest sum on two dice is 6 + 6 = 12. There are 11 different sums from 2 to 12 (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12).

81. No; 0 + 2 = 2

82. No; 0 + 0 = 0

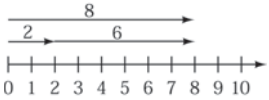
83. Answers will vary. For example:

A part-time instructor is teaching two classes this term, with 34 students in one class and 28 students in the other. How many students is the part-time instructor teaching this term? 62 students.

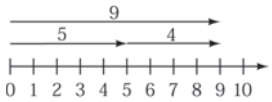
84. Ten numbers that are less than 100 end in a 7. They are 7, 17, 27, 37, 47, 57, 67, 77, 87, and 97.

Projects or Group Activities

85.



86.



Section 1.3

Concept Check

1. 4; 5 + 4 = 9

2. 5; 2 + 5 = 7

3. 11; 0 + 11 = 11

4. 0; 8 + 0 = 8

Objective A Exercises

5. 4

6. 7

7. 9

8. 11

9. 22

10. 9

11. 60

12. 51

13. 66

14. 74

15. 31

16. 33

17. 901

18. 501

19. 791

20. 962

21. 1125

22. 5002

23. 3131

24. 1513

25. 47

26. 41

27. 925

28. 71

29. 4561

30. 1244

31. 3205

32. 823

33. 1222

34. 4401

35. 5 and 3: 5 – 3 = 2, and 5 + 3 = 8

36. 7 and 2: 7 – 2 = 5 and 7 + 2 = 9

Objective B Exercises

37.
$$\begin{array}{r} {\scriptstyle 6\ 11} \\ \not{7}\not{1} \\ -\,18 \\ \hline 53 \end{array}$$

38.
$$\begin{array}{r} {\scriptstyle 8\ 13} \\ \not{9}\not{3} \\ -28 \\ \hline 65 \end{array}$$

39.
$$\begin{array}{r} {\scriptstyle 3\ 17} \\ \not{4}\not{7} \\ -\,18 \\ \hline 29 \end{array}$$

40.
$$\begin{array}{r} {\scriptstyle 3\ 14} \\ \not{4}\not{4} \\ -27 \\ \hline 17 \end{array}$$

41.
$$\begin{array}{r} {\scriptstyle 2\,17} \\ \not{3}\not{7} \\ -\ 29 \\ \hline 8 \end{array}$$

42.
$$\begin{array}{r} {\scriptstyle 4\,10} \\ \not{5}\not{0} \\ -27 \\ \hline 23 \end{array}$$

43.
$$\begin{array}{r} {\scriptstyle 6\,10} \\ \not{7}\not{0} \\ -\ 33 \\ \hline 37 \end{array}$$

44.
$$\begin{array}{r} {\scriptstyle 8\,13} \\ 9\not{9}\not{3} \\ -537 \\ \hline 456 \end{array}$$

45.
$$\begin{array}{r} {\scriptstyle 1\,14\,10} \\ 2\not{5}\not{0} \\ -\ 192 \\ \hline 58 \end{array}$$

46.
$$\begin{array}{r} {\scriptstyle 7\,13\,10} \\ 8\not{3}\not{0} \\ -783 \\ \hline 57 \end{array}$$

47.
$$\begin{array}{r} {\scriptstyle 6\,16} \\ 7\not{6}8 \\ -\ 194 \\ \hline 574 \end{array}$$

48.
$$\begin{array}{r} {\scriptstyle 6\,16\,10} \\ 7\not{7}\not{0} \\ -395 \\ \hline 375 \end{array}$$

49.
$$\begin{array}{r} {\scriptstyle 6\,14} \\ 6\not{7}\not{4} \\ -\ 337 \\ \hline 337 \end{array}$$

50.
$$\begin{array}{r} {\scriptstyle 11} \\ {\scriptstyle 4\,1\,16} \\ 3\not{5}\not{2}\not{6} \\ -\ \ 387 \\ \hline 3139 \end{array}$$

51.
$$\begin{array}{r} {\scriptstyle 10} \\ {\scriptstyle 6\,\not{0}\,12} \\ 1\not{7}\not{1}\not{2} \\ -\ \ 289 \\ \hline 1423 \end{array}$$

52.
$$\begin{array}{r} {\scriptstyle 3\,13\,4\,10} \\ \not{4}\not{3}\not{5}\not{0} \\ -\ \ 729 \\ \hline 3621 \end{array}$$

53.
$$\begin{array}{r} {\scriptstyle 16\ 9} \\ {\scriptstyle 0\,\not{6}\,10\,12} \\ 1\not{7}\not{0}\not{2} \\ -\ 948 \\ \hline 754 \end{array}$$

54.
$$\begin{array}{r} {\scriptstyle 15\ 9} \\ {\scriptstyle 0\,\not{5}\,10\,17} \\ 1\not{6}\not{0}\not{7} \\ -\ 869 \\ \hline 738 \end{array}$$

55.
$$\begin{array}{r} {\scriptstyle 12} \\ {\scriptstyle 8\,\not{2}\,13} \\ 5\not{9}\not{3}\not{3} \\ -\ \ 3754 \\ \hline 2179 \end{array}$$

56.
$$\begin{array}{r} {\scriptstyle 6\,12\,8\,13} \\ 7\not{2}\not{9}\not{3} \\ -3748 \\ \hline 3545 \end{array}$$

57.
$$\begin{array}{r} {\scriptstyle 13\ 9} \\ {\scriptstyle 8\,\not{3}\,\not{1}0\,17} \\ \not{9}\not{4}\not{0}\not{7} \\ -\ 2918 \\ \hline 6489 \end{array}$$

58.
$$\begin{array}{r} {\scriptstyle 16\ 9} \\ {\scriptstyle 2\ \not{6}\,\not{1}016} \\ \not{3}\not{7}\not{0}\not{6} \\ -2957 \\ \hline 749 \end{array}$$

59.
$$\begin{array}{r} {\scriptstyle 15\ 9} \\ {\scriptstyle 7\ \not{5}\,\not{1}015} \\ \not{8}\not{6}\not{0}\not{5} \\ -7716 \\ \hline 889 \end{array}$$

60.
$$\begin{array}{r} {\scriptstyle 7\,10\,4\,12} \\ \not{8}\not{0}\not{5}\not{2} \\ -2709 \\ \hline 5343 \end{array}$$

61.
$$\begin{array}{r} 7\ 10\ 2\ 9\ 10\ 15 \\ \not{8}\not{0},\not{3}\not{0}\not{5} \\ -\ 9,176 \\ \hline 71,129 \end{array}$$

62.
$$\begin{array}{r} 6\ 10\ 6\ 9\ 10\ 12 \\ \not{7}\not{0},\not{7}\not{0}\not{2} \\ -\ 4,239 \\ \hline 66,463 \end{array}$$

63.
$$\begin{array}{r} 9\ 9\ 9 \\ 0\ 10\ 10\ 10\ 14 \\ \not{1}\not{0},\not{0}\not{0}\not{4} \\ -\ 9,306 \\ \hline 698 \end{array}$$

64.
$$\begin{array}{r} 9\ 9 \\ 7\ 10\ 10\ 10 \\ \not{8}\not{0},\not{0}\not{0}\not{9} \\ -63,419 \\ \hline 16,590 \end{array}$$

65.
$$\begin{array}{r} 6\ 10 \\ \not{7}\not{0},618 \\ -41,213 \\ \hline 29,405 \end{array}$$

66.
$$\begin{array}{r} 9 \\ 7\ 10\ 10\ 4\ 13 \\ \not{8}\not{0},\not{0}\not{5}\not{3} \\ -27,649 \\ \hline 52,404 \end{array}$$

67.
$$\begin{array}{r} 6\ 10\ \ 6\ 9\ 10 \\ \not{7}\ \not{0},\not{7}\ \not{0}\ \not{0} \\ -2\ 1,\ 0\ 7\ 6 \\ \hline 4\ 9,\ 6\ 2\ 4 \end{array}$$

68.
$$\begin{array}{r} 7\ 10\ \ 9 \\ \not{8}\not{0},\not{8}\not{0}\not{0} \\ -42,023 \\ \hline 38,777 \end{array}$$

69.
$$\begin{array}{r} 15\ 9 \\ 1\ 5\ 10\ 10 \\ \not{2}\not{6}\not{0}\not{0} \\ -1972 \\ \hline 628 \end{array}$$

70.
$$\begin{array}{r} 13\ 9 \\ 7\ \not{3}\ 10\ 10 \\ \not{8}\not{4}\not{0}\not{0} \\ -3762 \\ \hline 4638 \end{array}$$

71.
$$\begin{array}{r} 9 \\ 8\ 10\ 10 \\ \not{9}\not{0}\not{0}3 \\ -2471 \\ \hline 6532 \end{array}$$

72.
$$\begin{array}{r} 9 \\ 5\ 10\ 10 \\ \not{6}\not{0}\not{0}4 \\ -2392 \\ \hline 3612 \end{array}$$

73.
$$\begin{array}{r} 11\ 9 \\ 7\ \not{1}\ 10\ 12 \\ \not{8}\not{2}\not{0}\not{2} \\ -3916 \\ \hline 4286 \end{array}$$

74.
$$\begin{array}{r} 6\ 10\ 4\ 10 \\ \not{7}\not{0}\not{5}\not{0} \\ -4137 \\ \hline 2913 \end{array}$$

75.
$$\begin{array}{r} 9 \\ 6\ \not{1}\ 10\ 11 \\ \not{7}\not{0}\not{1}5 \\ -2973 \\ \hline 4042 \end{array}$$

76.
$$\begin{array}{r} 11 \\ 3\ \not{1}\ 10 \\ 4\not{2}\not{0}7 \\ -1624 \\ \hline 2583 \end{array}$$

77.
$$\begin{array}{r} 9\ 9 \\ 6\ \not{1}\ 0\ \not{1}\ 15 \\ \not{7}\not{0}\not{0}\not{5} \\ -1796 \\ \hline 5209 \end{array}$$

78.
$$\begin{array}{r} 9\ 9 \\ 7\ \not{1}\ 0\ \not{1}\ 13 \\ \not{8}\not{0}\not{0}\not{3} \\ -2735 \\ \hline 5268 \end{array}$$

79.
$$\begin{array}{r} 9\ 9\ 9 \\ \not{1}\ 10\ 10\ 10\ 15 \\ \not{2}\not{0},\not{0}\not{0}\not{5} \\ -\ 9,627 \\ \hline 10,378 \end{array}$$

80.
$$\begin{array}{r} 9\ 9\ 9 \\ 7\ 10\ 10\ 10\ 14 \\ \not{8}\not{0},\not{0}\not{0}\not{4} \\ -\ 8,237 \\ \hline 71,767 \end{array}$$

81. (ii) and (iii)

82.
$$\begin{array}{r} {\scriptstyle 4\,11} \\ 10{,}0\not{5}\not{1} \\ -\ 9027 \\ \hline 1\,024 \end{array}$$

83.
$$\begin{array}{r} {\scriptstyle 6\ \ 9\,12\,11} \\ 1\not{7}{,}\not{0}\not{3}\not{1} \\ -5792 \\ \hline 11{,}239 \end{array}$$

84.
$$\begin{array}{r} {\scriptstyle 9\ 9\,13} \\ \not{1}\not{0}\not{0}\not{3} \\ -\ 447 \\ \hline 556 \end{array}$$

85.
$$\begin{array}{r} {\scriptstyle 7\ 17} \\ 29,\not{8}\not{7}4 \\ -21{,}392 \\ \hline 8\,482 \end{array}$$

86.
$$\begin{array}{r} {\scriptstyle 5\,17\ 9\ 9\,15} \\ \not{6}\not{8}{,}\not{0}\not{0}\not{5} \\ -29{,}797 \\ \hline 38{,}208 \end{array}$$

87.
$$\begin{array}{r} {\scriptstyle 6\ 9\ \ 9\ 9\,14} \\ \not{7}\not{0}{,}\not{0}\not{0}4 \\ -69{,}379 \\ \hline 625 \end{array}$$

88.
$$\begin{array}{r} {\scriptstyle 1\,14\ 13\,12\,12} \\ \not{2}\not{5}{,}\not{4}\not{3}\not{2} \\ -\ 7{,}994 \\ \hline 17{,}438 \end{array}$$

89.
$$\begin{array}{r} {\scriptstyle 7\,15\,16\,9\,11} \\ \not{8}\not{6}{,}\not{7}\not{0}\not{1} \\ -9{,}976 \\ \hline 76{,}725 \end{array}$$

90. **Strategy** To find the amount that completes the statement, subtract the addend (39) from the sum (104).

Solution
$$\begin{array}{r} 104 \\ -\ 39 \\ \hline 65 \end{array}$$
Therefore 65 completes the statement, 65 + 39 = 104.

91. **Strategy** To find the amount that completes the statement, subtract the addend (67) from the sum (90).

Solution
$$\begin{array}{r} 90 \\ -67 \\ \hline 23 \end{array}$$
Therefore 23 completes the statement, 67 + 23 = 90.

92. **Strategy** To find the amount that completes the statement, subtract the addend (497) from the sum (862).

Solution
$$\begin{array}{r} 862 \\ -\ 497 \\ \hline 365 \end{array}$$
Therefore 365 completes the statement, 365 + 497 = 862.

93. **Strategy** To find the amount that completes the statement, subtract the addend (253) from the sum (4901).

Solution
$$\begin{array}{r} 4901 \\ -\ 253 \\ \hline 4648 \end{array}$$
Therefore 4648 completes the statement, 253 + 4648 = 4901.

94.
$$\begin{array}{rcr} 80{,}032 & \approx & 80{,}000 \\ -19{,}605 & \approx & -20{,}000 \\ \text{Cal.: } 60{,}427 & & \text{Est.: } 60{,}000 \end{array}$$

95.
$$\begin{array}{rcr} 90{,}765 & \approx & 90{,}000 \\ -60{,}928 & \approx & -60{,}000 \\ \text{Cal.: } 29{,}837 & & \text{Est.: } 30{,}000 \end{array}$$

96.
$$\begin{array}{rcr} 32{,}574 & \approx & 30{,}000 \\ -10{,}961 & \approx & -10{,}000 \\ \text{Cal.: } 21{,}613 & & \text{Est.: } 20{,}000 \end{array}$$

97.
$$\begin{array}{rcr} 96{,}430 & \approx & 100{,}000 \\ -59{,}762 & \approx & -60{,}000 \\ \text{Cal.: } 36{,}668 & & \text{Est.: } 40{,}000 \end{array}$$

98.
$$\begin{array}{rcr} 567{,}423 & \approx & 570{,}000 \\ -\,208{,}444 & \approx & -210{,}000 \\ \text{Cal.: } 358{,}979 & & \text{Est.: } 360{,}000 \end{array}$$

99.
$$\begin{array}{rcr} 300{,}712 & \approx & 300{,}000 \\ -198{,}714 & \approx & -200{,}000 \\ \text{Cal.: } 101{,}998 & & \text{Est.: } 100{,}000 \end{array}$$

Objective C Exercises

100. **Strategy** To find the amount left in the checking account, subtract the amount of the check ($139) from the original amount in the checking account ($304).

Solution
$$\begin{array}{r} 304 \\ -139 \\ \hline 165 \end{array}$$

The amount left in the checking account is $165.

101a. **Strategy** To find the difference, subtract the number of smell genes for the mosquito (79) from the number of smell genes for the honey bee (170)

Solution
$$\begin{array}{r} 170 \\ -79 \\ \hline 91 \end{array}$$

The honey bee has 91 more smell genes than the mosquito.

b. **Strategy** To find the difference, subtract the number of taste genes for the fruit fly (68) from the number of taste genes for the mosquito (76).

Solution
$$\begin{array}{r} 76 \\ -68 \\ \hline 8 \end{array}$$

The mosquito has 8 more taste genes than the fruit fly.

c. **Strategy** The insect with the best sense of smell has the most smell genes. Inspect the table to find the insect with the most smell genes.

Solution The honey bee has the most smell genes, so the honey bee has the best sense of smell.

d. **Strategy** The insect with the worst sense of taste has the fewest taste genes. Inspect the table to find the insect with the fewest taste genes.

Solution The honey bee has the fewest taste genes, so the honey bee has the worst sense of taste.

102a. Yes

b. **Strategy** To find the number of cars, subtract the number sold in 2015 (188,000) from number sold in 2020 (414,000).

Solution
$$\begin{array}{r} 414{,}000 \\ -188{,}000 \\ \hline 226{,}000 \end{array}$$

226,000 more cars are projected to be sold in 2020 than in 2015.

c. **Strategy** To find which two years between which electric car sales are projected to increase the most, find the difference for each of the years and determine which is the greatest difference.

Solution For 2015 – 2016:

$$\begin{array}{r} 230{,}000 \\ -188{,}000 \\ \hline 42{,}000 \end{array}$$

For 2016 – 2017:

$$\begin{array}{r} 312{,}000 \\ -230{,}000 \\ \hline 82{,}000 \end{array}$$

For 2017 – 2018:

$$\begin{array}{r} 359{,}000 \\ -312{,}000 \\ \hline 47{,}000 \end{array}$$

For 2018 – 2019:

$$\begin{array}{r} 406{,}000 \\ -359{,}000 \\ \hline 47{,}000 \end{array}$$

For 2019 – 2020:

$$\begin{array}{r} 414{,}000 \\ -406{,}000 \\ \hline 8000 \end{array}$$

The greatest difference is between the years 2016 and 2017.

103. **Strategy** To find the difference in maximum heights between the two geysers, subtract the height of the Valentine (75 feet) from the height of the Great Fountain (90 feet).

Solution

$$\begin{array}{r} 90 \\ -75 \\ \hline 15 \end{array}$$

The Great Fountain geyser erupts 15 feet higher than the Valentine geyser.

104. **Strategy** To find how much higher the Giant erupts than Old Faithful, subtract the height of Old Faithful (175) from the height of the Giant (200).

Solution

$$\begin{array}{r} 200 \\ -175 \\ \hline 25 \end{array}$$

The Giant erupts 25 feet higher than Old Faithful.

105. **Strategy** To find how many more women than men earned a bachelor's degree, subtract the number of men (573,079) who earned a degree from the number of women (775,424) who earned a degree.

Solution

$$\begin{array}{r} 775{,}424 \\ -573{,}079 \\ \hline 202{,}345 \end{array}$$

202,345 more women than men earned a bachelor's degree in that year.

106. **Strategy** To find the expected increase over 10 years, subtract the population expected in 2010 (129,000) from the population expected in 2020 (235,000).

Solution

$$\begin{array}{r} 235{,}000 \\ -\,129{,}000 \\ \hline 106{,}000 \end{array}$$

The expected increase over 10 years is 106,000.

107a. Strategy To find which 2-year period has the smallest expected increase, find the difference for each of the 2-year periods and determine which is the smallest difference.

Solution

For 2010 – 2012:

$$\begin{array}{r} 146{,}000 \\ -\,129{,}000 \\ \hline 17{,}000 \end{array}$$

For 2012 – 2014:

$$\begin{array}{r} 166{,}000 \\ -\,146{,}000 \\ \hline 20{,}000 \end{array}$$

For 2014 – 2016:

$$\begin{array}{r} 187{,}000 \\ -\,166{,}000 \\ \hline 21{,}000 \end{array}$$

For 2016 – 2018:

$$\begin{array}{r} 208{,}000 \\ -\,187{,}000 \\ \hline 21{,}000 \end{array}$$

For 2018 – 2020:

$$\begin{array}{r} 235{,}000 \\ -\,208{,}000 \\ \hline 27{,}000 \end{array}$$

The smallest expected 2-year increase is 17,000 for 2010–2012.

b. Strategy To find which 2-year period has the greatest increase, find the difference for each of the 2-year periods and determine which is the greatest difference.

Solution Using the calculations from 107a, the greatest expected 2-year increase is 27,000 for 2018–2020.

108. The difference represents the increase in the number of people aged 100 and over from 2014 to 2018.

109. Strategy To find your new credit card balance:

- Add to find the total of your purchases.
- Add the total amount of your purchases to the balance before the purchase ($409).
- Subtract your payment ($350) from the new balance.

Solution

Purchases :

$$\begin{array}{r} 168 \\ 36 \\ +\,97 \\ \hline 301 \end{array}$$

$409 + 301 = 710$

$710 - 350 = 360$

The new credit card balance is $360.

Critical Thinking

110a. False

b. False

111. Answers will vary. For example:

Pat has earned 15 college credits, and Leslie has earned 8 college credits. How many more college credits has Pat earned? 7 college credits.

Projects or Group Activities

112. The result is 9. For example:

Select the number 12,345. Subtract it from 54,321.

$$\begin{array}{r} 54{,}321 \\ -12{,}345 \\ \hline 41{,}976 \end{array}$$

The sum of the digits of the difference is 27. The sum of the digits of 27 is 9. The result will be the same for a four-digit or six-digit number.

Check Your Progress: Chapter 1

1. 

2. $107 > 97$

3. Eighty-two thousand seven hundred forty-three

4. Two million five hundred thirty thousand twenty-one

5. 23,401

6. 903,003

7. $60{,}000 + 3000 + 200 + 90 + 1$

8. 592,000

9. 46,000

10.
$$\begin{array}{r} 90{,}361 \\ 2955 \\ +\ 750{,}679 \\ \hline 843{,}995 \end{array}$$

11.
$$\begin{array}{r} 2034 \\ +\ 12{,}598 \\ \hline 14{,}632 \end{array}$$

12.
$$\begin{array}{r} 40{,}781 \\ +\ 156{,}742 \\ \hline 197{,}523 \end{array}$$

13.
$$\begin{array}{r} {\scriptstyle 1\ \ 9\ \ 13\ \ 15} \\ 1\not{2},\not{0}\not{4}\not{5} \\ -4\ 9\ 8\ 7 \\ \hline 7\ 0\ 5\ 8 \end{array}$$

14.
$$\begin{array}{r} {\scriptstyle 8\ \ 13\ \ 5\ \ 11} \\ \not{9}\not{3}\not{6}\not{1} \\ -\ 8\ 2\ 3 \\ \hline 8\ 5\ 3\ 8 \end{array}$$

15. $14,800,000,000,000

16. **Strategy** To find the difference in heights between the two waterfalls, subtract the height of Yosemite Falls (2425 feet) from the height of Colonial Falls (2585 feet).

Solution
$$\begin{array}{r} 2585 \\ -2425 \\ \hline 160 \end{array}$$

Colonial Falls is 160 feet higher than Yosemite Falls.

17. **Strategy** To find the total amount of Janice's contribution, add the six amounts.

Solution
$$\begin{array}{r} 25 \\ 30 \\ 13 \\ 15 \\ 20 \\ +\ 27 \\ \hline 130 \end{array}$$

The total amount of Janice's contributions is $130.

18. **Strategy** To find the amount boys grow from birth to age 5,

subtract the median height for boys at birth (50 cm) from the median height for boys at age 5 (110 cm).

Solution

$$\begin{array}{r} 110 \\ -\ 50 \\ \hline 60 \end{array}$$

Boys grow 60 cm from birth to age 5.

19. Strategy To find the two years between which girls grow the most, find the difference in median heights for girls for each of the years and determine which is the greatest difference.

Solution For Birth – 1 year:

$$\begin{array}{r} 74 \\ -\ 49 \\ \hline 25 \end{array}$$

For 1 year – 2 years:

$$\begin{array}{r} 84 \\ -\ 74 \\ \hline 10 \end{array}$$

For 2 years – 3 years:

$$\begin{array}{r} 95 \\ -\ 84 \\ \hline 11 \end{array}$$

For 3 years – 4 years:

$$\begin{array}{r} 100 \\ -\ 95 \\ \hline 5 \end{array}$$

For 4 years – 5 years:

$$\begin{array}{r} 108 \\ -\ 100 \\ \hline 8 \end{array}$$

The greatest difference is 25 cm, between birth and age 1.

20. Strategy To find the golfer's total score for the four rounds, add the scores for each round (68, 72, 69, and 66).

Solution

$$\begin{array}{r} 68 \\ 72 \\ 69 \\ +\ 66 \\ \hline 275 \end{array}$$

The golfer's total score was 275.

Section 1.4

Concept Check

1. 6×2 or $6 \cdot 2$

2. 5×4 or $5 \cdot 4$

3. 4×7 or $4 \cdot 7$

4. 3×18 or $3 \cdot 18$

5. Multiplication Property of One

6. Associative Property of Multiplication

7. Commutative Property of Multiplication

8. Commutative Property of Multiplication

Objective A Exercises

9. 12

10. 16

11. 35

12. 24

13. 25

14. 49

15. 0

16. 0

17. 72

18. 42

19.
$$\begin{array}{r} {\scriptstyle 1}\\ 66\\ \times\ 3\\ \hline 198 \end{array}$$

20.
$$\begin{array}{r} 70\\ \times\ 4\\ \hline 280 \end{array}$$

21.
$$\begin{array}{r} {\scriptstyle 3}\\ 67\\ \times\ 5\\ \hline 335 \end{array}$$

22.
$$\begin{array}{r} {\scriptstyle 2\,6}\\ 127\\ \times\ 9\\ \hline 1143 \end{array}$$

23.
$$\begin{array}{r} {\scriptstyle 1}\\ 623\\ \times\ 4\\ \hline 2492 \end{array}$$

24.
$$\begin{array}{r} {\scriptstyle 1}\\ 802\\ \times\ 5\\ \hline 4010 \end{array}$$

25.
$$\begin{array}{r} {\scriptstyle 6}\\ 607\\ \times\ 9\\ \hline 5463 \end{array}$$

26.
$$\begin{array}{r} 300\\ \times\ 5\\ \hline 1500 \end{array}$$

27.
$$\begin{array}{r} 600\\ \times\ 7\\ \hline 4200 \end{array}$$

28.
$$\begin{array}{r} {\scriptstyle 4}\\ 906\\ \times\ 8\\ \hline 7248 \end{array}$$

29.
$$\begin{array}{r} {\scriptstyle 2}\\ 703\\ \times\ 9\\ \hline 6327 \end{array}$$

30.
$$\begin{array}{r} {\scriptstyle 1\,3}\\ 127\\ \times\ 5\\ \hline 635 \end{array}$$

31.
$$\begin{array}{r} 632\\ \times\ 3\\ \hline 1896 \end{array}$$

32.
$$\begin{array}{r} {\scriptstyle 2\,3}\\ 559\\ \times\ 4\\ \hline 2236 \end{array}$$

33.
$$\begin{array}{r} {\scriptstyle 2\,1}\\ 632\\ \times\ 8\\ \hline 5056 \end{array}$$

34.
$$\begin{array}{r} {\scriptstyle 1}\\ 524\\ \times\ 4\\ \hline 2096 \end{array}$$

35.
$$\begin{array}{r} {\scriptstyle 1\,3}\\ 337\\ \times\ 5\\ \hline 1685 \end{array}$$

36.
$$\begin{array}{r} {\scriptstyle 2}\\ 841\\ \times\ 6\\ \hline 5046 \end{array}$$

37.
$$\begin{array}{r} {\scriptstyle 4\ 6}\\ 6709\\ \times\ 7\\ \hline 46,963 \end{array}$$

38.
$$\begin{array}{r} {\scriptstyle 3\ 4}\\ 3608\\ \times\ 5\\ \hline 18,040 \end{array}$$

39.
$$\begin{array}{r} {\scriptstyle 3\,4\,5}\\ 8568\\ \times\ 7\\ \hline 59,976 \end{array}$$

40.
$$\begin{array}{r} {\scriptstyle 1\,3\,2}\\ 5495\\ \times\ 4\\ \hline 21,980 \end{array}$$

41.
$$\begin{array}{r} {\scriptstyle 3\ 3} \\ 4780 \\ \times \quad 4 \\ \hline 19{,}120 \end{array}$$

42.
$$\begin{array}{r} {\scriptstyle 3\ 4} \\ 3690 \\ \times \quad 5 \\ \hline 18{,}450 \end{array}$$

43.
$$\begin{array}{r} {\scriptstyle 1\ 1\ 1} \\ 9895 \\ \times \quad 2 \\ \hline 19{,}790 \end{array}$$

44. False

45. $5 \times 7 \times 4 = 140$

46. $6 \times 2 \times 9 = 108$

47.
$$\begin{array}{r} 3208 \\ \times \quad 7 \\ \hline 22{,}456 \end{array}$$

48.
$$\begin{array}{r} 5009 \\ \times \quad 4 \\ \hline 20{,}036 \end{array}$$

49.
$$\begin{array}{r} 3105 \\ \times \quad 6 \\ \hline 18{,}630 \end{array}$$

50.
$$\begin{array}{r} 8957 \\ \times \quad 8 \\ \hline 71{,}656 \end{array}$$

Objective B Exercises

51.
$$\begin{array}{r} 16 \\ \times\ 21 \\ \hline 16 \\ 32 \\ \hline 336 \end{array}$$

52.
$$\begin{array}{r} 18 \\ \times 24 \\ \hline 72 \\ 36 \\ \hline 432 \end{array}$$

53.
$$\begin{array}{r} 35 \\ \times\ 26 \\ \hline 210 \\ 70 \\ \hline 910 \end{array}$$

54.
$$\begin{array}{r} 27 \\ \times 72 \\ \hline 54 \\ 189 \\ \hline 1944 \end{array}$$

55.
$$\begin{array}{r} 693 \\ \times\ 91 \\ \hline 693 \\ 6237 \\ \hline 63{,}063 \end{array}$$

56.
$$\begin{array}{r} 581 \\ \times\ 72 \\ \hline 1162 \\ 4067 \\ \hline 41{,}832 \end{array}$$

57.
$$\begin{array}{r} 419 \\ \times \quad 80 \\ \hline 33{,}520 \end{array}$$

58.
$$\begin{array}{r} 727 \\ \times\ 60 \\ \hline 43{,}620 \end{array}$$

59.
$$\begin{array}{r} 8279 \\ \times\ 46 \\ \hline 49674 \\ 33116 \\ \hline 380{,}834 \end{array}$$

60.
$$\begin{array}{r} 9577 \\ \times\ 35 \\ \hline 47885 \\ 28731 \\ \hline 335{,}195 \end{array}$$

61.
$$\begin{array}{r} 6938 \\ \times\ 78 \\ \hline 55504 \\ 48566 \\ \hline 541{,}164 \end{array}$$

62.
$$\begin{array}{r} 8875 \\ \times\quad 67 \\ \hline 62125 \\ 53250 \\ \hline 594{,}625 \end{array}$$

63.
$$\begin{array}{r} 7035 \\ \times\quad 57 \\ \hline 49245 \\ 35175 \\ \hline 400{,}995 \end{array}$$

64.
$$\begin{array}{r} 6702 \\ \times\quad 48 \\ \hline 53616 \\ 26808 \\ \hline 321{,}696 \end{array}$$

65.
$$\begin{array}{r} 3009 \\ \times\quad 35 \\ \hline 15045 \\ 9027 \\ \hline 105{,}315 \end{array}$$

66.
$$\begin{array}{r} 6003 \\ \times\quad 57 \\ \hline 42021 \\ 30015 \\ \hline 342{,}171 \end{array}$$

67.
$$\begin{array}{r} 809 \\ \times\quad 530 \\ \hline 24270 \\ 4045 \\ \hline 428{,}770 \end{array}$$

68.
$$\begin{array}{r} 607 \\ \times\quad 460 \\ \hline 36420 \\ 2428 \\ \hline 279{,}220 \end{array}$$

69.
$$\begin{array}{r} 800 \\ \times\quad 325 \\ \hline 4000 \\ 1600 \\ 2400 \\ \hline 260{,}000 \end{array}$$

70.
$$\begin{array}{r} 700 \\ \times\ 274 \\ \hline 2800 \\ 4900 \\ 1400 \\ \hline 191{,}800 \end{array}$$

71.
$$\begin{array}{r} 987 \\ \times\ 349 \\ \hline 8883 \\ 3948 \\ 2961 \\ \hline 344{,}463 \end{array}$$

72.
$$\begin{array}{r} 688 \\ \times\ 674 \\ \hline 2752 \\ 4816 \\ 4128 \\ \hline 463{,}712 \end{array}$$

73.
$$\begin{array}{r} 312 \\ \times\ 134 \\ \hline 1248 \\ 936 \\ 312 \\ \hline 41{,}808 \end{array}$$

74.
$$\begin{array}{r} 423 \\ \times\ 427 \\ \hline 2961 \\ 846 \\ 1692 \\ \hline 180{,}621 \end{array}$$

75.
$$\begin{array}{r} 379 \\ \times\quad 500 \\ \hline 189{,}500 \end{array}$$

76.
$$\begin{array}{r} 684 \\ \times\quad 700 \\ \hline 478{,}800 \end{array}$$

77.
$$\begin{array}{r} 985 \\ \times\quad 408 \\ \hline 7880 \\ 39400 \\ \hline 401{,}880 \end{array}$$

78.
$$\begin{array}{r} 758 \\ \times\ 209 \\ \hline 6822 \\ 15160 \\ \hline 158,422 \end{array}$$

79.
$$\begin{array}{r} 3407 \\ \times\ 309 \\ \hline 30663 \\ 102210 \\ \hline 1,052,763 \end{array}$$

80.
$$\begin{array}{r} 5207 \\ \times\ 902 \\ \hline 10414 \\ 468630 \\ \hline 4,696,714 \end{array}$$

81.
$$\begin{array}{r} 4258 \\ \times\ 986 \\ \hline 25548 \\ 34064 \\ 38322 \\ \hline 4,198,388 \end{array}$$

82.
$$\begin{array}{r} 6327 \\ \times\ 876 \\ \hline 37962 \\ 44289 \\ 50616 \\ \hline 5,542,452 \end{array}$$

83. Answers will vary. For example, 5 and 20

$$\begin{array}{r} 20 \\ \times 5 \\ \hline 100 \end{array}$$

84.
$$\begin{array}{r} 5763 \\ \times\ 45 \\ \hline 28815 \\ 23052 \\ \hline 259,335 \end{array}$$

85.
$$\begin{array}{r} 7349 \\ \times\ 27 \\ \hline 51443 \\ 14698 \\ \hline 198,423 \end{array}$$

86. $2 \times 19 = 38$

$$\begin{array}{r} 38 \\ \times 34 \\ \hline 152 \\ 114 \\ \hline 1292 \end{array}$$

87. $6 \times 73 = 438$

$$\begin{array}{r} 438 \\ \times\ 43 \\ \hline 1314 \\ 1752 \\ \hline 18,834 \end{array}$$

88.
$$\begin{array}{r} 376 \\ \times 402 \\ \hline 752 \\ 1504 \\ \hline 151,152 \end{array}$$

89.
$$\begin{array}{r} 842 \\ \times\ 309 \\ \hline 7578 \\ 2526 \\ \hline 260,178 \end{array}$$

90.
$$\begin{array}{rcr} 8745 & \approx & 9000 \\ \times\ 63 & \approx & \times\ 60 \end{array}$$
Cal.: 550,935 Est.: 540,000

91.
$$\begin{array}{rcr} 4732 & \approx & 5000 \\ \times\ 93 & \approx & \times\ 90 \end{array}$$
Cal.: 440,076 Est.: 450,000

92.
$$\begin{array}{rcr} 2937 & \approx & 3000 \\ \times\ 206 & \approx & \times\ 200 \end{array}$$
Cal.: 605,022 Est.: 600,000

93.
$$\begin{array}{rcr} 8941 & \approx & 9000 \\ \times\ 726 & \approx & \times\ 700 \end{array}$$
Cal.: 6,491,166 Est.: 6,300,000

94.
$$\begin{array}{rcr} 3097 & \approx & 3000 \\ \times\ 1025 & \approx & \times\ 1000 \end{array}$$
Cal.: 3,174,425 Est.: 3,000,000

95.
$$\begin{array}{rcl} 6379 & \approx & 6000 \\ \times\ 2936 & \approx & \times\ 3000 \end{array}$$
Cal.: 18,728,744 Est.: 18,000,000

96.
$$\begin{array}{rcl} 35{,}508 & \approx & 30{,}000 \\ \times\ 591 & \approx & \times\ 600 \end{array}$$
Cal.: 19,212,228 Est.: 18,000,000

97.
$$\begin{array}{rcl} 62{,}504 & \approx & 60{,}000 \\ \times\ 923 & \approx & \times\ 900 \end{array}$$
Cal.: 57,691,192 Est.: 54,000,000

Objective C Exercises

98. **Strategy** To find the perimeter, multiply the four by the length of the side (8 ft).

Solution
$$\begin{array}{r} 8 \\ \times 4 \\ \hline 32 \end{array}$$
The perimeter is 32 feet.

99. **Strategy** To find the area, multiply the length (78 ft) by the width (36 ft).

Solution
$$\begin{array}{r} 78 \\ \times 36 \\ \hline 468 \\ 234 \\ \hline 2808 \end{array}$$
The area is 2808 square feet.

100. (iv)

101. **Strategy** To find the distance the car could travel on 12 gallons of gas, multiply the mileage per gallon (43) by the number of gallons (12).

Solution
$$\begin{array}{r} 43 \\ \times 12 \\ \hline 86 \\ 43 \\ \hline 516 \end{array}$$
The car could travel 516 miles.

102. **Strategy** To find the number of gallons of fuel used on a 6-hour flight, multiply the number of gallons used in 1 hour (865) by 6.

Solution
$$\begin{array}{r} 865 \\ \times\ 6 \\ \hline 5190 \end{array}$$
The plane used 5190 gallons of fuel in a 6-hour flight.

103a. **Strategy** To find the number of marriages per week, multiply the number per day (542) by the number of days in a week (7).

Solution
$$\begin{array}{r} 542 \\ \times\ 7 \\ \hline 3794 \end{array}$$
3794 marriages occur each week between eHarmony members.

b. **Strategy** To find the number of marriages per year, multiply the number per day (542) by the number of days in a year (365).

Solution

$$\begin{array}{r} 365 \\ \times\ 542 \\ \hline 730 \\ 14\,60 \\ 182\,5 \\ \hline 197{,}830 \end{array}$$

197,830 marriages occur each year between eHarmony members.

104a. Strategy To find the average cost of tuition, room, and board for 4 years at a public university, multiply the amount per year ($15,875) by 4.

Solution

$$\begin{array}{r} 15{,}875 \\ \times\ \ \ 4 \\ \hline 63{,}500 \end{array}$$

The average cost of tuition, room, and board for 4 years at a public university is $63,500.

b. Strategy To find the average cost of tuition, room, and board for 4 years at a private university, multiply the amount per year ($42,841) by 4.

Solution

$$\begin{array}{r} 42{,}841 \\ \times\ \ \ 4 \\ \hline 171{,}364 \end{array}$$

The average cost of tuition, room, and board for 4 years at a private university is $171,364.

c. Strategy To find the difference in average cost between tuition, room, and board for 4 years at a private university and a public university, subtract the average cost for 4 years for a public university ($63,500) from the average cost for 4 years at a private university ($171,364).

Solution

$$\begin{array}{r} 171{,}364 \\ -\ 63{,}500 \\ \hline 107{,}864 \end{array}$$

The difference in average cost is $107,864.

105. **Strategy** To estimate the cost for the electricians' labor, multiply the number of electricians (3) by the number of hours each works (50) by the wage per hour (34).

Solution

$$\begin{aligned}\text{Total cost} &= \text{no. of electricians} \times \text{no. of hours each works} \times \text{wages per hour}\\ &= 3 \times 50 \times 34\\ &= 5100\end{aligned}$$

The estimated cost of the electricians' labor is \$5100.

106. **Strategy** To find the total wages paid, multiply the number of plumbers (4) by the number of hours each works (23) by the wage per hour (30).

Solution

$$\begin{aligned}\text{Total wages} &= \text{no. of plumbers} \times \text{no. of hours each works} \times \text{wages per hour}\\ &= 4 \times 23 \times 30\\ &= 2760\end{aligned}$$

The total wages paid to Carlos are \$2760.

107. **Strategy** To find the total cost for the four components:

• Determine the costs for the electrician, the plumber, the clerical work, and the bookkeeper.

• Add to find the sum of the four costs.

Solution

$$\begin{aligned}\textit{Electrician} &= 1 \times 30 \times \$34 = \$1020\\ \textit{Plumber} &= 1 \times 33 \times \$30 = \$990\\ \textit{Clerk} &= 1 \times 3 \times \$16 = \$48\\ \textit{Bookkeeper} &= 1 \times 4 \times \$20 = \$80\\ \textit{Total} &= \$2138\end{aligned}$$

The total cost is \$2138.

Critical Thinking

108a. Always true

b. Always true

c. Sometimes true, c is a true statement except in the cases described in parts a and b.

109. There is one accidental death every 5 minutes.

There are 60 minutes in an hour.

$5 \times 12 = 60$

There are 12 accidental deaths in an hour.

There are 24 hours per day.

$12 \times 24 = 288$

There are 288 accidental deaths in a day.

There are 365 days in a year.

$288 \times 365 = 105{,}120$

There are 105,120 accidental deaths in a year.

110. To find the increase per minute, subtract the number of people who die every minute from the number of people born every minute.

$267 - 108 = 159$

To find the increase every hour, multiply the increase per minute by 60 minutes per hour.

$159 \times 60 = 9540$

The population increases by 9540 people every hour.

To find the increase every day, multiply the increase per hour by 24 hours per day.

$9540 \times 24 = 228{,}960$

The population increases by 228,960 people every day.

To find the increase every week, multiply the increase per day by 7 days per week.

$228{,}960 \times 7 = 1{,}602{,}720$

The population increases by 1,602,720 people every week.

To find the increase every year, multiply the increase per day by 365 days per year.

$228{,}960 \times 365 = 83{,}570{,}400$

The population increases by 83,570,400 people every year.

Projects or Group Activities

111. S = 2, T = 1, R = 9, A = 7, W = 8

$$\begin{array}{r} 21{,}978 \\ \times \quad 4 \\ \hline 87{,}912 \end{array}$$

Section 1.5

Concept Check

1. 2: $2 \times 4 = 8$

2. 4; $4 \times 3 = 12$

3. 6; $6 \times 5 = 30$

4. 7; $7 \times 9 = 63$

5. 6

6. 5

7. 12

8. 6

Objective A Exercises

9. 7

10.
$$\begin{array}{r} 16 \\ 5\overline{)80} \\ \underline{-5} \\ 30 \\ \underline{-30} \\ 0 \end{array}$$

11.
$$\begin{array}{r} 16 \\ 6\overline{)96} \\ \underline{-\ 6} \\ 36 \\ \underline{-\ 36} \\ 0 \end{array}$$

12.
$$\begin{array}{r} 80 \\ 6\overline{)480} \\ \underline{-48} \\ 00 \\ \underline{-\ 0} \\ 0 \end{array}$$

13.
$$\begin{array}{r} 210 \\ 4\overline{)840} \\ \underline{-8} \\ 04 \\ \underline{-\ 4} \\ 00 \\ \underline{-\ 0} \\ 0 \end{array}$$

14.
$$\begin{array}{r} 230 \\ 3\overline{)690} \\ \underline{-6} \\ 09 \\ \underline{-\ 9} \\ 00 \\ \underline{-\ 0} \\ 0 \end{array}$$

15.
$$\begin{array}{r} 44 \\ 7\overline{)308} \\ \underline{-\ 28} \\ 28 \\ \underline{-\ \ 28} \\ 0 \end{array}$$

16.
$$\begin{array}{r} 29 \\ 7\overline{)203} \\ \underline{-14} \\ 63 \\ \underline{-63} \\ 0 \end{array}$$

17.
$$\begin{array}{r} 703 \\ 9\overline{)6327} \\ \underline{-\ 63} \\ 02 \\ \underline{-\ \ 0} \\ 27 \\ \underline{-27} \\ 0 \end{array}$$

18.
$$\begin{array}{r} 530 \\ 4\overline{)2120} \\ \underline{-20} \\ 12 \\ \underline{-12} \\ 00 \\ \underline{-\ 0} \\ 0 \end{array}$$

19.
$$\begin{array}{r} 910 \\ 8\overline{)7280} \\ \underline{-72} \\ 08 \\ \underline{-\ 8} \\ 00 \\ \underline{-\ 0} \\ 0 \end{array}$$

20.
$$\begin{array}{r} 902 \\ 9\overline{)8118} \\ \underline{-81} \\ 01 \\ \underline{-\ 0} \\ 18 \\ \underline{-18} \\ 0 \end{array}$$

21.
$$\begin{array}{r} 5006 \\ 7\overline{)35{,}042} \\ \underline{-35} \\ 0\ 042 \\ \underline{-42} \\ 0 \end{array}$$

22.
$$\begin{array}{r} 7008 \\ 4\overline{)28{,}032} \\ -28 \\ \hline 0032 \\ -32 \\ \hline 0 \end{array}$$

23.
$$\begin{array}{r} 6050 \\ 9\overline{)54{,}450} \\ -54 \\ \hline 0\,45 \\ -45 \\ \hline 00 \end{array}$$

24.
$$\begin{array}{r} 3204 \\ 8\overline{)25{,}632} \\ -24 \\ \hline 1\,6 \\ -1\,6 \\ \hline 032 \\ -32 \\ \hline 0 \end{array}$$

25.
$$\begin{array}{r} 1075 \\ 7\overline{)7525} \\ -\,7 \\ \hline 05 \\ -\,0 \\ \hline 52 \\ -\,49 \\ \hline 35 \\ -35 \\ \hline 0 \end{array}$$

26.
$$\begin{array}{r} 8\,091 \\ 4\overline{)32{,}364} \\ -32 \\ \hline 03 \\ -\,0 \\ \hline 36 \\ -\,36 \\ \hline 04 \\ -\,4 \\ \hline 0 \end{array}$$

27. 1

Objective B Exercises

28.
$$\begin{array}{r} 2 \text{ rl} \\ 4\overline{)9} \\ -8 \\ \hline 1 \end{array}$$

29.
$$\begin{array}{r} 3 \text{ r1} \\ 2\overline{)7} \\ -6 \\ \hline 1 \end{array}$$

30.
$$\begin{array}{r} 5 \text{ r2} \\ 5\overline{)27} \\ -25 \\ \hline 2 \end{array}$$

31.
$$\begin{array}{r} 9 \text{ r7} \\ 9\overline{)88} \\ -81 \\ \hline 7 \end{array}$$

32.
$$\begin{array}{r} 13 \text{ rl} \\ 3\overline{)40} \\ -\,3 \\ \hline 10 \\ -\,9 \\ \hline 1 \end{array}$$

33.
$$\begin{array}{r} 16 \text{ r1} \\ 6\overline{)97} \\ -6 \\ \hline 37 \\ -36 \\ \hline 1 \end{array}$$

34.
$$\begin{array}{r} 10 \text{ r3} \\ 8\overline{)83} \\ -8 \\ \hline 03 \\ -\,0 \\ \hline 3 \end{array}$$

35.
$$\begin{array}{r} 10 \text{ r4} \\ 5\overline{)54} \\ -5 \\ \hline 04 \\ -\,0 \\ \hline 4 \end{array}$$

36.
$$\begin{array}{r} 90 \text{ r2} \\ 7\overline{)632} \\ -63 \\ \hline 02 \\ -0 \\ \hline 2 \end{array}$$

37.
$$\begin{array}{r} 90 \text{ r3} \\ 4\overline{)363} \\ -36 \\ \hline 03 \\ -0 \\ \hline 3 \end{array}$$

38.
$$\begin{array}{r} 230 \text{ rl} \\ 4\overline{)921} \\ -8 \\ \hline 12 \\ -12 \\ \hline 01 \\ -0 \\ \hline 1 \end{array}$$

39.
$$\begin{array}{r} 120 \text{ r5} \\ 7\overline{)845} \\ -7 \\ \hline 14 \\ -14 \\ \hline 05 \\ -0 \\ \hline 5 \end{array}$$

40.
$$\begin{array}{r} 204 \text{ r3} \\ 8\overline{)1635} \\ -16 \\ \hline 03 \\ -0 \\ \hline 35 \\ -32 \\ \hline 3 \end{array}$$

41.
$$\begin{array}{r} 309 \text{ r3} \\ 5\overline{)1548} \\ -15 \\ \hline 04 \\ -0 \\ \hline 48 \\ -45 \\ \hline 3 \end{array}$$

42.
$$\begin{array}{r} 1347 \text{ r3} \\ 7\overline{)9432} \\ -7 \\ \hline 24 \\ -21 \\ \hline 33 \\ -28 \\ \hline 52 \\ -49 \\ \hline 3 \end{array}$$

43.
$$\begin{array}{r} 1160 \text{ r4} \\ 7\overline{)8124} \\ -7 \\ \hline 11 \\ -7 \\ \hline 42 \\ -42 \\ \hline 04 \\ -0 \\ \hline 4 \end{array}$$

44.
$$\begin{array}{r} 1720 \text{ r2} \\ 3\overline{)5162} \\ -3 \\ \hline 21 \\ -21 \\ \hline 06 \\ -6 \\ \hline 02 \\ -0 \\ \hline 2 \end{array}$$

45.
$$\begin{array}{r} 708 \text{ r2} \\ 5\overline{)3542} \\ -35 \\ \hline 04 \\ -0 \\ \hline 42 \\ -40 \\ \hline 2 \end{array}$$

46.
$$\begin{array}{r} 409 \text{ r2} \\ 8\overline{)3274} \\ -32 \\ \hline 07 \\ -0 \\ \hline 74 \\ -72 \\ \hline 2 \end{array}$$

47.
$$\begin{array}{r} 3\,825 \\ 4\overline{)15{,}301} \\ -12 \\ \hline 33 \\ -32 \\ \hline 10 \\ -\ 8 \\ \hline 21 \\ -20 \\ \hline 1 \end{array} \quad \text{r1}$$

48.
$$\begin{array}{r} 6\,214 \\ 7\overline{)43{,}500} \\ -\ 42 \\ \hline 15 \\ -14 \\ \hline 10 \\ -\ 7 \\ \hline 30 \\ -28 \\ \hline 2 \end{array} \quad \text{r2}$$

49.
$$\begin{array}{r} 5\,710 \\ 6\overline{)34{,}263} \\ -\ 30 \\ \hline 42 \\ -42 \\ \hline 06 \\ -\ 6 \\ \hline 03 \\ -\ 0 \\ \hline 3 \end{array} \quad \text{r3}$$

50.
$$\begin{array}{r} 3\,070 \\ 7\overline{)21{,}495} \\ -\ 21 \\ \hline 049 \\ -49 \\ \hline 05 \\ -\ 0 \\ \hline 5 \end{array} \quad \text{r5}$$

51.
$$\begin{array}{r} 11{,}434 \\ 4\overline{)45{,}738} \\ -4 \\ \hline 05 \\ -4 \\ \hline 17 \\ -16 \\ \hline 13 \\ -12 \\ \hline 18 \\ -16 \\ \hline 2 \end{array} \quad \text{r2}$$

Round to 11,430.

52.
$$\begin{array}{r} 4{,}210 \\ 9\overline{)37{,}896} \\ -36 \\ \hline 18 \\ -\ 18 \\ \hline 09 \\ -\ 9 \\ \hline 06 \\ -\ 0 \\ \hline 6 \end{array} \quad \text{r6}$$

Round to 4200.

53.
$$\begin{array}{r} 510 \\ 7\overline{)3572} \\ -35 \\ \hline 07 \\ -7 \\ \hline 02 \\ -0 \\ \hline 2 \end{array} \quad \text{r2}$$

Round to 510.

54.
$$\begin{array}{r} 19{,}586 \\ 4\overline{)78{,}345} \\ -4 \\ \hline 38 \\ -36 \\ \hline 23 \\ -20 \\ \hline 34 \\ -\ 32 \\ \hline 25 \\ -24 \\ \hline 1 \end{array} \quad \text{r1}$$

Round to 19,600.

55. False

Objective C Exercises

56.
$$\begin{array}{r} 3 \\ 27\overline{)96} \\ -81 \\ \hline 15 \end{array} \quad \text{r15}$$

57.
$$\begin{array}{r} 1 \\ 44\overline{)82} \\ -44 \\ \hline 38 \end{array} \quad \text{r38}$$

58.
$$\begin{array}{r} 2 \\ 42\overline{)87} \\ -84 \\ \hline 3 \end{array} \quad \text{r3}$$

59.
$$\begin{array}{r} 1 \\ 67\overline{)93} \\ -67 \\ \hline 26 \end{array} \quad \text{r26}$$

60.
$$\begin{array}{r} 21 \\ 41\overline{)897} \\ -82 \\ \hline 77 \\ -41 \\ \hline 36 \end{array} \quad \text{r36}$$

61.
$$\begin{array}{r} 21 \\ 32\overline{)693} \\ -64 \\ \hline 53 \\ -32 \\ \hline 21 \end{array} \quad \text{r21}$$

62.
$$\begin{array}{r} 34 \\ 23\overline{)784} \\ -69 \\ \hline 94 \\ -92 \\ \hline 2 \end{array} \quad \text{r2}$$

63.
$$\begin{array}{r} 30 \\ 25\overline{)772} \\ -75 \\ \hline 22 \\ -0 \\ \hline 22 \end{array} \quad \text{r22}$$

64.
$$\begin{array}{r} 8 \\ 74\overline{)600} \\ -592 \\ \hline 8 \end{array} \quad \text{r8}$$

65.
$$\begin{array}{r} 5 \\ 92\overline{)500} \\ -460 \\ \hline 40 \end{array} \quad \text{r40}$$

66.
$$\begin{array}{r} 4 \\ 70\overline{)329} \\ -280 \\ \hline 49 \end{array} \quad \text{r49}$$

67.
$$\begin{array}{r} 9 \\ 50\overline{)467} \\ -450 \\ \hline 17 \end{array} \quad \text{r17}$$

68.
$$\begin{array}{r} 200 \\ 36\overline{)7225} \\ -72 \\ \hline 02 \\ -0 \\ \hline 25 \\ -0 \\ \hline 25 \end{array} \quad \text{r25}$$

69.
$$\begin{array}{r} 200 \\ 44\overline{)8821} \\ -88 \\ \hline 02 \\ -0 \\ \hline 21 \\ -0 \\ \hline 21 \end{array} \quad \text{r21}$$

70.
$$\begin{array}{r} 203 \\ 19\overline{)3859} \\ -38 \\ \hline 05 \\ -0 \\ \hline 59 \\ -57 \\ \hline 2 \end{array} \quad \text{r2}$$

71.
$$\begin{array}{r} 303 \\ 32\overline{)9697} \\ -96 \\ \hline 09 \\ -0 \\ \hline 97 \\ -96 \\ \hline 1 \end{array} \quad \text{r1}$$

72.
$$\begin{array}{r} 35 \\ 88\overline{)3127} \\ -264 \\ \hline 487 \\ -440 \\ \hline 47 \end{array}$$ r47

73.
$$\begin{array}{r} 67 \\ 92\overline{)6177} \\ -552 \\ \hline 657 \\ -644 \\ \hline 13 \end{array}$$ r13

74.
$$\begin{array}{r} 507 \\ 29\overline{)14,721} \\ -145 \\ \hline 221 \\ -203 \\ \hline 18 \end{array}$$ r18

75.
$$\begin{array}{r} 708 \\ 63\overline{)44,653} \\ -441 \\ \hline 553 \\ -504 \\ \hline 49 \end{array}$$ r49

76.
$$\begin{array}{r} 4484 \\ 22\overline{)98,654} \\ -88 \\ \hline 106 \\ -88 \\ \hline 185 \\ -176 \\ \hline 94 \\ -88 \\ \hline 6 \end{array}$$ r6

77.
$$\begin{array}{r} 1086 \\ 77\overline{)83,639} \\ -77 \\ \hline 66 \\ -0 \\ \hline 662 \\ -616 \\ \hline 469 \\ -462 \\ \hline 7 \end{array}$$ r7

78.
$$\begin{array}{r} 2009 \\ 57\overline{)114,545} \\ -114 \\ \hline 0545 \\ -513 \\ \hline 32 \end{array}$$ r32

79.
$$\begin{array}{r} 5007 \\ 73\overline{)365,566} \\ -365 \\ \hline 0566 \\ -511 \\ \hline 55 \end{array}$$ r55

80.
$$\begin{array}{r} 15 \\ 206\overline{)3097} \\ -206 \\ \hline 1037 \\ -1030 \\ \hline 7 \end{array}$$ r7

81.
$$\begin{array}{r} 12 \\ 504\overline{)6504} \\ -504 \\ \hline 1464 \\ -1008 \\ \hline 456 \end{array}$$ r456

82.
$$\begin{array}{r} 1 \\ 654\overline{)1217} \\ -654 \\ \hline 563 \end{array}$$ r563

83.
$$\begin{array}{r} 4 \\ 546\overline{)2344} \\ -2184 \\ \hline 160 \end{array}$$ r160

84.
$$\begin{array}{r} 258 \\ 21\overline{)5432} \\ -42 \\ \hline 123 \\ -105 \\ \hline 182 \\ -168 \\ \hline 14 \end{array}$$ r14

85.
$$\begin{array}{r} 160 \text{ r27} \\ 53\overline{)8507} \\ -53 \\ \hline 320 \\ -318 \\ \hline 27 \end{array}$$

86.
$$\begin{array}{r} 517 \text{ r70} \\ 72\overline{)37{,}294} \\ -360 \\ \hline 129 \\ -72 \\ \hline 574 \\ -504 \\ \hline 70 \end{array}$$

87.
$$\begin{array}{r} 1\,669 \text{ r14} \\ 46\overline{)76{,}788} \\ -46 \\ \hline 307 \\ -276 \\ \hline 318 \\ -276 \\ \hline 428 \\ -414 \\ \hline 14 \end{array}$$

88.
$$\begin{array}{r} 545 \text{ r22} \\ 43\overline{)23{,}457} \\ -215 \\ \hline 195 \\ -172 \\ \hline 237 \\ -215 \\ \hline 22 \end{array}$$

Round to 500.

89.
$$\begin{array}{r} 7\,948 \text{ r17} \\ 43\overline{)341{,}781} \\ -301 \\ \hline 407 \\ -387 \\ \hline 208 \\ -172 \\ \hline 361 \\ -344 \\ \hline 17 \end{array}$$

Round to 7950.

90. False

91. Cal.: $\begin{array}{r} 5129 \\ 76\overline{)389{,}804} \end{array}$ Est.: $\begin{array}{r} 5000 \\ 80\overline{)400{,}000} \end{array}$

92. Cal.: $\begin{array}{r} 2225 \\ 53\overline{)117{,}925} \end{array}$ Est.: $\begin{array}{r} 2000 \\ 50\overline{)100{,}000} \end{array}$

93. Cal.: $\begin{array}{r} 21{,}968 \\ 29\overline{)637{,}072} \end{array}$ Est.: $\begin{array}{r} 20{,}000 \\ 30\overline{)600{,}000} \end{array}$

94. Cal.: $\begin{array}{r} 11{,}016 \\ 67\overline{)738{,}072} \end{array}$ Est.: $\begin{array}{r} 10{,}000 \\ 70\overline{)700{,}000} \end{array}$

95. Cal.: $\begin{array}{r} 24{,}596 \\ 38\overline{)934{,}684} \end{array}$ Est.: $\begin{array}{r} 22{,}500 \\ 40\overline{)900{,}000} \end{array}$

96. Cal.: $\begin{array}{r} 26{,}656 \\ 34\overline{)906{,}304} \end{array}$ Est.: $\begin{array}{r} 30{,}000 \\ 30\overline{)900{,}000} \end{array}$

97. Cal.: $\begin{array}{r} 2836 \\ 309\overline{)876{,}324} \end{array}$ Est.: $\begin{array}{r} 3000 \\ 300\overline{)900{,}000} \end{array}$

98. Cal.: $\begin{array}{r} 504 \\ 642\overline{)323{,}568} \end{array}$ Est.: $\begin{array}{r} 500 \\ 600\overline{)300{,}000} \end{array}$

99. Cal.: $\begin{array}{r} 3024 \\ 209\overline{)632{,}016} \end{array}$ Est.: $\begin{array}{r} 3000 \\ 200\overline{)600{,}000} \end{array}$

100. Cal.: $\begin{array}{r} 541 \\ 614\overline{)332{,}174} \end{array}$ Est.: $\begin{array}{r} 500 \\ 600\overline{)300{,}000} \end{array}$

101.

Cal.: $\begin{array}{r} 32{,}036 \\ 179\overline{)5{,}734{,}444} \end{array}$ Est.: $\begin{array}{r} 30{,}000 \\ 200\overline{)6{,}000{,}000} \end{array}$

102.

Cal.: $\begin{array}{r} 20{,}621 \\ 374\overline{)7{,}712{,}254} \end{array}$ Est.: $\begin{array}{r} 20{,}000 \\ 400\overline{)8{,}000{,}000} \end{array}$

Objective D Exercises

103. **Strategy** To find the monthly salary, divide the annual salary ($69,048) by the number of months (12).

Solution

$$\begin{array}{r} 5754 \\ 12\overline{)69{,}048} \\ -60 \\ \hline 90 \\ -84 \\ \hline 64 \\ -60 \\ \hline 48 \\ -48 \\ \hline 0 \end{array}$$

Melissa's monthly salary is $5754.

104a. **Strategy** To find the number of calories in one meatball, divide the number of calories in six pounds of hamburger (7200 calories) by the number of meatballs six pounds of hamburger makes.

Solution

$$\begin{array}{r} 60 \\ 120\overline{)7200} \\ -720 \\ \hline 00 \\ -0 \\ \hline 0 \end{array}$$

Each meatball contains 60 calories.

b. **Strategy** To find the number of calories in one pound of hamburger, divide the number of calories in six pounds of hamburger (7200 calories) by the number of pounds (6).

Solution

$$\begin{array}{r} 1200 \\ 6\overline{)7200} \\ -6 \\ \hline 12 \\ -12 \\ \hline 00 \\ -0 \\ \hline 0 \end{array}$$

One pound of hamburger contains 1200 calories.

105. **Strategy** To find the cost of the gold alloy in each necklace:

- Find the total cost of the gold alloy by multiplying the number of ounces of gold (30) by the price per ounce ($375).
- Divide the total cost of the gold alloy by the number of necklaces (15).

Solution

$$\begin{array}{r} 375 \\ \times\ 30 \\ \hline 11{,}250 \end{array} \qquad \begin{array}{r} 750 \\ 15\overline{)11{,}250} \\ -105 \\ \hline 75 \\ -75 \\ \hline 00 \\ -0 \\ \hline 0 \end{array}$$

The gold alloy in each necklace costs $750.

106. **Strategy** To find the cost of a carton of 4 bottles:

- Find the cost per bottle

by dividing the total cost ($126,000) by the total number of bottles (63,000).

- Multiply the cost per bottle by the number of bottles in a carton (4).

Solution

$$63{,}000\overline{)126{,}000}\quad 2$$
$$-126{,}000$$
$$0$$

$2 \times 4 = 8$

A carton of 4 bottles costs $8.

107. Strategy To find the average score:

- Add the scores for the four exams (86, 94, 79, and 93).
- Divide the sum by the number of exams (4).

Solution

$$\begin{array}{r} 86 \\ 94 \\ 79 \\ +93 \\ \hline 352 \end{array} \qquad 4\overline{)352}\quad 88$$
$$-32$$
$$32$$
$$-32$$
$$0$$

The average score was 88.

108. Strategy To find the average score Richard must receive on the remaining four tests:

- Subtract the score received on the first exam (82) from the minimum total score to receive an A (450 points).
- Divide the difference by the number of remaining tests (4).

Solution

$$\begin{array}{r} 450 \\ -82 \\ \hline 368 \end{array} \qquad 4\overline{)368}\quad 92$$
$$-36$$
$$08$$
$$-8$$
$$0$$

Richard must receive an average score of 92 on the remaining four tests.

109. Strategy To find the monthly payment:

- Subtract the down payment ($1620) from the cost of the television ($3180).
- Divide the result by the number of monthly payments (12).

Solution

$$\begin{array}{r} 3180 \\ -1620 \\ \hline 1560 \end{array} \qquad 12\overline{)1560}\quad 130$$
$$-12$$
$$36$$
$$-36$$
$$00$$
$$-0$$
$$0$$

The monthly payment is $130.

110. Strategy To find the difference in pay rates:

- Find the regular hourly pay rate by dividing the weekly salary ($440) by the number of hours worked (40 hours).
- Subtract the regular

hourly pay rate from the hourly overtime pay rate.

Solution

$$\begin{array}{r} 11 \\ 40\overline{)440} \\ -40 \\ \hline 40 \\ -40 \\ \hline 0 \end{array} \qquad 13 - 11 = 2$$

The difference in pay rates is \$2.

111. **Strategy** To find the average monthly claim for theft, divide the annual claim for theft (\$300,000) by the number of months (12).

Solution

$$\begin{array}{r} 25{,}000 \\ 12\overline{)300{,}000} \\ -24 \\ \hline 60 \\ -60 \\ \hline 00 \\ -\ 0 \\ \hline 00 \\ -\ 0 \\ \hline 00 \\ -\ 0 \\ \hline 0 \end{array}$$

The average monthly claim for theft is \$25,000.

112. **Strategy** To find the average claims per month for all the sources combined:

- Add all the claims.
- Divide the sum by the number of months (12).

Solution

$$\begin{array}{r} 560{,}000 \\ 300{,}000 \\ 80{,}000 \\ 50{,}000 \\ 20{,}000 \\ 20{,}000 \\ +\ 110{,}000 \\ \hline 1{,}140{,}000 \end{array} \qquad \begin{array}{r} 95{,}000 \\ 12\overline{)1{,}140{,}000} \\ -108 \\ \hline 60 \\ -60 \\ \hline 00 \\ -\ 0 \\ \hline 00 \\ -\ 0 \\ \hline 00 \\ -\ 0 \\ \hline 0 \end{array}$$

The average claims per month is \$95,000.

113. **Strategy** To find the average hours worked by employees in the United Kingdom, divide the annual hours worked (1731) by the number of weeks (50).

Solution

$$\begin{array}{r} 32 \\ 50\overline{)1646} \\ -150 \\ \hline 146 \\ -100 \\ \hline 46 \end{array}$$

Since 46 is greater than half of 50, the average number of hours worked by employees in the United Kingdom is 33 hours.

114. **Strategy** To find the difference in the average weekly work hours between an employee from France and the United States:

- Find the average weekly work hours for a U.S. employee by dividing the annual work hours (1768) by the number of weeks

in a year (50).

- Find the average weekly work hours for a French employee by dividing the annual work hours (1554) by the number of weeks in a year (50).
- Find the difference between the two by subtracting.

Solution

$$\begin{array}{r} 35 \\ 50\overline{)1768} \\ -150 \\ \hline 268 \\ -250 \\ \hline 38 \end{array} \qquad \begin{array}{r} 31 \\ 50\overline{)1554} \\ -150 \\ \hline 54 \\ -50 \\ \hline 4 \end{array}$$

The U.S. employee works approximately 35 hours, and the French employee works approximately 31 hours.

$$\begin{array}{r} 35 \\ -31 \\ \hline 4 \end{array}$$

The difference is 4 hours.

115. Strategy To find the difference per week:

- Read the table to determine the greatest number of hours worked per year.
- Read the table to find the least number of hours worked per year.
- Subtract the least number from the greatest number.
- Divide the result by the number of weeks worked per year (50).

Solution Greatest number of hours worked: 2119 (Greece)

Least number of hours worked: 1390 (Germany)

$$\begin{array}{r} 2119 \\ -1390 \\ \hline 729 \end{array} \qquad \begin{array}{r} 14 \\ 50\overline{)729} \\ -50 \\ \hline 229 \\ -200 \\ \hline 29 \end{array}$$

On average, employees in Greece work 15 more hours per week than employees in Germany.

116. Strategy To find the average low temperature:

- Add the low temperatures for the 9 days.
- Divide the sum by the number of days (9).

Solution

$$\begin{array}{r} 66 \\ 55 \\ 55 \\ 61 \\ 62 \\ 66 \\ 65 \\ 52 \\ +58 \\ \hline 540 \end{array} \qquad \begin{array}{r} 60 \\ 9\overline{)540} \\ -54 \\ \hline 00 \\ -0 \\ \hline 0 \end{array}$$

The average low temperature was 60°F.

117. Strategy To find the number of pieces processed per day, divide the total number of pieces of mail processed (117 billion, or

117,000,000,000) by the number of working days in a year (300).

Solution

$$
\begin{array}{r}
390,000,000 \\
300\overline{)117,000,000,000} \\
-900 \\
\hline
2700 \\
-2700 \\
\hline
0
\end{array}
$$

The U.S. Postal Service processed 390 million pieces of mail.

118. (i) and (iii)

Critical Thinking

119. **Strategy** To find the total of the three deductions, add the three deductions.

Solution

$$
\begin{array}{rl}
\$225 & \text{Savings} \\
98 & \text{Taxes} \\
\underline{27} & \text{Insurance} \\
\$350 &
\end{array}
$$

The total of the three deductions is $350.

120. **Strategy** To find the number of cases of eggs produced during the year, add all the values read from the graph.

Solution

$$
\begin{array}{rl}
111,100,000 & \text{Retail Stores} \\
61,600,000 & \text{Non-shell Products} \\
24,100,000 & \text{Food Service Use} \\
\underline{1,600,000} & \text{Exported} \\
198,400,000 &
\end{array}
$$

198,400,000 cases of eggs were produced during the year.

121. **Strategy** To find how many more cases of eggs were sold by retail stores than were used for non-shell products, subtract the number of non-shell products cases (61,600,000) from the number of cases sold in retail stores (111,100,000).

Solution

$$
\begin{array}{r}
111,100,000 \\
-61,600,000 \\
\hline
49,500,000
\end{array}
$$

Retail stores sold 49,500,000 more cases of eggs than were used for nonshell products.

122. **Strategy** To find the total amount spent annually, add all the expenses.

Solution

$$
\begin{array}{r}
\$11,713 \\
5366 \\
1746 \\
1903 \\
3381 \\
4810 \\
\underline{+\ 6616} \\
\$35,535
\end{array}
$$

The total amount spent annually is $35,535.

123. **Strategy** To find the monthly expense for housing, divide annual housing expense ($11,713)by the number of months(12).

Solution

$$
\begin{array}{r}
976 \\
12\overline{)11,713} \\
\underline{-108} \\
91 \\
\underline{-84} \\
73 \\
\underline{-72} \\
1
\end{array}
$$

The average monthly expense for housing is $976.

124. Strategy To find the difference between the average monthly expense for food and health care:

- Find the average monthly expense for food by dividing the annual expense for food ($4810) by the number of months in a year (12).
- Find the average monthly expense for health care by dividing the annual expense for health care ($1903) by the number of months in a year (12).
- Find the difference between the two by subtracting the average monthly expense for health care from the average monthly expense for food.

Solution

$$\begin{array}{r} 400 \\ 12\overline{)4810} \\ -48 \\ \hline 01 \\ -0 \\ \hline 10 \\ -0 \\ \hline 10 \end{array}$$

Round the quotient to 401.

$$\begin{array}{r} 158 \\ 12\overline{)1903} \\ -12 \\ \hline 70 \\ -60 \\ \hline 103 \\ -96 \\ \hline 7 \end{array}$$

Round the quotient to 159.

The monthly expense for food is approximately $401, and the monthly expense for health care is approximately $159.

$$\begin{array}{r} 401 \\ -159 \\ \hline 242 \end{array}$$

The difference is $242.

125. Strategy To find the total amount paid for the car:

• Multiply $195 by 48 to find the amount paid in monthly payments.

• Add the total for the monthly payments to the down payment ($2500).

Solution

$$\begin{array}{r} 195 \\ \times\ 48 \\ \hline 1560 \\ 780 \\ \hline 9360 \end{array} \qquad \begin{array}{r} 2500 \\ +9360 \\ \hline 11{,}860 \end{array}$$

The total amount paid for the car was $11,860.

Projects or Group Activities

126a. 1, 2, 3, 4, 6, 8, 12, 16, 24, 48

b. 1, 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 36, 48, 72, 144

c. 1, 97

127. Subtraction

128. Multiplication

129. Division

130. Addition

Section 1.6

Concept Check

1. Five times

2. Yes; Associative Property of Multiplication

3. (i) and (iii)

4. (i) and (ii)

Objective A Exercises

5. 2^3

6. 7^5

7. $6^3 \cdot 7^4$

8. $6^2 \cdot 9^4$

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

10. $3^2 \cdot 10^2$

11. $5 \cdot 7^5$

12. $4^3 \cdot 5^3$

13. $3^3 \cdot 6^4$

14. $2^2 \cdot 5^3 \cdot 8$

15. $3^3 \cdot 5 \cdot 9^3$

16. $2^3 \cdot 4 \cdot 7^3$

17. $2 \cdot 2 \cdot 2 = 8$

18. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 64$

19. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 5 \cdot 5 = 16 \cdot 25 = 400$

20. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 = 64 \cdot 9 = 576$

21. $3 \cdot 3 \cdot 10 \cdot 10 = 9 \cdot 100 = 900$

22. $2 \cdot 2 \cdot 2 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 8 \cdot 10{,}000 = 80{,}000$

23. $6 \cdot 6 \cdot 3 \cdot 3 \cdot 3 = 36 \cdot 27 = 972$

24. $4 \cdot 4 \cdot 4 \cdot 5 \cdot 5 = 64 \cdot 25 = 1600$

25. $5 \cdot 2 \cdot 2 \cdot 2 \cdot 3 = 5 \cdot 8 \cdot 3 = 120$

26. $6 \cdot 3 \cdot 3 \cdot 4 = 6 \cdot 9 \cdot 4 = 216$

27. $2 \cdot 2 \cdot 3 \cdot 3 \cdot 10 = 4 \cdot 9 \cdot 10 = 360$

28. $3 \cdot 3 \cdot 5 \cdot 5 \cdot 10 = 9 \cdot 25 \cdot 10 = 2250$

29. $0 \cdot 0 \cdot 4 \cdot 4 \cdot 4 = 0 \cdot 64 = 0$

30. $6 \cdot 6 \cdot 0 \cdot 0 \cdot 0 = 36 \cdot 0 = 0$

31. $3 \cdot 3 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 9 \cdot 10{,}000 = 90{,}000$

32. $5 \cdot 5 \cdot 5 \cdot 10 \cdot 10 \cdot 10 = 125 \cdot 1000 = 125{,}000$

33. $2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 5 = 4 \cdot 27 \cdot 5 = 540$

34. $5 \cdot 5 \cdot 7 \cdot 7 \cdot 7 \cdot 2 = 25 \cdot 343 \cdot 2 = 17{,}150$

35. $2 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 5 \cdot 5 = 2 \cdot 81 \cdot 25 = 4050$

36. $6 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 7 \cdot 7 = 6 \cdot 64 \cdot 49 = 18{,}816$

37. $5 \cdot 5 \cdot 3 \cdot 3 \cdot 7 \cdot 7 = 25 \cdot 9 \cdot 49 = 11{,}025$

38. $4 \cdot 4 \cdot 9 \cdot 9 \cdot 6 \cdot 6 = 16 \cdot 81 \cdot 36 = 46{,}656$

39. $3 \cdot 3 \cdot 3 \cdot 3 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$
$= 81 \cdot 64 \cdot 5$
$= 25{,}920$

40. $4 \cdot 4 \cdot 4 \cdot 6 \cdot 6 \cdot 6 \cdot 7 = 64 \cdot 216 \cdot 7 = 96{,}768$

41. $4 \cdot 4 \cdot 3 \cdot 3 \cdot 3 \cdot 10 \cdot 10 \cdot 10 \cdot 10$
$= 16 \cdot 27 \cdot 10{,}000$
$= 4{,}320{,}000$

42a. $5 \cdot 3 = 15$

b. $3^5 = 243$

Objective B Exercises

43. $4 - 2 + 3 = 2 + 3 = 5$

44. $6 - 3 + 2 = 3 + 2 = 5$

45. $6 \cdot 3 + 5 = 18 + 5 = 23$

46. $5 \cdot 9 + 2 = 45 + 2 = 47$

47. $14 - 2 \cdot 4 = 14 - 8 = 6$

48. $12 + 3 \cdot 5 = 12 + 15 = 27$

49. $3 + 6 \div 3 = 3 + 2 = 5$

50. $12 + 8 \div 4 = 12 + 2 = 14$

51. $2 \cdot 3^2 = 2 \cdot 9 = 18$

52. $5 \cdot 2^3 = 5 \cdot 8 = 40$

53. $4 \cdot (5 - 3) + 2 = 4 \cdot 2 + 2 = 8 + 2 = 10$

54. $3 + (4 + 2) \div 3 = 3 + 6 \div 3$
$= 3 + 2 = 5$

55. $5 + (8 + 4) \div 6 = 5 + 12 \div 6$
$= 5 + 2 = 7$

56. $8 - 2^2 + 4 = 8 - 4 + 4$
$= 4 + 4 = 8$

57. $16 \cdot (3 + 2) \div 10 = 16 \cdot 5 \div 10$
$= 80 \div 10 = 8$

58. $12 \cdot (1 + 5) \div 12 = 12 \cdot 6 \div 12$
$= 72 \div 12 = 6$

59. $10 - 2^3 + 4 = 10 - 8 + 4$
$= 2 + 4 = 6$

60. $5 \cdot 3^2 + 8 = 5 \cdot 9 + 8$
$= 45 + 8 = 53$

61. $16 + 4 \cdot 3^2 = 16 + 4 \cdot 9$
$= 16 + 36 = 52$

62. $12 + 4 \cdot 2^3 = 12 + 4 \cdot 8$
$= 12 + 32 = 44$

63. $16 + (8 - 3) \cdot 2 = 16 + 5 \cdot 2$
$= 16 + 10 = 26$

64. $7 + (9 - 5) \cdot 3 = 7 + 4 \cdot 3$
$= 7 + 12 = 19$

65. $2^2 + 3 \cdot (6 - 2)^2 = 2^2 + 3 \cdot 4^2$
$= 4 + 3 \cdot 16$
$= 4 + 48 = 52$

66. $3^3 + 5 \cdot (8 - 6)^3 = 3^3 + 5 \cdot 2^3$
$= 27 + 5 \cdot 8$
$= 27 + 40 = 67$

67. $2^2 \cdot 3^2 + 2 \cdot 3 = 4 \cdot 9 + 2 \cdot 3$
$= 36 + 2 \cdot 3$
$= 36 + 6 = 42$

68. $4 \cdot 6 + 3^2 \cdot 4^2 = 4 \cdot 6 + 9 \cdot 16$
$= 24 + 9 \cdot 16$
$= 24 + 144 = 168$

69. $3 \cdot (6 - 2) + 4 = 3 \cdot 4 + 4 = 12 + 4 = 16$

70. $5 \cdot (8 - 4) - 6 = 5 \cdot 4 - 6 = 20 - 6 = 14$

71. $8 - (8 - 2) \div 3 = 8 - 6 \div 3 = 8 - 2 = 6$

72. $12 - (12 - 4) \div 4 = 12 - 8 \div 4 = 12 - 2 = 10$

73. $8 + 2 - 3 \cdot 2 \div 3 = 8 + 2 - 6 \div 3$
$= 8 + 2 - 2$
$= 10 - 2 = 8$

74. $10 + 1 - 5 \cdot 2 \div 5 = 10 + 1 - 10 \div 5$
$= 10 + 1 - 2$
$= 11 - 2 = 9$

75. $3 \cdot (4 + 2) \div 6 = 3 \cdot 6 \div 6 = 18 \div 6 = 3$

76. $(7 - 3)^2 \div 2 - 4 + 8 = 4^2 \div 2 - 4 + 8$
$= 16 \div 2 - 4 + 8$
$= 8 - 4 + 8$
$= 4 + 8 = 12$

77. $20 - 4 \div 2 \cdot (3 - 1)^3 = 20 - 4 \div 2 \cdot 2^3$
$= 20 - 4 \div 2 \cdot 8$
$= 20 - 2 \cdot 8$
$= 20 - 16 = 4$

78. $12 \div 3 \cdot 2^2 + (7 - 3)^2 = 12 \div 3 \cdot 2^2 + 4^2$
$= 12 \div 3 \cdot 4 + 16$
$= 4 \cdot 4 + 16$
$= 16 + 16 = 32$

79. $(4-2)\cdot 6 \div 3 + (5-2)^2 = 2 \cdot 6 \div 3 + 3^2$
$= 2 \cdot 6 \div 3 + 9$
$= 12 \div 3 + 9$
$= 4 + 9 = 13$

80. $18 - 2 \cdot 3 + (4-1)^3 = 18 - 2 \cdot 3 + 3^3$
$= 18 - 2 \cdot 3 + 27$
$= 18 - 6 + 27$
$= 12 + 27 = 39$

81. $100 \div (2+3)^2 - 8 \div 2 = 100 \div 5^2 - 8 \div 2$
$= 100 \div 25 - 8 \div 2$
$= 4 - 8 \div 2$
$= 4 - 4 = 0$

82. $2\cdot 3 + 8\cdot(4-2) = 2\cdot 3 + 8\cdot 2$
$= 6 + 16$
$= 22$

83. $(2\cdot 3 + 8)\cdot 4 - 2 = (6+8)\cdot 4 - 2$
$= 14\cdot 4 - 2$
$= 56 - 2$
$= 54$

84. $2\cdot(3+8)\cdot(4-2) = 2\cdot 11\cdot 2$
$= 22\cdot 2$
$= 44$

85. $2\cdot(3+8\cdot 4-2) = 2\cdot(3+32-2)$
$= 2\cdot(35-2)$
$= 2\cdot 33$
$= 66$

Critical Thinking

86. $(2\cdot 3)^5 = 6^5 = 7776$
$2^5 \cdot 3^5 = 32\cdot 243 = 7776$
Yes, the expressions are equal.

87. $(2+3)^5 = 5^5 = 3125$
$2^5 + 3^5 = 32 + 243 = 275$
No, the expression are not equal.

88. $(12 \div 3)^4 = 4^4 = 256$
$12^4 \div 3^4 = 20{,}736 \div 81 = 256$
Yes, the expressions are equal.

89. $(6-4)^4 = 2^4 = 16$
$6^4 - 4^4 = 396 - 256 = 1040$
No, the expressions are not equal.

Projects or Group Activities

90a. No. For instance, $(9-5)-2 \neq 9-(5-2)$.

b. No. For instance, $(12 \div 6) \div 2 \neq 12 \div (6 \div 2)$.

91a. $\left(3^4\right)^2 = 81^2 = 6561$

b. $3^{(4^2)} = 3^{16} = 43{,}046{,}721$

c. $3^{4^2} = 3^{16} = 43{,}046{,}721$

Section 1.7

Concept Check

1. (ii), (iii), (v), and (vi)

2. (i), (ii), (iii), (v), and (vi)

Objective A Exercises

3. $4 \div 1 = 4$
$4 \div 2 = 2$
Factors are 1, 2, and 4.

4. $6 \div 1 = 6$
$6 \div 2 = 3$
$6 \div 3 = 2$
Factors are 1, 2, 3, and 6

5. $10 \div 1 = 10$
$10 \div 2 = 5$
$10 \div 5 = 2$
Factors are 1, 2, 5, and 10.

6. $20 \div 1 = 20$
$20 \div 2 = 10$
$20 \div 4 = 5$
$20 \div 5 = 4$
Factors are 1, 2, 4, 5, 10, and 20.

7. $7 \div 1 = 7$
$7 \div 7 = 1$
Factors are 1 and 7.

8. $12 \div 1 = 12$
$12 \div 2 = 6$
$12 \div 3 = 4$
$12 \div 4 = 3$
Factors are 1, 2, 3, 4, 6, and 12.

9. $9 \div 1 = 9$
$9 \div 3 = 3$
Factors are 1, 3, and 9.

10. $8 \div 1 = 8$
$8 \div 2 = 4$
$8 \div 4 = 2$
Factors are 1, 2, 4, and 8.

11. $13 \div 1 = 13$
$13 \div 13 = 1$
Factors are 1 and 13.

12. $17 \div 1 = 17$
$17 \div 17 = 1$
Factors are 1 and 17.

13. $18 \div 1 = 18$
$18 \div 2 = 9$
$18 \div 3 = 6$
$18 \div 6 = 3$
Factors are 1, 2, 3, 6, 9, and 18.

14. $24 \div 1 = 24$
$24 \div 2 = 12$
$24 \div 3 = 8$
$24 \div 4 = 6$
$24 \div 6 = 4$
Factors are 1, 2, 3, 4, 6, 8, 12, and 24.

15. $56 \div 1 = 56$
$56 \div 2 = 28$
$56 \div 4 = 14$
$56 \div 7 = 8$
$56 \div 8 = 7$
Factors are 1, 2, 4, 7, 8, 14, 28, and 56.

16. $36 \div 1 = 36$
$36 \div 2 = 18$
$36 \div 3 = 12$
$36 \div 4 = 9$
$36 \div 6 = 6$
Factors are 1, 2, 3, 4, 6, 9, 12, 18, and 36.

17. $45 \div 1 = 45$
$45 \div 3 = 15$
$45 \div 5 = 9$
Factors are 1, 3, 5, 9, 15, and 45.

18. $28 \div 1 = 28$
$28 \div 2 = 14$
$28 \div 4 = 7$
$28 \div 7 = 4$
Factors are 1, 2, 4, 7, 14, and 28.

19. $29 \div 1 = 29$
$29 \div 29 = 1$
Factors are 1 and 29.

20. $33 \div 1 = 33$
$33 \div 3 = 11$
$33 \div 11 = 3$
Factors are 1, 3, 11, and 33.

21. $22 \div 1 = 22$
$22 \div 2 = 11$
$22 \div 11 = 2$
Factors are 1, 2, 11, and 22.

22. $26 \div 1 = 26$
$26 \div 2 = 13$
$26 \div 13 = 2$
Factors are 1, 2, 13, and 26.

23. $52 \div 1 = 52$
$52 \div 2 = 26$
$52 \div 4 = 13$
$52 \div 13 = 4$
Factors are 1, 2, 4, 13, 26, and 52.

24. $49 \div 1 = 49$
$49 \div 7 = 7$
Factors are 1, 7, and 49.

25. $82 \div 1 = 82$
$82 \div 2 = 41$
$82 \div 41 = 2$
Factors are 1, 2, 41, and 82.

26. $37 \div 1 = 37$
$37 \div 37 = 1$
Factors are 1 and 37.

27. $57 \div 1 = 57$
$57 \div 3 = 19$
$57 \div 19 = 3$
Factors are 1, 3, 19, and 57.

28. $69 \div 1 = 69$
$69 \div 3 = 23$
$69 \div 23 = 3$
Factors are 1, 3, 23, and 69.

29.

$48 \div 1 = 48$
$48 \div 2 = 24$
$48 \div 3 = 16$
$48 \div 4 = 12$
$48 \div 6 = 8$
$48 \div 8 = 6$
Factors are 1, 2, 3, 4, 6, 8, 12, 16, 24, and 48.

30. $64 \div 1 = 64$
$64 \div 2 = 32$
$64 \div 4 = 16$
$64 \div 8 = 8$
Factors are 1, 2, 4, 8, 16, 32, and 64.

31. $95 \div 1 = 95$
$95 \div 5 = 19$
$95 \div 19 = 5$
Factors are 1, 5, 19, and 95.

32. $46 \div 1 = 46$
$46 \div 2 = 23$
$46 \div 23 = 2$
Factors are 1, 2, 23, and 46.

33. $54 \div 1 = 54$
$54 \div 2 = 27$
$54 \div 3 = 18$
$54 \div 6 = 9$
$54 \div 9 = 6$
Factors are 1, 2, 3, 6, 9, 18, 27, and 54.

34. $50 \div 1 = 50$
$50 \div 2 = 25$
$50 \div 5 = 10$
$50 \div 10 = 5$
Factors are 1, 2, 5, 10, 25, and 50.

35. $66 \div 1 = 66$
$66 \div 2 = 33$
$66 \div 3 = 22$
$66 \div 6 = 11$
$66 \div 11 = 6$
Factors are 1, 2, 3, 6, 11, 22, 33, and 66.

36. $77 \div 1 = 77$
$77 \div 7 = 11$
$77 \div 11 = 7$
Factors are 1, 7, 11, and 77.

37. $80 \div 1 = 80$
$80 \div 2 = 40$
$80 \div 4 = 20$
$80 \div 5 = 16$
$80 \div 8 = 10$
$80 \div 10 = 8$
Factors are 1, 2, 4, 5, 8, 10, 16, 20, 40, and 80.

38. $100 \div 1 = 100$
$100 \div 2 = 50$
$100 \div 4 = 25$
$100 \div 5 = 20$
$100 \div 10 = 10$
Factors are 1, 2, 4, 5, 10, 20, 25, 50, and 100.

39. $96 \div 1 = 96$
$96 \div 2 = 48$
$96 \div 3 = 32$
$96 \div 4 = 24$
$96 \div 6 = 16$
$96 \div 8 = 12$
$96 \div 12 = 8$
Factors are 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, and 96.

40. $85 \div 1 = 85$
$85 \div 5 = 17$
$85 \div 17 = 5$
Factors are 1, 5, 17 and 85.

41. $90 \div 1 = 90$
$90 \div 2 = 45$
$90 \div 3 = 30$
$90 \div 5 = 18$
$90 \div 6 = 15$
$90 \div 9 = 10$
$90 \div 10 = 9$
Factors are 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, and 90.

42. $101 \div 1 = 101$
$101 \div 101 = 1$
Factors are 1 and 101.

43. True

44. False

Objective B Exercises

45.
$$\begin{array}{r|l} & 6 \\ 2 & 3 \\ 3 & 1 \end{array}$$
$6 = 2 \cdot 3$

46.
$$\begin{array}{r|l} & 14 \\ 2 & 7 \\ 7 & 1 \end{array}$$
$14 = 2 \cdot 7$

47. 17 is prime.

48. 83 is prime.

49.
$$\begin{array}{r|l} & 24 \\ 2 & 12 \\ 2 & 6 \\ 2 & 3 \\ 3 & 1 \end{array}$$
$24 = 2 \cdot 2 \cdot 2 \cdot 3$

50.
$$\begin{array}{r|l} & 12 \\ 2 & 6 \\ 2 & 3 \\ 3 & 1 \end{array}$$
$12 = 2 \cdot 2 \cdot 3$

51.
$$\begin{array}{r|l} & 27 \\ 3 & 9 \\ 3 & 3 \\ 3 & 1 \end{array}$$
$27 = 3 \cdot 3 \cdot 3$

52.
$$\begin{array}{r|l} & 9 \\ 3 & 3 \\ 3 & 1 \end{array}$$
$9 = 3 \cdot 3$

53.
$$\begin{array}{r|l} & 36 \\ 2 & 18 \\ 2 & 9 \\ 3 & 3 \\ 3 & 1 \end{array}$$
$36 = 2 \cdot 2 \cdot 3 \cdot 3$

54.
$$\begin{array}{r|l} & 40 \\ 2 & 20 \\ 2 & 10 \\ 2 & 5 \\ 5 & 1 \end{array}$$
$40 = 2 \cdot 2 \cdot 2 \cdot 5$

55. 19 is prime.

56. 37 is a prime.

57.
$$\begin{array}{r|l} & 90 \\ 2 & 45 \\ 3 & 15 \\ 3 & 5 \\ 5 & 1 \end{array}$$
$90 = 2 \cdot 3 \cdot 3 \cdot 5$

58.
65	
5	13
13	1

$65 = 5 \cdot 13$

59.
115	
5	23
23	1

$115 = 5 \cdot 23$

60.
80	
2	40
2	20
2	10
2	5
5	1

$80 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$

61.
18	
2	9
3	3
3	1

$18 = 2 \cdot 3 \cdot 3$

62.
26	
2	13
13	1

$26 = 2 \cdot 13$

63.
28	
2	14
2	7
7	1

$28 = 2 \cdot 2 \cdot 7$

64.
49	
7	7
7	1

$49 = 7 \cdot 7$

65. 31 is prime.

66.
42	
2	21
3	7
7	1

$42 = 2 \cdot 3 \cdot 7$

67.
62	
2	31
31	1

$62 = 2 \cdot 31$

68.
81	
3	27
3	9
3	3
3	1

$81 = 3 \cdot 3 \cdot 3 \cdot 3$

69.
22	
2	11
11	1

$22 = 2 \cdot 11$

70.
39	
3	13
13	1

$39 = 3 \cdot 13$

71. 101 is prime.

72. 89 is prime.

73.
66	
2	33
3	11
11	1

$66 = 2 \cdot 3 \cdot 11$

74.
86	
2	43
43	1

$86 = 2 \cdot 43$

75.
74	
2	37
37	1

$74 = 2 \cdot 37$

76.
95	
5	19
19	1

$95 = 5 \cdot 19$

77. 67 is prime.

78.
78	
2	39
3	13
13	1

$78 = 2 \cdot 3 \cdot 13$

79.
55	
5	11
11	1

$55 = 5 \cdot 11$

80.
46	
2	23
23	1

$46 = 2 \cdot 23$

81.
120	
2	60
2	30
2	15
3	5
5	1

$120 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5$

82.
144	
2	72
2	36
2	18
2	9
3	3
3	1

$144 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$

83.
160	
2	80
2	40
2	20
2	10
2	5
5	1

$160 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$

84.
175	
5	35
5	7
7	1

$175 = 5 \cdot 5 \cdot 7$

85.
216	
2	108
2	54
2	27
3	9
3	3
3	1

$216 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3$

86.
400	
2	200
2	100
2	50
2	25
5	5
5	1

$400 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5 \cdot 5$

87.
625	
5	125
5	25
5	5
5	1

$625 = 5 \cdot 5 \cdot 5 \cdot 5$

88.
225	
3	75
3	25
5	5
5	1

$225 = 3 \cdot 3 \cdot 5 \cdot 5$

89. False; the prime factorization of 102 is

$2 \cdot 3 \cdot 17$.

Critical Thinking

90. 1, 3, 7, 9

91. Answers will vary. For example, 21, 33, 27, and 39.

92. 1, 3, 7 For example, 317; 713

Projects or Group Activities

93. Answers will vary.

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41

43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

Chapter 1 Review Exercises

1. $3 \cdot 2^3 \cdot 5^2 = 3 \cdot 8 \cdot 25$
$= 24 \cdot 25 = 600$

2. 10,000 + 300 + 20 + 7

3. $18 \div 1 = 18$
$18 \div 2 = 9$
$18 \div 3 = 6$
$18 \div 6 = 3$
Factors are 1, 2, 3, 6, 9, and 18.

4.
$$\begin{array}{r} {\scriptstyle 1\,1\,1} \\ 5894 \\ 6301 \\ +\ \ 298 \\ \hline 12{,}493 \end{array}$$

5.
$$\begin{array}{r} {\scriptstyle 8\ \ 1\ \ 16} \\ 4\not{9}\ \not{2}\ \not{6} \\ -3\ 1\ 7\ 7 \\ \hline 1\ 7\ 4\ 9 \end{array}$$

6.
$$\begin{array}{r} 2\,135 \\ 7\overline{)14{,}945} \\ -14 \\ \hline 09 \\ -\ 7 \\ \hline 24 \\ -21 \\ \hline 35 \\ -35 \\ \hline 0 \end{array}$$

7. $101 > 87$

8. $5 \cdot 5 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 = 5^2 \cdot 7^5$

9.
$$\begin{array}{r} {\scriptstyle 6} \\ 2019 \\ \times\ \ 307 \\ \hline 14133 \\ 60570 \\ \hline 619{,}833 \end{array}$$

10.
$$\begin{array}{r} {\scriptstyle 9\ \ 10\ 11\ 2\ 14} \\ \not{0}\not{1}\not{0}\not{1}\not{3}\not{4} \\ -\ 4\ 725 \\ \hline 5\ 409 \end{array}$$

11.
$$\begin{array}{r} {\scriptstyle 1\ \ 1} \\ 298 \\ 461 \\ +\ 322 \\ \hline 1081 \end{array}$$

12. $2^3 - 3 \cdot 2 = 8 - 3 \cdot 2 = 8 - 6 = 2$

13. 45,700

14. Two hundred seventy-six thousand fifty-seven

15.
$$\begin{array}{r} 1306 \quad \text{r59} \\ 84\overline{)109{,}763} \\ -84 \\ \hline 257 \\ -252 \\ \hline 56 \\ -\ 0 \\ \hline 563 \\ -504 \\ \hline 59 \end{array}$$

16. 2,011,044

17.
$$\begin{array}{r} 488 \quad \text{r2} \\ 8\overline{)3906} \\ -32 \\ \hline 70 \\ -64 \\ \hline 66 \\ -64 \\ \hline 2 \end{array}$$

18. $3^2 + 2^2 \cdot (5-3) = 3^2 + 2^2 \cdot (2)$
$= 9 + 4 \cdot 2$
$= 9 + 8 = 17$

19. $8 \cdot (6-2)^2 \div 4 = 8 \cdot 4^2 \div 4$
$= 8 \cdot 16 \div 4$
$= 128 \cdot 4 = 32$

20.
$$\begin{array}{r|l} 2 & 36 \\ 2 & 18 \\ 2 & 9 \\ 3 & 3 \\ 3 & 1 \end{array}$$
$72 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$

21. 2133

22.
$$\begin{array}{r} 843 \\ \times\ 27 \\ \hline 5901 \\ 1686 \\ \hline 22{,}761 \end{array}$$

23. **Strategy** To find the total pay for last week's work:

- Multiply the overtime rate ($24) by the number of hours worked (12).
- Add the total earned as overtime to the assistant's salary ($480).

Solution
$$\begin{array}{r} 24 \\ \times 12 \\ \hline 48 \\ 24 \\ \hline 288 \end{array} \qquad \begin{array}{r} 480 \\ +\ 288 \\ \hline 768 \end{array}$$

The total pay for last week's work is $768.

24. **Strategy** To find the number of miles driven per gallon of gasoline, divide the total number of miles driven (351) by the number of gallons used (13).

Solution
$$\begin{array}{r} 27 \\ 13\overline{)351} \\ -26 \\ \hline 91 \\ -91 \\ \hline 0 \end{array}$$

He drove 27 miles per gallon of gasoline.

25. **Strategy** To find the monthly car payment:

- Subtract the down payment ($3000) from the cost of the car ($29,880) to find the balance.
- Divide the balance by the number of equal payments (48).

Solution
$$\begin{array}{r} 29{,}880 \\ -\ 3{,}000 \\ \hline 26{,}880 \end{array} \qquad \begin{array}{r} 560 \\ 48\overline{)26{,}880} \\ -240 \\ \hline 288 \\ -288 \\ \hline 00 \\ -\ 0 \\ \hline 0 \end{array}$$

Each monthly car payment is $560.

26. **Strategy** To find the total income from commissions, add the amounts received for each of the 4 weeks ($723, $544, $812, and $488).

Solution
$$\begin{array}{r} 723 \\ 544 \\ 812 \\ +488 \\ \hline 2567 \end{array}$$

The total income from commissions is $2567.

27. **Strategy** To find the total amount deposited, add the two deposits ($88 and $213). To find the new checking account balance, add the total amount deposited ($301) to the original balance

($516).

Solution

$$\begin{array}{r} 88 \\ +213 \\ \hline 301 \end{array}$$

The total amount deposit is $301.

$$\begin{array}{r} 301 \\ +516 \\ \hline 817 \end{array}$$

The new checking balance is $817.

28. Strategy To find the total of the car payments over a 12-month period, multiply the amount of each payment ($246) by the number of payments (12).

Solution

$$\begin{array}{r} 246 \\ \times\ 12 \\ \hline 492 \\ 246 \\ \hline 2952 \end{array}$$

The total of the car payment is $2952.

29. Strategy To find the year that there were more males enrolled in U.S. colleges, read the values from the table and determine which number is larger.

Solution $7{,}455{,}925 < 8{,}769{,}504$

Since 8,769,504 is associated with the year 2009, there were more males enrolled in U.S. colleges in 2009 than in 2005.

30. Strategy To find the difference between the number of males and the number of females enrolled in U.S. colleges in 2005, subtract the values given in the table.

Solution

$$\begin{array}{r} 10{,}031{,}550 \text{ males} \\ -\ 7{,}455{,}925 \text{ females} \\ \hline 2{,}575{,}625 \end{array}$$

The difference between the numbers of males and females enrolled in U.S. colleges in 2005 was 2,575,625 students.

31. Strategy To find the increase in the number of males enrolled in U.S. colleges from 2005 to 2009, subtract the number in 2005 (7,455,925) from the number in 2009 (8,769,504).

Solution

$$\begin{array}{r} 8{,}769{,}504 \\ -\ 7{,}455{,}925 \\ \hline 1{,}313{,}579 \end{array}$$

The number of males enrolled in U.S. colleges increased by 1,313,579 males from 2005 to 2009.

32. Strategy To find how many more students were enrolled in U.S colleges in 2009 than in 2005:

- Add the number of male and female students in 2005.
- Add the number of male and female students in 2009.
- Subtract these two sums to find the increase.

Solution

2005: 7,455,925 males
+10,031,550 females
17,487,475

2009: 8,769,504 males
+ 11,658,207 females
20,427,711

20,427,711 2009
−17,487,475 2005
2,940,236

2,940,236 more students were enrolled in U.S. colleges in 2009 than in 2005.

Chapter 1 Test

1. $3^3 \cdot 4^2 = 27 \cdot 16 = 432$

2. Two hundred seven thousand sixty-eight

3.
$$\begin{array}{r} {\scriptstyle 1}\not{2}\,{\scriptstyle 12}\not{3},{\scriptstyle 9}\not{0}\,{\scriptstyle 9}\not{0}\,{\scriptstyle 16}\not{0} \\ -\ 7\ 9\ 3\ 7 \\ \hline 1\ 5,0\ 6\ 9 \end{array}$$

4. $20 \div 1 = 20$
$20 \div 2 = 10$
$20 \div 4 = 5$
$20 \div 5 = 4$
Factors are 1, 2, 4, 5, 10, and 20.

5.
$$\begin{array}{r} 9736 \\ \times\ \ 704 \\ \hline 38,944 \\ 681,520 \\ \hline 6,854,144 \end{array}$$

6. $4^2 \cdot (4 - 2) \div 8 + 5 = 4^2 \cdot (2) \div 8 + 5$
$= 16 \cdot (2) \div 8 + 5$
$= 32 \div 8 + 5$
$= 4 + 5 = 9$

7. 900,000 + 6000 + 300 + 70 + 8

8. 75,000

9.
$$\begin{array}{r} 1121 \text{ r27} \\ 97\overline{)108,764} \\ -97 \\ \hline 117 \\ -97 \\ \hline 206 \\ -194 \\ \hline 124 \\ -\ 97 \\ \hline 27 \end{array}$$

10. $3 \cdot 3 \cdot 3 \cdot 7 \cdot 7 = 3^3 \cdot 7^2$

11.
$$\begin{array}{r} {\scriptstyle 2\ \ 2\,1} \\ 8,756 \\ 9,094 \\ +\ 37,065 \\ \hline 54,915 \end{array}$$

12. $84 = 2 \cdot 2 \cdot 3 \cdot 7$

84	
2	42
2	21
3	7
1	1

13. $16 \div 4 \cdot 2 - (7 - 5)^2 = 16 \div 4 \cdot 2 - 2^2$
$= 16 \div 4 \cdot 2 - 4$
$= 4 \cdot 2 - 4$
$= 8 - 4 = 4$

14.
$$\begin{array}{r} {\scriptstyle 6\ \ 5\,2} \\ 90,763 \\ \times\ \ \ \ 8 \\ \hline 726,104 \end{array}$$

15. 1,204,006

16.
$$\begin{array}{r} 8710 \text{ r2} \\ 7\overline{)60972} \\ -56 \\ \hline 49 \\ -49 \\ \hline 07 \\ -\ 7 \\ \hline 02 \\ -\ 0 \\ \hline 2 \end{array}$$

17. $21 > 19$

18.
$$\begin{array}{r} 703 \\ 8\overline{)5624} \\ -56 \\ \hline 02 \\ -\ 0 \\ \hline 24 \\ -24 \\ \hline 0 \end{array}$$

19.
$$\begin{array}{r} 25,492 \\ +71,306 \\ \hline 96,798 \end{array}$$

20.
$$\begin{array}{r} {\scriptstyle 1\ 18\ 17} \\ 2\not{9},\not{7}36 \\ -\ 9,814 \\ \hline 19,922 \end{array}$$

21. **Strategy** To find the difference between the total enrollment in 2016 and 2013:

- Add the numbers in the two columns for 2013 to find the total enrollment for 2013.
- Add the numbers in the two columns for 2016 to find the total enrollment for 2016.
- Subtract the two values to find the difference.

Solution

$$\begin{array}{rll} \underline{2013}: & 41,873,000 & \text{K}-8 \\ & +16,000,000 & 9-12 \\ & 57,873,000 & \end{array}$$

$$\begin{array}{rll} \underline{2016}: & 43,097,000 & \text{K}-8 \\ & +16,684,000 & 9-12 \\ & 59,781,000 & \end{array}$$

$$\begin{array}{rl} 59,781,000 & 2016 \\ -57,873,000 & 2013 \\ \hline 1,908,000 & \end{array}$$

The difference in projected total enrollment between 2016 and 2013 is 1,908,000 students.

22. **Strategy** To find the number of students projected to be enrolled in pre-kindergarten through grade 12 in 2016, read the table to find the number of students projected to be in each of these grade groups. Then add the numbers.

Solution
$$\begin{array}{r} 43,097,000 \\ +\ 16,684,000 \\ \hline 59,781,000 \end{array}$$

In 2016, there are 59,781,000 students projected to be enrolled in pre-kindergarten through grade 12.

23. **Strategy** To find how many boxes were needed to pack the lemons:

- Find the total number of lemons harvested by adding the amounts harvested from the two groves (48,290 and 23,710 pounds).
- Divide the total number of pounds harvested by the number of pounds of lemons that can be packed in each box (24).

Solution

$$\begin{array}{r} 48{,}290 \\ +23{,}710 \\ \hline 72{,}000 \end{array}$$

$$\begin{array}{r} 3000 \\ 24\overline{)72{,}000} \\ \underline{-72} \\ 00 \\ \underline{-\ 0} \\ 00 \\ \underline{-\ 0} \\ 00 \\ \underline{-\ 0} \\ 0 \end{array}$$

3000 boxes were needed to pack the lemons.

24. Strategy To find the number of times a hummingbird beats its wings in 900 seconds, multiply the number of beats per second (52) by the number of seconds (900).

Solution

$$\begin{array}{r} 52 \\ \times\ 900 \\ \hline 46{,}800 \end{array}$$

A hummingbird beats its wings 46,800 times in 900 seconds.

25. Strategy To find the average speed:

- Add the speeds for the 12 cars.
- Divide the sum by 12.

Solution

$$\begin{array}{r} 68 \\ 73 \\ 59 \\ 77 \\ 65 \\ 52 \\ 71 \\ 68 \\ 76 \\ 64 \\ 59 \\ +\ 60 \\ \hline 792 \end{array}$$

$$\begin{array}{r} 66 \\ 12\overline{)792} \\ \underline{-72} \\ 72 \\ \underline{-72} \\ 0 \end{array}$$

The average speed was 66 miles per hour.