The quotient should be near 30.

$$\begin{array}{r} 31 \\ 11\overline{)341} \\ -33 \\ \hline 11 \\ -11 \\ \hline 0 \end{array}$$

Actual quotient

Remainder

Thus, the actual cost of each ticket is \$31.

Now work margin exercise 13.

Completion Example Answer

5. 700; 5900; 6372 **12.** 300 estimate; 307 actual quotient; 14 remainder; yes; 7

Margin Exercise Answers

1. a. 5800 **b.** 90 **2. a.** 7440 **b.** 30,000 **c.** 140,000 **d.** 8,000,000 **3.** 280 feet **4.** Estimate: 360; sum: 335 **5.** Estimate: 9000; sum: 8861 **6.** Estimate: 2200; difference: 1838 **7.** Estimate: 1400 bags; difference: 1001 bags **8.** Estimate: 1400; product: 1332 **9.** Estimate: \$45,000; product: \$40,120 **10.** Estimate: 200; quotient: 219 **11.** Estimate: 11; quotient: 11 R46 **12.** Estimate: 25; quotient: 37 R8 **13.** Estimate: 25 buses; quotient: 21 buses

1.5 Exercises

Concept Check

Fill-in-the-Blank. Complete each sentence using information found in this section.

1. When rounding, consider the place being rounded to and the number to its _____.
2. 37,068,155 rounded to the ten thousands place is _____, rounded to the millions place is _____.
3. When rounding, it is important that the desired _____ of accuracy be known.
4. When rounding, if a digit to the right of the place of accuracy is _____ or greater, the digit in the place of accuracy increases by 1.
5. With whole numbers, once rounding has occurred, the digits to the right of the desired place of accuracy become _____.
6. Finding a number close to a given number is called _____.

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

7. Rounding means finding a number close to the given number, using a specified place of accuracy.
8. When rounded to the ten thousands place, 435,613 becomes 400,000.
9. To estimate the answer for a division problem, begin by rounding both the divisor and dividend.
10. If estimated, $4250 \div 51$ is $4000 \div 50 = 80$.

Practice

Use a number line to round each number as indicated. (Graph the number on the line with a heavy dot and mark the rounded number with an x.) See Example 1.

1. 78 (nearest ten)

2. 94 (nearest ten)

3. 655 (nearest ten)

4. 382 (nearest ten)

5. 479 (nearest hundred)

6. 258 (nearest hundred)

Fill in the blanks to correctly complete each statement.

7. Round 1426 to the nearest ten.

a. The digit in the tens position is _____.

b. The next digit to the right is _____.

c. Since _____ is greater than 5, change _____ to _____ and replace _____ with 0.

d. So 1426 rounds to _____ to the nearest _____.

8. Round 96,315 to the nearest thousand.

a. The digit in the thousands position is _____.

b. The next digit to the right is _____.

c. Since _____ is less than 5, leave _____ as it is and replace _____, _____, and _____ with 0.

d. So 96,315 rounds to _____ to the nearest _____.

Round each number as indicated. See Example 2.

To the nearest ten:

9. 31

10. 82

11. 25

12. 55

13. 503

14. 204

15. 996

16. 998

To the nearest hundred:

17. 75

18. 63

19. 637

20. 215

21. 4163

22. 4475

23. 9954

24. 9972

To the nearest thousand:

25. 6912

26. 3790

27. 9610

28. 9900

29. 62,265

30. 13,499

31. 13,501

32. 28,559

To the nearest ten thousand:

33. 5697

34. 8787

35. 62,200

36. 44,593

37. 125,000

38. 615,000

39. 1,603,587

40. 3,527,054

Estimate each answer; then find the actual sum or difference. See Examples 4 through 6.

41.
$$\begin{array}{r} 83 \\ 62 \\ +\ 78 \\ \hline \end{array}$$

42.
$$\begin{array}{r} 49 \\ 31 \\ +\ 86 \\ \hline \end{array}$$

43.
$$\begin{array}{r} 146 \\ 259 \\ +\ 384 \\ \hline \end{array}$$

44.
$$\begin{array}{r} 475 \\ 126 \\ +\ 572 \\ \hline \end{array}$$

45.
$$\begin{array}{r} 5742 \\ 6271 \\ 8156 \\ +\ 972 \\ \hline \end{array}$$

46.
$$\begin{array}{r} 483 \\ 1681 \\ 3054 \\ +\ 4006 \\ \hline \end{array}$$

47.
$$\begin{array}{r} 854 \\ -\ 367 \\ \hline \end{array}$$

48.
$$\begin{array}{r} 692 \\ -\ 427 \\ \hline \end{array}$$

49.
$$\begin{array}{r} 63,504 \\ -\ 42,700 \\ \hline \end{array}$$

50.
$$\begin{array}{r} 74,305 \\ -\ 33,082 \\ \hline \end{array}$$

51.
$$\begin{array}{r} 275,600 \\ -\ 94,300 \\ \hline \end{array}$$

52.
$$\begin{array}{r} 450,315 \\ -\ 98,000 \\ \hline \end{array}$$

53. Match each product with the closest estimate of that product. Perform any calculations mentally.

	Product	**Estimate**
_____	**a.** $16 \cdot 18$	**A.** 210
_____	**b.** $6(78)$	**B.** 300
_____	**c.** $11 \cdot 32$	**C.** 400
_____	**d.** $(8)(69)$	**D.** 480
_____	**e.** $25(7)$	**E.** 560

54. Match each product with the closest estimate of that product. Perform any calculations mentally.

	Product	**Estimate**
_____	**a.** $37(500)$	**A.** 200
_____	**b.** $37(50)$	**B.** 2000
_____	**c.** $37(5)$	**C.** 20,000
_____	**d.** $37(5000)$	**D.** 200,000

55. Match each quotient with the closest estimate of that quotient. Perform any calculations mentally.

	Quotient	Estimate
_____	**a.** $9\overline{)910}$	**A.** 6
_____	**b.** $34 \div 5$	**B.** 10
_____	**c.** $34\overline{)12,000}$	**C.** 100
_____	**d.** $18\overline{)3900}$	**D.** 200
_____	**e.** $216 \div 18$	**E.** 300

56. Match each quotient with the closest estimate of that quotient. Perform any calculations mentally.

	Quotient	Estimate
_____	**a.** $3\overline{)870}$	**A.** 30
_____	**b.** $3\overline{)87,000}$	**B.** 300
_____	**c.** $3\overline{)87}$	**C.** 3000
_____	**d.** $3\overline{)8700}$	**D.** 30,000

Estimate each answer; then find the actual product or quotient. (Remember that single-digit numbers are already considered to be rounded.) See Examples 8 and 10 through 12.

57. 56×4

58. 84×3

59. 17×32

60. 16×26

61. 420×104

62. 673×186

63. $18\overline{)216}$

64. $11\overline{)99}$

65. $49\overline{)993}$

66. $18\overline{)773}$

67. $50\overline{)3065}$

68. $37\overline{)2003}$

Applications

Solve.

69. A certain manufacturer pays his workers for every ten widgets that a person produces, rounded to the nearest ten. If Lucas produced 4564 widgets, how many widgets will he be paid for?

70. Oliver decides to keep a journal of the number of calories he eats each day, rounded to the nearest ten. Today, he calculates that he ate 2348 calories. How many calories should he record in his journal?

71. As of 2021, the average household credit card debt was $8590. Round this number to the nearest hundred dollars.

72. On a typical day, 46,931 vehicles are driven through the northbound toll gates at a busy bridge. Round this number to the nearest hundred vehicles.

73. A Honda Accord EX sedan with automatic transmission has a sticker price of $26,120. Round this number to the nearest thousand dollars.

74. On a single weekday, 791,567 people rode the public transportation system in a major metropolitan area. How many people is this, rounded to the nearest thousand people?

75. A salesperson drives 96,469 miles a year. Round this number to the nearest ten thousand miles.

76. In 2021, there were 2,147,070 electric vehicles in the United States. Round this number to the nearest ten thousand.[1]

77. College expenses for a private four-year college in the 2022–2023 academic year are as follows:

Tuition & Fees	$25,243
Room & Board	$8996
Books & Supplies	$1077

Estimate the total cost to attend for a year using rounded numbers to the nearest thousand. Then calculate the actual cost.

78. In 2021, the University of California campuses had the following undergraduate enrollments:

University of California 2021 Enrollment

Campus	Enrollment	Campus	Enrollment
UC Berkeley	45,036	UC Riverside	26,847
UC Davis	40,050	UC San Diego	41,885
UC Irvine	36,505	UC Santa Barbara	26,124
UC Los Angeles	46,116	UC Santa Cruz	19,841

Source: www.universityofcalifornia.edu/infocenter/fall-enrollment-glance

Approximately how many undergraduate students were enrolled in the University of California system in 2021?

79. Emilia is sending her three children to different week long daytime summer camps. The cost of the summer camp is $239 for the youngest child, $487 for the middle child, and $350 for the oldest child. Estimate how much it will cost to send the three kids to summer camp.

80. Mateo purchased the following items for his home office: one laptop computer for $483, one wireless router for $99, one printer for $138, and a pack of printer paper for $18. Estimate the total purchase price using rounded numbers. Then calculate the actual purchase price.

1 Source: evadoption.com

81. Paula is in charge of keeping inventory of the medical supplies at the hospital she works for. According to her records, the hospital began the month with 384 sets of crutches. But now, at the end of the month, there are only 68 sets remaining. Estimate the number of sets of crutches the hospital used in the last month, then calculate the actual number of sets of crutches they used.

82. Elizabeth paid $2191 to add on special paint, 18" alloy wheels, and a cargo net to the car she just purchased. If she paid a total of $23,766 for the car with the add-ons, estimate the base price of the car using rounded numbers. Then find the actual base price.

83. A total of 22 microphones are to be purchased. Each microphone costs $347. Estimate the total purchase price by using rounded numbers. Then calculate the actual purchase price.

84. A jewelry store purchased 11 fine diamond-studded watches at a wholesale cost of $1,586 each. Estimate the total cost for all of the watches by using rounded numbers. Then, calculate the actual cost for all of the watches.

85. A summer camp has 396 campers who will be going on an outing. Estimate the number of vans needed to accommodate the entire camp if each van can comfortably hold 11 passengers. Then calculate the actual number of vans that will be needed.

86. Four people decide to purchase equal shares of a beach house that costs $312,760. Estimate the contribution each person makes by using rounded numbers. Then calculate the actual contribution.

87. A technical school plans on purchasing four pieces of test equipment that cost $648 each, plus two work benches at $284 each. Estimate the total cost of the purchase using rounded numbers. Then, calculate the actual cost.

88. Ramón is running a sand volleyball tournament soon and must purchase some new equipment. He needs three new nets, which cost $159 each. He also needs five new sets of boundary lines, which cost $86 each. Estimate the total cost of the new equipment. Then calculate the actual cost.

Writing & Thinking

89. In your own words, define estimation.

90. List the steps to use in estimating a product in a multiplication problem.

91. Compare and contrast rounding and estimating.

92. Give an example when you might use rounding and/or estimation (other than in a class).