EXERCISES

Practice and Problem Solving

For more practice, see *Extra Pract*

A Practice by Example

Is the given sequence arithmetic? If so, identify the common difference.

Example 1 (page 594)

1. $1, 4, 9, 16, \ldots$
2. $10, 20, 30, 40, \ldots$
3. $1, 1, 2, 3, 5, 8, \ldots$
4. $0, 1, 3, 6, 10, \ldots$
5. $-21, -18, -15, -12, \ldots$
6. $97, 86, 75, 64, \ldots$
7. $3, 7, 11, 15, \ldots$
8. $100, 10, 1, 0.1, \ldots$
9. $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \ldots$
10. $-5, 5, -5, 5, -5, \ldots$

Example 2 (page 595)

Find the 32nd term of each sequence.

11. $34, 37, 40, 43, \ldots$
12. $-9, -8.7, -8.4, \ldots$
13. $0.1, 0.5, 0.9, 1.3, \ldots$
14. $0.0023, 0.0025, 0.0027, \ldots$
15. $101, 105, 109, 113, \ldots$
16. $213, 201, 189, 177, \ldots$
17. $3, 1, -1, -3, \ldots$
18. $23, 30, 37, 44, \ldots$
19. $9, 4, -1, -6, -11, \ldots$
20. $13, 17, 21, 25, \ldots$

Example 3 (page 595)

Find the missing term of each arithmetic sequence.

21. $-16, \blacksquare, 1, \ldots$
22. $14, \blacksquare, 28, \ldots$
23. $\ldots 5, \blacksquare, 21, \ldots$
24. $\frac{13}{2}, \blacksquare, \frac{51}{2}, \ldots$
25. $101, \blacksquare, -115, \ldots$
26. $203, \blacksquare, 1117, \ldots$
27. $25, \blacksquare, -10, \ldots$
28. $\ldots 65, \blacksquare, -60, \ldots$
29. $\ldots a_{10}, \blacksquare, a_{12}, \ldots$
30. $\ldots 99, \blacksquare, 66, \ldots$

B Apply Your Skills

Find the arithmetic mean a_n of the given terms.

31. $a_{n-1} = 7, a_{n+1} = 1$
32. $a_{n-1} = 4, a_{n+1} = -3$
33. $a_{n-1} = 21, a_{n+1} = 5$
34. $a_{n-1} = 100, a_{n+1} = 140$
35. $a_{n-1} = -18, a_{n+1} = -21$
36. $a_{n-1} = 0.3, a_{n+1} = 1.9$
37. $a_{n-1} = 9, a_{n+1} = -11$
38. $a_{n-1} = \frac{3}{5}, a_{n+1} = 1$
39. $a_{n-1} = r, a_{n+1} = s$
40. $a_{n-1} = r, a_{n+1} = r + s$
41. $a_{n-1} = -2x, a_{n+1} = 2x$
42. $a_{n-1} = x + 3, a_{n+1} = 3x - 1$

43. **Error Analysis** A student claims that the next term of the arithmetic sequence $0, 2, 4, \ldots$ is 8. What error did the student make?

44. **a. Open-Ended** Use your calculator to generate an arithmetic sequence with a common difference of -7. How could you use a calculator to find the 6th term? The 8th term? The 20th term?

b. Critical Thinking Explain how your answer to part (a) relates to the explicit formula $a_n = a_1 + (n - 1)d$.

45. **Writing** Describe some advantages and some disadvantages of a recursive formula and an explicit formula.

Find the 17th term of each sequence.

46. $a_{16} = 18, d = 5$

47. $a_{16} = 18, d = -3$

48. $a_{16} = 18, d = \frac{1}{2}$

49. $a_{18} = 18, d = -4$

50. $a_{18} = 18, d = 12$

51. $a_{18} = 18, d = -11$

Write an explicit and a recursive formula for each sequence.

52. $2, 4, 6, 8, 10, \ldots$

53. $0, 6, 12, 18, 24, \ldots$

54. $-5, -4, -3, -2, -1, \ldots$

55. $-4, -8, -12, -16, -20, \ldots$

56. $-2, 5, 12, 19, 26, 33, \ldots$

57. $27, 15, 3, -9, -21, \ldots$

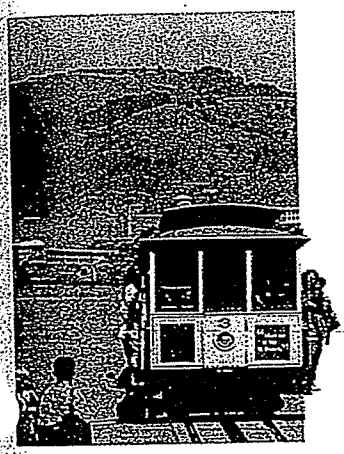
58. $-5, -3.5, -2, -0.5, 1, \ldots$

59. $-32, -20, -8, 4, 16, \ldots$

60. $1, 1\frac{1}{3}, 1\frac{2}{3}, 2, \ldots$

61. $0, \frac{1}{8}, \frac{1}{4}, \frac{3}{8}, \ldots$

62. **Transportation** Suppose a trolley stops at a certain intersection every 14 min. The first trolley of the day gets to the stop at 6:43 A.M. How long do you have to wait for a trolley if you get to the stop at 8:15 A.M.? At 3:20 P.M.?



Real-World Connection

San Francisco's historic cable cars move by gripping and releasing a moving steel cable under the street.

Find the missing terms of each arithmetic sequence. (*Hint:* The arithmetic mean of the first and fifth terms is the third term.)

63. $2, \blacksquare, \blacksquare, \blacksquare, -22, \ldots$

64. $10, \blacksquare, \blacksquare, \blacksquare, -11.6, \ldots$

65. $1, \blacksquare, \blacksquare, \blacksquare, -35, \ldots$

66. $\ldots \frac{13}{5}, \blacksquare, \blacksquare, \blacksquare, \frac{37}{5}, \ldots$

67. $17, \blacksquare, \blacksquare, \blacksquare, 17, \ldots$

68. $660, \blacksquare, \blacksquare, \blacksquare, 744, \ldots$

69. $\ldots -17, \blacksquare, \blacksquare, \blacksquare, 1, \ldots$

70. $\ldots a + 1, \blacksquare, \blacksquare, \blacksquare, a + 17, \ldots$

71. **Savings** In February you start a holiday savings account with a deposit of \$20. You increase each monthly deposit by five dollars until the end of the year.
   a. Write the amount in the account after each deposit.
   b. Write a recursive formula for the sequence of balances.
   c. How much money will you have saved by the end of the year?

Graph the arithmetic sequence generated by each formula over the domain $1 \le n \le 10$.

72. $a_1 = -60, a_n = a_{n-1} + 9$

73. $a_n = 50 - 7n$

74. **Critical Thinking** Suppose you turn the water on in an empty bathtub with vertical sides. After 20 s, the water has reached a level of 1.15 in. You then leave the room. You want to turn the water off when the level in the bathtub is 8.5 in. How many minutes later should you return? (*Hint:* Begin by identifying two terms of an arithmetic sequence.)

Challenge

75. The arithmetic mean of two terms in an arithmetic sequence is 42. One term is 30. Find the other term.

76. The arithmetic mean of two terms in an arithmetic sequence is −6. One term is −20. Find the other term.

77. In an arithmetic sequence with $a_1 = 4$ and $d = 9$, which term is 184?

78. In an arithmetic sequence with $a_1 = 2$ and $d = -2$, which term is −82?