Extra Practice

Chapter 9

Lesson 9-1

Write a recursive definition for each sequence.

1. 3, 5, 7, . . .   **2.** 19, 15, 11, . . .   **3.** −12, −10.5, −9, . . .

4. 0.2, 0.5, 0.8, . . .   **5.** −23, −36, −49, . . .   **6.** 25, 37.5, 50, . . .

Decide whether each formula is *explicit* or *recursive*. Then find the first five terms of each sequence.

7. $a_n = 3n + 2$ **8.** $a_1 = 4; a_n = a_{n-1} + 7$ **9.** $a_n = 5n(n + 2)$

10. $a_1 = 2; a_n = a_{n-1} - 3$ **11.** $a_n = 6n^2 - 1$ **12.** $a_n = 6 - 2n$

13. A contractor must pay a penalty if work on a project is not completed on time. The penalty on the first day is $300. The penalty increases to $500 on the second day, to $700 on the third day, and so on.

   a. Write an explicit formula that describes the sequence.

   b. The contractor accumulated a penalty of $4500. How many days after the due date was the project completed?

14. Table tennis rules regulate the specific properties for the table, the ball, the net, and the paddles. According to the rules, a ball dropped from 30 cm above the table surface must bounce back to the height of 23 cm. This ratio of the drop height to the bounce height remains the same for any two consecutive bounces.

   a. Write the first five terms of a sequence that describes the bounce heights after an initial drop of 30 cm. Round your answers to the nearest tenth.

   b. Write an explicit formula that describes the sequence.

Lesson 9-2

Determine whether each sequence is arithmetic. If so, identify the common difference.

15. 5, 9, 13, 17, . . .   **16.** 7, 1, −5, −11, . . .   **17.** 9, −18, 27, −36, . . .

18. 15, 12, 9, 6, . . .   **19.** 2, 5, 9, 14, . . .   **20.** −12, −5, 2, 9, . . .

Find the 24th term of each sequence.

21. 9, 12, 15, 18, . . .   **22.** 19, 12, 5, −2, . . .   **23.** −187, −181, −175, −169, . . .

24. 43, 41, 39, 37, . . .   **25.** −16, −4, 8, 20, . . .   **26.** 0.40, 0.35, 0.30, 0.25, . . .

Extra Practice (continued)

Chapter 9

Find the arithmetic mean a_n of the given terms.

27. $a_{n-1} = 10$, $a_{n+1} = 20$ **28.** $a_{n-1} = 7$, $a_{n+1} = 19$ **29.** $a_{n-1} = -2$, $a_{n+1} = -7$

30. a. Find the common difference for the arithmetic sequence that has 17 as its twelfth term and 71 as its sixth term.

   b. Write the explicit formula for the sequence.

Lesson 9-3

Find the eighth term of each geometric sequence.

31. $2, 6, 18, \ldots$ **32.** $-7, 21, -63, \ldots$ **33.** $\dfrac{1}{12}, \dfrac{1}{2}, 3, \ldots$

Write an explicit formula for each geometric sequence. Then generate the first five terms.

34. $a_1 = 6$, $r = 2$ **35.** $a_1 = -27$, $r = \dfrac{1}{3}$ **36.** $a_1 = 1900$, $r = 0.1$

37. $a_1 = -5$, $r = 3$ **38.** $a_1 = 1$, $r = 4$ **39.** $a_1 = 500$, $r = 0.2$

40. A fruit fly receives genetic material from two parents. Each parent also receives genetic material from 2 parents. So each fruit fly receives genes from 4 grandparents, 8 great-grandparents, and so on. How many ancestors does a fruit fly have going back 15 generations?

Lesson 9-4

Find the sum of each finite arithmetic series.

41. $3 + 5 + 7 + 9 + 11$ **42.** $13 + 9 + 5 + 1 + (-3)$ **43.** $4 + 11 + 18 + \ldots + 53$

44. $(-2) + 3 + 8 + \ldots + 23$ **45.** $\dfrac{1}{2} + \dfrac{3}{2} + \dfrac{5}{2} + \ldots + \dfrac{11}{2}$ **46.** $(-5) + (-1) + 3 + \ldots + 15$

Extra Practice (continued)

Chapter 9

Write each arithmetic series in summation notation. Then evaluate each series.

47. 21, 19, 17, 15, . . . ; 8 terms

48. 4, 7, 10, 13, 16, 19, . . . ; 10 terms

49. −35, −28, −21, −14, . . . ; 7 terms

50. 97, 96, 95, 94, 93, . . . ; 20 terms

Find the sum of each finite series.

51. $\displaystyle\sum_{n=1}^{5}(2n+3)$

52. $\displaystyle\sum_{n=2}^{7}(4-n)$

53. $\displaystyle\sum_{n=1}^{5}(n+1)$

54. The orchestra section of a theater has 25 seats in the front row, 27 seats in the second row, 29 seats in the third row, and so on. The pattern continues until the twelfth row. After that, every row has the same number of seats as row 12.

  a. How many seats are there in row 12?

  b. The orchestra section has 19 rows. How many seats are in the orchestra section?

Lesson 9-5

Evaluate the sum of the finite geometric series.

55. $1 + 2 + 4 + \ldots ; n = 8$

56. $3 + 6 + 12 + \ldots ; n = 7$

57. $243 - 81 + 27 - 3 + \ldots ; n = 8$

58. $\dfrac{1}{27} + \dfrac{1}{3} + 3 + \ldots ; n = 7$

59. $-5 - 15 - 45 - \ldots ; n = 6$

60. $20 - 50 + 125 - \dfrac{625}{2} + \ldots ; n = 9$

Determine whether each infinite geometric series *diverges* or *converges*. If it converges, state the sum.

61. $4 + 2 + 1 + \dfrac{1}{2} + \ldots$

62. $3 - 1 + \dfrac{1}{3} - \dfrac{1}{9} + \ldots$

63. $2.2 - 0.22 + 0.022 - \ldots$

64. $0.9 + 0.09 + 0.009 + \ldots$

65. $5 - \dfrac{5}{2} + \dfrac{5}{4} - \dfrac{5}{8} + \ldots$

66. $1 + 0.1 + 0.01 + \ldots$

Extra Practice (continued)

Determine whether each series is *arithmetic* or *geometric*. Then evaluate the finite series for the specified number of terms.

67. $3 + 6 + 9 + 12 + 15 + \ldots$; 10th term

68. $3 + 6 + 12 + 24 + 48 + \ldots$; 10th term

69. $-1000 + 500 - 250 + 125 - \ldots$; 7th term

70. $87 + 72 + 57 + 42 + \ldots$; 20th term

71. Give an example of an infinite geometric series without a finite sum.

72. Suppose a dropped ball bounces back to $\dfrac{4}{5}$ of its original height. A ball falls from a height of 5 feet and keeps bouncing until someone picks it up. Estimate the total vertical distance the ball travels if no one picks it up.

73. A new company hires an executive. The company is not expected to make a profit right away, so the executive agrees to an alternative payment scheme. The first month, he receives \$.01. Each successive month his salary doubles, until his annual salary equals or exceeds \$2,000,000. Then this salary remains at the maximum level.

    a. What is the total salary the executive receives in the first year?

    b. After how many months will the company start paying the executive the maximum salary under the contract?

    c. According to the contract, what is the maximum *annual* salary?