CHAPTER 12 REVIEW

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

1. $5, 9, 13, 17, \ldots$ **2.** $7, 1, -5, -11, \ldots$ **3.** $9, -18, 27, -36, \ldots$

4. $15, 12, 9, 6, \ldots$ **5.** $2, 5, 9, 14, \ldots$ **6.** $-12, -5, 2, 9, \ldots$

Find the 24th term of each sequence.

7. $9, 12, 15, 18, \ldots$ **8.** $19, 12, 5, -2, \ldots$ **9.** $-187, -181, -175, -169, \ldots$

10. $43, 41, 39, 37, \ldots$ **11.** $-16, -4, 8, 20, \ldots$ **12.** $0.40, 0.35, 0.30, 0.25, \ldots$

Find the arithmetic mean a_n of the given terms.

13. $a_{n-1} = 10, a_{n+1} = 20$ **14.** $a_{n-1} = 7, a_{n+1} = 19$ **15.** $a_{n-1} = -2, a_{n+1} = -7$

16. 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.

Find the eighth term of each geometric sequence.

17. $2, 6, 18, \ldots$ **18.** $-7, 21, -63, \ldots$ **19.** $\dfrac{1}{12}, \dfrac{1}{2}, 3, \ldots$

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

20. $a_1 = 6, r = 2$ **21.** $a_1 = -27, r = \dfrac{1}{3}$ **22.** $a_1 = 1900, r = 0.1$

23. $a_1 = -5, r = 3$ **24.** $a_1 = 1, r = 4$ **25.** $a_1 = 500, r = 0.2$

Evaluate the sum of the finite geometric series.

26. $1 + 2 + 4 + \ldots ; n = 8$ **27.** $3 + 6 + 12 + \ldots ; n = 7$

28. $243 - 81 + 27 - 3 + \ldots ; n = 8$ **29.** $\dfrac{1}{27} + \dfrac{1}{3} + 3 + \ldots ; n = 7$

30. $-5 - 15 - 45 - \ldots ; n = 6$ **31.** $20 - 50 + 125 - \dfrac{625}{2} + \ldots ; n = 9$

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

32. $4 + 2 + 1 + \dfrac{1}{2} + \ldots$

33. $3 - 1 + \dfrac{1}{3} - \dfrac{1}{9} + \ldots$

34. $2.2 - 0.22 + 0.022 - \ldots$

35. $0.9 + 0.09 + 0.009 + \ldots$

36. $5 - \dfrac{5}{2} + \dfrac{5}{4} - \dfrac{5}{8} + \ldots$

37. $1 + 0.1 + 0.01 + \ldots$

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

38. $3 + 6 + 9 + 12 + 15 + \ldots$; 10th term

39. $3 + 6 + 12 + 24 + 48 + \ldots$; 10th term

40. $-1000 + 500 - 250 + 125 - \ldots$; 7th term

41. $87 + 72 + 57 + 42 + \ldots$; 20th term

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

43. 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.

44. 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?

45. 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?