10. 1, 3, 9, 27, . . . 11. 2, 8, 32, 128, . . . 12. 1, −6, 36, −216, . . .

13. 375, −75, 15, −3, . . . 14. $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \ldots$ 15. $-28, 14, -7, \frac{7}{2}, -\frac{7}{4}, \ldots$

Write a rule for the *n*th term of the geometric sequence.

16. $r = 3, a_1 = 2$ 17. $r = -2, a_1 = 6$ 18. $r = -3, a_1 = 12$

19. $a_1 = \frac{1}{4}, a_3 = 6$ 20. $a_2 = 5, a_4 = \frac{1}{5}$ 21. $a_2 = 28, a_5 = -1792$

22. Find the sum of the first 8 terms of the geometric series $1 + 8 + 64 + 512 + \cdots$.

23. **CELLULAR PHONES** Use the model from Example 6 to find the average monthly bill for cellular telephone service in 1997.

PRACTICE AND APPLICATIONS

STUDENT HELP

Extra Practice to help you master skills is on p. 955.

CLASSIFYING SEQUENCES **Decide whether the sequence is *arithmetic*, *geometric*, or *neither*. Explain your answer.**

24. 6, 24, 96, 384, . . . 25. 1, 3, 7, 13, . . . 26. 4, 13, 22, 31, . . .

27. 3, −1, −5, −9, . . . 28. −11, −7, −3, 1, . . . 29. $\frac{1}{2}, \frac{3}{2}, \frac{9}{2}, \frac{27}{2}, \ldots$

30. $\frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, \ldots$ 31. $-\frac{3}{4}, \frac{1}{8}, -\frac{1}{16}, \frac{3}{32}, \ldots$ 32. $-\frac{3}{5}, \frac{4}{25}, \frac{5}{125}, \frac{6}{625}, \ldots$

STUDENT HELP

HOMEWORK HELP

Example 1: Exs. 24–32
Example 2: Exs. 33–44
Example 3: Exs. 45–49, 54–59
Example 4: Exs. 50–53
Example 5: Exs. 60–69
Examples 6, 7: Exs. 70–79

FINDING COMMON RATIOS **Find the common ratio of the geometric sequence.**

33. 1, 4, 16, 64, . . . 34. 3, 6, 12, 24, . . . 35. −3, 6, −12, 24, . . .

36. 5, 40, 320, 2560, . . . 37. 136, 68, 34, 17, . . . 38. $-\frac{1}{4}, \frac{1}{8}, -\frac{1}{16}, \frac{1}{32}, \ldots$

WRITING TERMS **Write a rule for the *n*th term of the geometric sequence. Then find a_6.**

39. 1, −4, 16, −64, . . . 40. 5, 10, 20, 40, . . . 41. 2, 14, 98, 686, . . .

42. 6, −30, 150, −750, . . . 43. $5, -\frac{5}{3}, \frac{5}{9}, -\frac{5}{27}, \ldots$ 44. $2, \frac{4}{3}, \frac{8}{9}, \frac{16}{27}, \ldots$

WRITING RULES Write a rule for the nth term of the geometric sequence.

45. $r = 3, a_1 = 4$

46. $r = \frac{1}{3}, a_1 = 45$

47. $r = 6, a_3 = 72$

48. $r = \frac{1}{8}, a_1 = 4$

49. $r = 8, a_1 = -2$

50. $a_1 = -\frac{1}{2}, a_4 = -16$

51. $a_3 = 10, a_6 = 300$

52. $a_2 = -20, a_4 = -5$

53. $a_2 = -30, a_5 = 3750$

GRAPHING SEQUENCES Graph the geometric sequence.

54. $a_n = 4(2)^{n-1}$

55. $a_n = 3(5)^{n-1}$

56. $a_n = 2(3)^{n-1}$

57. $a_n = 8(3)^{n-1}$

58. $a_n = 5\left(\frac{1}{2}\right)^{n-1}$

59. $a_n = 4\left(\frac{3}{2}\right)^{n-1}$

FINDING SUMS For part (a), find the sum of the first n terms of the geometric series. For part (b), find n for the given sum S_n.

60. $1 + 4 + 16 + 64 + \cdots$
a. $n = 14$ **b.** $S_n = 341$

61. $1 + 9 + 81 + 729 + \cdots$
a. $n = 10$ **b.** $S_n = 820$

62. $7 + (-21) + 63 + (-189) + \cdots$
a. $n = 18$ **b.** $S_n = 3829$

63. $-90 + 30 + (-10) + \frac{10}{3} + \cdots$
a. $n = 16$ **b.** $S_n = -66.67$

USING SUMMATION NOTATION Find the sum of the series.

64. $\sum_{i=1}^{10} 6(2)^{i-1}$

65. $\sum_{i=1}^{8} 5(4)^{i-1}$

66. $\sum_{i=0}^{9} 12\left(-\frac{1}{2}\right)^{i}$

67. $\sum_{i=1}^{10} 8\left(\frac{3}{4}\right)^{i-1}$

68. $\sum_{i=0}^{6} 4\left(\frac{3}{2}\right)^{i}$

69. $\sum_{i=1}^{12} (-2)^{i-1}$

TENNIS **In Exercises 70 and 71, use the following information.**
The men's U.S. Open tennis tournament is held annually in Flushing Meadow in New York City. In the first round of the tournament, 64 matches are played. In each successive round, the number of matches played decreases by one half.
▶ Source: United States Tennis Association

70. Find a rule for the number of matches played in the nth round. For what values of n does your rule make sense?

71. Find the total number of matches played in the men's U.S. Open tennis tournament.

COMPUTER SCIENCE **In Exercises 72 and 73, use the following information.**
When a computer must find an item in an ordered list of data (such as an alphabetical list of names), it may be programmed to perform a *binary search*. This search technique involves jumping to the middle of the list and deciding whether the item is there. If not, the computer decides whether the item comes before or after the middle. Half of the list is then ignored on the next pass through the list, and the computer jumps to the middle of the remaining list. This is repeated until the item is found.

72. An ordered list contains 1024 items. Find a rule for the number of items remaining after the nth pass through the list.

73. In the worst case, the item to be found is the only one left in the list after n passes through the list. What is the worst-case value of n for a binary search of a list with 1024 items?

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