EXAMPLES 2 and 3
on p. 828 for Exs. 13–23

WRITING RULES **Write a recursive rule for the sequence. The sequence may be arithmetic, geometric, or neither.**

13. 21, 14, 7, 0, −7, . . .

14. 3, 12, 48, 192, 768, . . .

15. 4, −12, 36, −108, 324, . . .

16. 1, 8, 15, 22, 29, . . .

17. 44, 11, $\frac{11}{4}$, $\frac{11}{16}$, $\frac{11}{64}$, . . .

18. 1, 4, 5, 9, 14, . . .

19. 54, 43, 32, 21, 10, . . .

20. 3, 5, 15, 75, 1125, . . .

21. 16, 9, 7, 2, 5, . . .

ERROR ANALYSIS ***Describe*** **and correct the error in writing a recursive rule for the sequence 5, 2, 3, −1, 4, ...**

22.

Beginning with the third term in the sequence, each term a_n equals $a_{n-2} - a_{n-1}$. So a recursive rule is given by:

$a_n = a_{n-2} - a_{n-1}$

23.

Beginning with the second term in the sequence, each term a_n is $a_{n-1} - 3$. So a recursive rule is given by:

$a_1 = 5, a_n = a_{n-1} - 3$

EXAMPLE 5
on p. 830 for Exs. 24–33

ITERATING FUNCTIONS **Find the first three iterates of the function for the given initial value.**

24. $f(x) = 3x - 2, x_0 = 2$

25. $f(x) = 5x + 6, x_0 = -2$

26. $g(x) = -4x + 7, x_0 = 1$

27. $f(x) = \frac{1}{2}x - 3, x_0 = 2$

28. $f(x) = \frac{2}{3}x + 5, x_0 = 6$

29. $h(x) = x^2 - 4, x_0 = -3$

30. $f(x) = 2x^2 + 1, x_0 = -1$

31. $f(x) = x^2 - x + 2, x_0 = 1$

32. $g(x) = -3x^2 + 2x, x_0 = 2$

33. **TAKS REASONING** What are the first three iterates x_1, x_2, and x_3 of the function $f(x) = -2x + 3$ for an initial value of $x_0 = 2$?

Ⓐ −1, 1, 3 Ⓑ 1, −5, 7 Ⓒ −1, 5, −7 Ⓓ 1, −1, −3

WRITING RULES **Write a recursive rule for the sequence.**

34. 3, 8, 17, 81, 370, . . .

35. 1, 2, 12, 56, 272, . . .

36. 5, $5\sqrt{3}$, 15, $15\sqrt{3}$, 45, . . .

37. 2, 5, 11, 26, 59, . . .

38. 8, 4, 2, 2, 1, . . .

39. −3, −2, 5, −3, −2, . . .

40. **TAKS REASONING** Give an example of a sequence in which each term after the third term is a function of the three terms preceding it. Write a recursive rule for the sequence and find its first eight terms.

41. **REASONING** *Explain* why there are not a function f and an initial value x_0 such that the function's first three iterates are $x_1 = 2$, $x_2 = 2$, and $x_3 = 8$.

42. **CHALLENGE** You can define a sequence using a piecewise rule. The following is an example of a piecewise-defined sequence.

$$a_1 = 5,\ a_n = \begin{cases} \frac{a_{n-1}}{2}, \text{ if } a_{n-1} \text{ is even} \\ 3a_{n-1} + 3, \text{ if } a_{n-1} \text{ is odd} \end{cases}$$

a. Write the first ten terms of the sequence.

b. Choose three different positive integer values for a_1 (other than $a_1 = 5$). For each value of a_1, find the first ten terms of the sequence. What conclusions can you make about the behavior of this sequence of integers?