Chapter 12

12.1 For the sequence, describe the pattern, write the next term, and write a rule for the nth term. 1–3. See margin.

1. 9, 16, 25, 36, . . .
2. $\frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, \ldots$
3. 12.5, 7, 1.5, −4, . . .

12.1 Write the series using summation notation.

4. $16 + 32 + 48 + 64 + \cdots + 144$ $\sum_{n=1}^{9} 16n$
5. $\frac{1}{6} + \frac{2}{7} + \frac{3}{8} + \frac{4}{9} + \frac{1}{2} + \cdots$ $\sum_{n=1}^{\infty} \frac{n}{5+n}$

12.1 Find the sum of the series.

6. $\sum_{i=1}^{5} (3i + 2)$ 55
7. $\sum_{i=0}^{5} 4i^2$ 220
8. $\sum_{n=4}^{6} \frac{n}{n+3}$ $\frac{313}{168}$
9. $\sum_{k=6}^{8} k^3$ 1071

12.2 Write a rule for the nth term of the arithmetic sequence. Then graph the first six terms of the sequence. 10–12. See margin for art.

10. $a_5 = 15, d = 6$ $a_n = 6n - 15$
11. $a_{10} = -78, d = -10$ $a_n = -10n + 22$
12. $a_6 = -\frac{11}{5}, d = -\frac{2}{5}$ $a_n = -\frac{2}{5}n + \frac{1}{5}$

12.2 Write a rule for the nth term of the arithmetic sequence. Then find a_{15}.

13. 11, 20, 29, 38, . . . $a_n = 9n + 2$; 137
14. −8, −15, −22, −29, . . . $a_n = -7n - 1$; −106
15. $3, \frac{7}{3}, \frac{5}{3}, 1, \ldots$ $a_n = -\frac{2}{3}n + \frac{11}{3}$; $-\frac{19}{3}$

12.2 Write a rule for the nth term of the arithmetic sequence that has the two given terms.

16. $a_2 = 9, a_7 = 37$ $a_n = 5.6n - 2.2$
17. $a_8 = 10.5, a_{16} = 18.5$ $a_n = 2.5 + n$
18. $a_3 = -\frac{14}{5}, a_{10} = -\frac{42}{5}$ $a_n = -\frac{4}{5}n - \frac{2}{5}$

12.3 Write a rule for the nth term of the geometric sequence. Then find a_{10}.

19. $\frac{1}{27}, \frac{1}{9}, \frac{1}{3}, 1, \ldots$ $a_n = \frac{1}{27} \cdot 3^{n-1}$; 729
20. 5, 4, 3.2, 2.56, . . . $a_n = 5 \cdot \left(\frac{4}{5}\right)^{n-1}$; about 0.671
21. $4, \frac{16}{3}, \frac{64}{9}, \frac{256}{27}, \ldots$ $a_n = 4 \cdot \left(\frac{4}{3}\right)^{n-1}$; $\frac{1{,}048{,}576}{19{,}683}$

12.3 Find the sum of the geometric series.

22. $\sum_{i=1}^{4} 3(4)^{i-1}$ 255
23. $\sum_{i=1}^{7} 0.5(-3)^{i-1}$ 273.5
24. $\sum_{i=1}^{5} 10\left(\frac{3}{5}\right)^{i-1}$ 23.056
25. $\sum_{i=1}^{7} 2(1.2)^{i-1}$ about 25.8

12.4 Find the sum of the infinite geometric series, if it exists.

26. $8 + 4 + 2 + 1 + \cdots$ 16
27. $2 - 4 + 8 - 16 + \cdots$ no sum
28. $-6.75 + 4.5 - 3 + 2 - \cdots$ −4.05

12.4 Write the repeating decimal as a fraction in lowest terms.

29. 0.333. . . $\frac{1}{3}$
30. 0.898989. . . $\frac{89}{99}$
31. 0.212121. . . $\frac{7}{33}$
32. 1.50150150. . . $\frac{500}{333}$

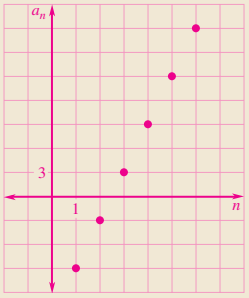
12.5 Write a recursive rule for the sequence. The sequence may be arithmetic, geometric, or neither.

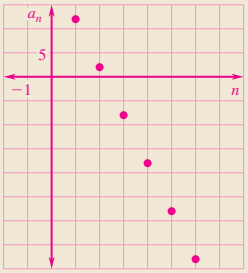
33. 2.5, 5, 10, 20, . . . $a_1 = 2.5, a_n = 2a_{n-1}$
34. 2, −2, −6, −10, . . . $a_1 = 2, a_n = a_{n-1} - 4$
35. 1, 2, 2, 4, 8, 32, . . . $a_1 = 1$ and $a_2 = 2, a_n = (a_{n-2})(a_{n-1})$

12.5 Find the first three iterates of the function for the given initial value.

36. $f(x) = 2x - 5, x_0 = 3$ 1, −3, −11
37. $f(x) = \frac{4}{5}x - 2, x_0 = -10$ −10, −10, −10
38. $f(x) = 3x^2 + x, x_0 = -1$ 2, 14, 602

EXTRA PRACTICE

1. perfect squares beginning with $3^2 = 9$; 49; $a_n = (n+2)^2$
2. multiples of $\frac{1}{3}, \frac{5}{3}$; $a_n = \frac{n}{3}$
3. each term is decreased by 5.5; −9.5; $a_n = 18 - 5.5n$
10. 

11. 

12.