Answers for 12.5

For use with pages 830–838

12.5 Skill Practice

1. iteration

2. An explicit rule gives the value based on the position of the term in the sequence while a recursive rule gives the value based on previous term(s) in the sequence.

3. 1, 4, 7, 10, 13

4. 4, 8, 16, 32, 64

5. $-1, -6, -11, -16, -21$

6. 3, 2, $-2, -11, -27$

7. 2, 5, 26, 677, 458,330

8. 4, 6, 26, 666, 443,546

9. 2, 8, 10, 18, 22

10. 2, 4, 2, $-2, -4$

11. 2, 3, 6, 18, 108

12. A

13. $a_1 = 21, a_n = a_{n-1} - 7$

14. $a_1 = 3, a_n = 4a_{n-1}$

15. $a_1 = 4, a_n = -3a_{n-1}$

16. $a_1 = 1, a_n = a_{n-1} + 7$

17. $a_1 = 44, a_n = \frac{1}{4}a_{n-1}$

18. $a_1 = 1, a_2 = 4,$
$a_n = a_{n-2} + a_{n-1}$

19. $a_1 = 54, a_n = a_{n-1} - 11$

20. $a_1 = 3, a_2 = 5,$
$a_n = a_{n-2} \cdot a_{n-1}$

21. $a_1 = 16, a_2 = 9,$
$a_n = a_{n-2} - a_{n-1}$

22. When writing a recursive rule, you must define the previous information needed; $a_1 = 5,$ $a_2 = 2, a_n = a_{n-2} - a_{n-1}$.

23. The rule does not work for all of the terms of the sequence; $a_1 = 5,$ $a_2 = 2, a_n = a_{n-2} - a_{n-1}$.

24. 4, 10, 28

25. $-4, -14, -64$

26. 3, -5, 27

27. $-2, -4, -5$

28. 9, 11, $12\frac{1}{3}$

29. 5, 21, 437

30. 3, 19, 723

31. 2, 4, 14

32. $-8, -208, -130{,}208$

33. C

34. $a_1 = 3, a_2 = 8,$
$a_n = (a_{n-2})^2 + a_{n-1}$

35. $a_1 = 1, a_2 = 2,$
$a_n = 4(a_{n-2} + a_{n-1})$

36. $a_1 = 5, a_n = \sqrt{3}\, a_{n-1}$

37. $a_1 = 2, a_2 = 5,$
$a_n = 3a_{n-2} + a_{n-1}$

38. $a_1 = 8, a_2 = 4, a_n = \frac{a_{n-2}}{a_{n-1}}$

39. $a_1 = -3, a_2 = -2,$
$a_n = -1(a_{n-2} + a_{n-1})$

40. *Sample answer:* $a_1 = 2, a_2 = 4,$
$a_3 = 7,$
$a_n = a_{n-3} + a_{n-2} + a_{n-1},$
2, 4, 7, 13, 24, 44, 81, 149

41. *Sample answer:* If the first two iterates are 2, the given rule must not be a function.

42. a. 5, 18, 9, 30, 15, 48, 24, 12, 6, 3

b. *Sample answer:* $a_1 = 2$: 2, 1, 6, 3, 12, 6, 3, 12, 6, 3;
$a_1 = 3$: 3, 12, 6, 3, 12, 6, 3, 12, 6, 3;
$a_1 = 6$: 6, 3, 12, 6, 3, 12, 6, 3, 12, 6; the terms of the sequence will eventually repeat the numbers 3, 6, 12.

12.5 Problem Solving

43. a. $a_1 = 5000,$
$a_n = 0.8a_{n-1} + 500;$
3524 fish

b. The population of the lake approaches 2500 fish.

44. $a_1 = 34, a_n = 0.6a_{n-1} + 16;$
the amount of chlorine in the pool approaches 40 ounces.

45. $a_1 = 2000,$
$a_n = 1.014a_{n-1} - 100$; 24 mo.

Sample answer: As long as Gladys does not add anything to her credit card and continues her payments, her 24th payment will only be \$62.14.

46. 1, 1, 2, 3, 5

47. a. $a_1 = 20, a_n = 0.7a_{n-1} + 20$

b. $66\frac{2}{3}$ mg

c. The maintenance level of the drug doubles as well; $a_1 = 20,$
$a_n = 0.7\,(2a_{n-1}) + 2(20).$

48 a. $a_n = 1.08a_{n-1} - 30{,}000$

b. $a_{n-1} = \dfrac{a_n + 30{,}000}{1.08};$

$a_0 =$ about 294,544.42

12.5 Mixed Review

49. $3\sqrt{2}$ **50.** $2\sqrt{14}$ **51.** 9

52. 64 **53.** 9 **54.** $\frac{1}{8}$

12.4–12.5 Mixed Review of Problem Solving

1. a. $\sum_{i=1}^{\infty} 16.8(0.7)^{i-1}$

b. 68 ft

2. a. 1, 2, 4, 8, 16, 32

b. geometric

c. $a_n = 2^{n-1}$ and $a_1 = 1$, $a_n = 2a_{n-1}$

3. 60;

		6	0
⊙	⊘ ⊙	⊘ ⊙	⊙
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

4. *Sample answer:* $a_n = -2 + 5n$ and $a_1 = 3$, $a_n = a_{n-1} + 5$

5. *Sample answer:* The sum continues to grow larger because the terms of the sequence are constantly growing larger and never approach any specific value.

6. Finite; the common ratio is less than 1; 160 in.

7. a. 0.54%; $a_1 = 10{,}000$, $a_n = 1.0054a_{n-1} - 196$

b. \$8244.47

c. 47 months

d. *Sample answer:* Yes; by paying an extra \$50 each month, you are paying the loan off early and therefore will pay less interest.

8. 5000 trees;

5	0	0	0
⊙	⊘ ⊙	⊘ ⊙	⊙
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

9. *Sample answer:* $\sum_{i=1}^{\infty} 2\left(\frac{1}{2}\right)^{i-1}$