Answers for 12.1

For use with pages 798–800

12.1 Skill Practice

1. sigma notation

2. A sequence is a list of numbers, and a series is the sum of the terms of a sequence.

3. 3, 4, 5, 6, 7, 8

4. 5, 4, 3, 2, 1, 0

5. 1, 4, 9, 16, 25, 36

6. 3, 10, 29, 66, 127, 218

7. 1, 4, 16, 64, 256, 1024

8. $-1, -4, -9, -16, -25, -36$

9. $-4, -1, 4, 11, 20, 31$

10. 16, 25, 36, 49, 64, 81

11. $-4, -2, -\frac{4}{3}, -1, -\frac{4}{5}, -\frac{2}{3}$

12. $3, \frac{3}{2}, 1, \frac{3}{4}, \frac{3}{5}, \frac{1}{2}$

13. $\frac{2}{3}, 1, \frac{6}{5}, \frac{4}{3}, \frac{10}{7}, \frac{3}{2}$

14. $1, \frac{2}{3}, \frac{3}{5}, \frac{4}{7}, \frac{5}{9}, \frac{6}{11}$

15. You can write the terms as $5(1) - 4, 5(2) - 4, 5(3) - 4, 5(4) - 4, a_5 = 21, a_n = 5n - 4$.

16. You can write the terms as $2^{1-1}, 2^{2-1}, 2^{3-1}, 2^{4-1}, a_5 = 16, a_n = 2^{n-1}$.

17. You can write the terms as $(-1)^1(4 \cdot 1), (-1)^2(4 \cdot 2), (-1)^3(4 \cdot 3), (-1)^4(4 \cdot 4), a_5 = -20, a_n = (-1)^n(4 \cdot n)$.

18. You can write the terms as $1^3 + 1, 2^3 + 1, 3^3 + 1, 4^3 + 1, a_5 = 126, a_n = n^3 + 1$.

19. You can write the terms as $\frac{2}{3(1)}, \frac{2}{3(2)}, \frac{2}{3(3)}, \frac{2}{3(4)}, a_5 = \frac{2}{15}, a_n = \frac{2}{3n}$.

20. You can write the terms as $\frac{2(1)}{1 + 2}, \frac{2(2)}{2 + 2}, \frac{2(3)}{3 + 2}, \frac{2(4)}{4 + 2}, a_5 = \frac{10}{7}, a_n = \frac{2n}{n + 2}$.

21. You can write the terms as $\frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{4}{4}, \frac{4}{5}, a_6 = \frac{6}{4}, a_n = \frac{n}{4}$.

22. You can write the terms as $\frac{2(1) - 1}{1(10)}, \frac{2(2) - 1}{2(10)}, \frac{2(3) - 1}{3(10)}, \frac{2(4) - 1}{4(10)}, a_5 = \frac{9}{50}, a_n = \frac{2n - 1}{10n}$.

23. You can write the terms as $0.7(1) + 2.4, 0.7(2) + 2.4, 0.7(3) + 2.4, 0.7(4) + 2.4, a_5 = 5.9, a_n = 0.7n + 2.4$.

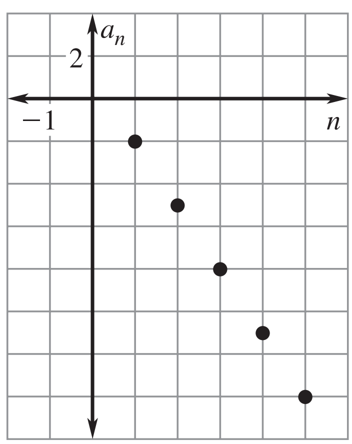
24. You can write the terms as $5.8 - 1.6(1)$, $5.8 - 1.6(2)$, $5.8 - 1.6(3)$, $5.8 - 1.6(4)$, $5.8 - 1.6(5)$, $a_6 = -3.8$, $a_n = 5.8 - 1.6n$.

25. You can write the terms as $1^2 + 0.2$, $2^2 + 0.2$, $3^2 + 0.2$, $4^2 + 0.2$, $a_5 = 25.2$, $a_n = n^2 + 0.2$.

26. You can write the terms as $7.8(1) + 1.2$, $7.8(2) + 1.2$, $7.8(3) + 1.2$, $7.8(4) + 1.2$, $a_5 = 40.2$, $a_n = 7.8n + 1.2$.

27. D

28.



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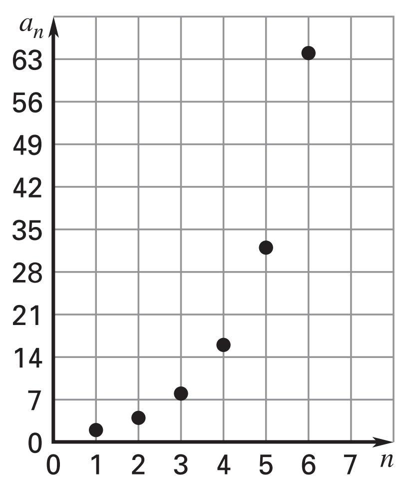

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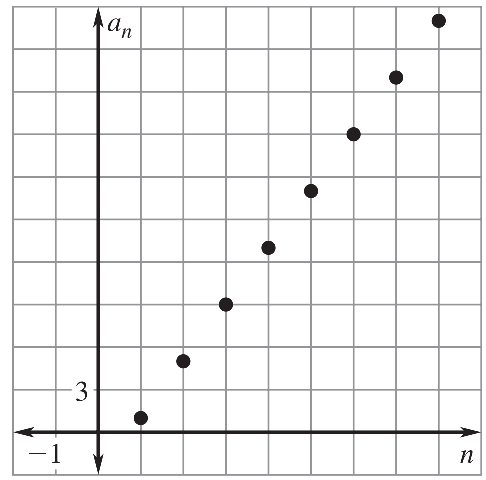

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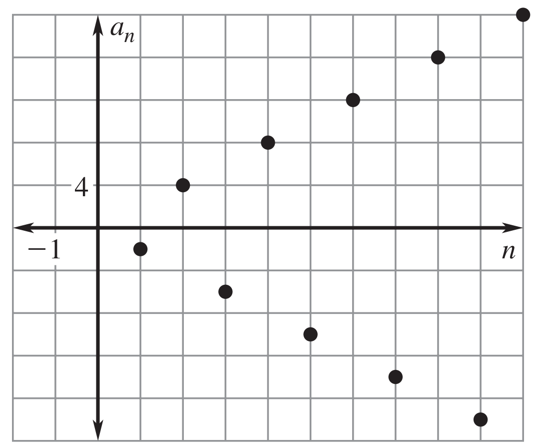

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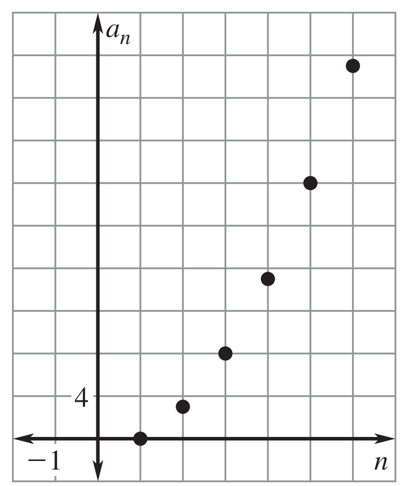

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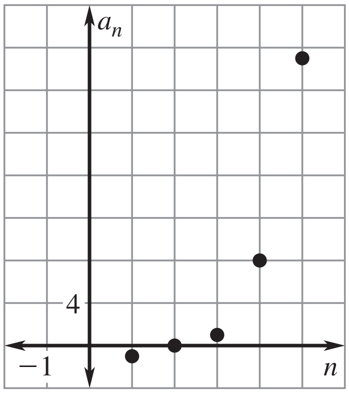
33.



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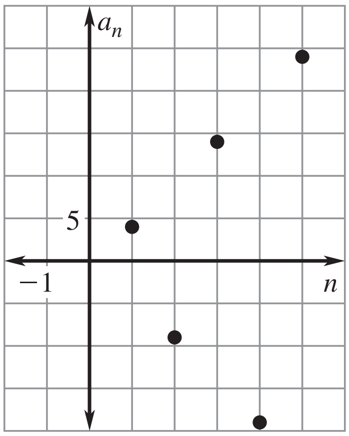

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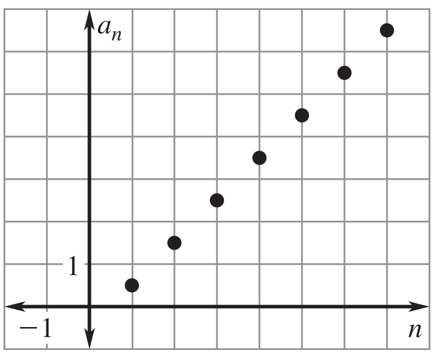

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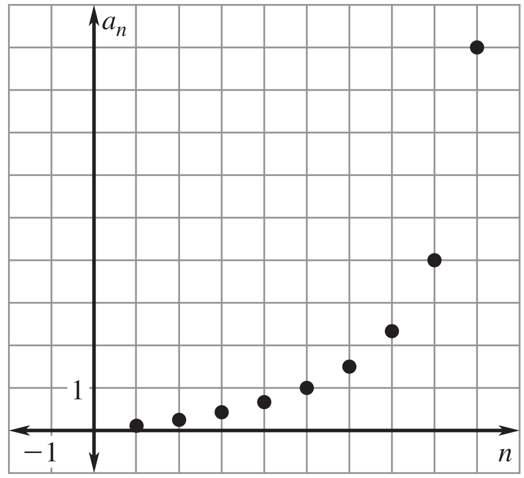


37. $\sum_{i=1}^{5} 3i + 4$ **38.** $\sum_{i=1}^{5} 6i + 4$

39. $\sum_{i=1}^{\infty} 2i - 3$ **40.** $\sum_{i=1}^{\infty} (-2)^i$

41. $\sum_{i=1}^{\infty} 7i - 4$ **42.** $\sum_{i=1}^{4} \frac{1}{3^i}$

43. $\sum_{i=1}^{7} \frac{i}{3 + i}$ **44.** $\sum_{i=1}^{\infty} i^2 - 2$

45. 42 **46.** 105 **47.** 100

48. 90 **49.** 82 **50.** 50

51. $\frac{761}{140}$ **52.** $\frac{617}{140}$ **53.** 35

54. 136 **55.** 325 **56.** 2109

57. The lower limit is zero, so the first term should be 3; $3 + 5 + 7 + 9 + 11 + 13 = 48$.

58. B

59. true; $\sum_{i=1}^{n} ka_i = (ka_1 + ka_2 + ka_3 + \cdots + ka_n) = k(a_1 + a_2 + a_3 + \cdots + a_n) = k\sum_{i=1}^{n} a_i$

60. true; $\sum_{i=1}^{n} (a_i + b_i) = (a_1 + b_1) + (a_2 + b_2) + (a_3 + b_3) + \cdots + (a_n + b_n) = (a_1 + a_2 + a_3 + \cdots + a_n) + (b_1 + b_2 + b_3 + \cdots + b_n) = \sum_{i=1}^{n} a_i + \sum_{i=1}^{n} b_i$

61. False. *Sample answer:*

$$\sum_{i=1}^{4} (2i)(-4i) \neq \left(\sum_{i=1}^{4} 2i\right)\left(\sum_{i=1}^{4} -4i\right)$$

62. False. *Sample answer:*

$$\sum_{i=1}^{4} (2x)^2 \neq \left(\sum_{i=1}^{4} 2x\right)^2$$

12.1 Problem Solving

63. 60°, 90°, 108°, 120°, about 128.57°; $T_n = 180(n - 2)$; 1800°

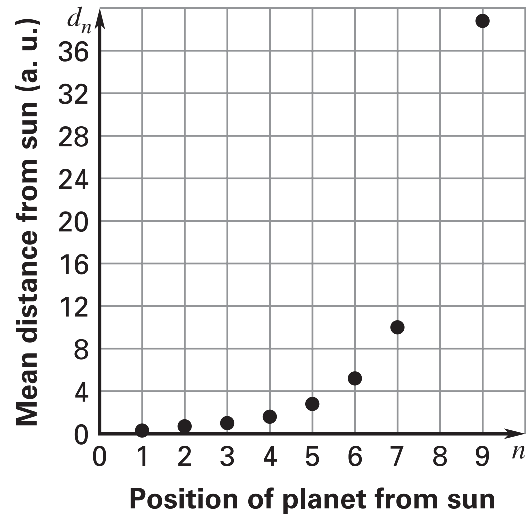
64. $50.50; 316 days. *Sample answer:* I used the special series formula for the sum of the first *n* positive integers and set it equal to 50,000 (since there are 50,000 pennies in $500) and solved.

65. $a_n = 2^n - 1$; 63 moves, 127 moves, 255 moves

66. **a.** about 1.6 astronomical units

b. about 239,356,592 km

c.



67. **a.** 15 balls

b. 35 balls

c. Except for layer 1, there are always more balls in the same layer of the square pyramid. The difference in the number of balls is $\frac{n(n-1)}{2}$.

68.

$$S_n = \frac{1}{2}\left(\frac{n(n+1)(2n+1)}{6} + \frac{n(n+1)}{2}\right)$$

12.1 Mixed Review

69. 5 **70.** 4 **71.** −2

72. $\frac{5}{4}$ **73.** $\frac{3}{2}$ **74.** 2

Answers for 12.1 *continued*

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75. -3

76. 2

77. -3

78. $2\sqrt{10}$

79. $5\sqrt{2}$

80. $\sqrt{74}$

81. $\sqrt{34}$

82. $\sqrt{17}$

83. 5

84. $\sqrt{17}$

85. $2\sqrt{13}$

86. $\sqrt{205}$