Answers for 12.3

For use with pages 814–818

12.3 Skill Practice

1. common ratio

2. When you divide consecutive terms you have the same ratio.

3. Not geometric; there is no common ratio.

4. Geometric; there is a common ratio of 4.

5. Geometric; there is a common ratio of $\frac{1}{6}$.

6. Geometric; there is a common ratio of 2.

7. Not geometric; there is no common ratio.

8. Not geometric; there is no common ratio.

9. Geometric; there is a common ratio of $\frac{1}{2}$.

10. Not geometric; there is no common ratio.

11. Geometric; there is a common ratio of -3.

12. Geometric; there is a common ratio of 3.

13. Not geometric; there is no common ratio.

14. Not geometric; there is no common ratio.

15. $a_n = (-4)^{n-1}$; 4096

16. $a_n = 6(3)^{n-1}$; 4374

17. $a_n = 4(6)^{n-1}$; 186,624

18. $a_n = 7(-5)^{n-1}$; 109,375

19. $a_n = 2\left(\frac{3}{4}\right)^{n-1}$; $\frac{729}{2048}$

20. $a_n = 3\left(-\frac{2}{5}\right)^{n-1}$; $\frac{192}{15{,}625}$

21. $a_n = 4\left(\frac{1}{2}\right)^{n-1}$; $\frac{1}{16}$

22. $a_n = -0.3(-2)^{n-1}$; -19.2

23. $a_n = -2(0.4)^{n-1}$; -0.008192

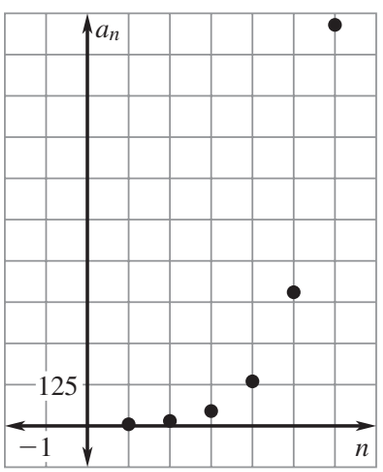
24. $a_n = 7(-0.6)^{n-1}$; 0.326592

25. $a_n = 5(-2.8)^{n-1}$; 2409.45152

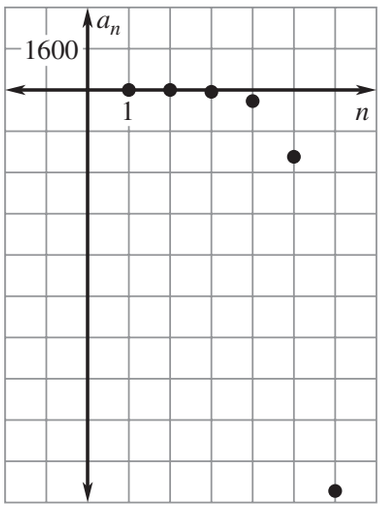
26. $a_n = 120(1.5)^{n-1}$; 1366.875

27. B

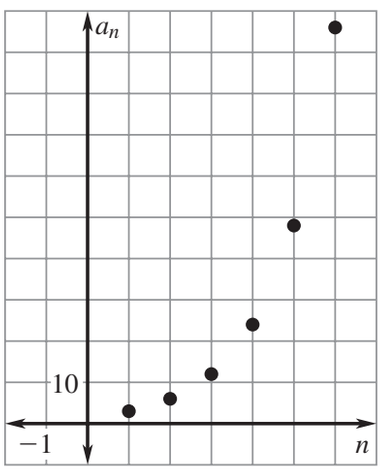
28. $a_n = 5(3)^{n-1}$



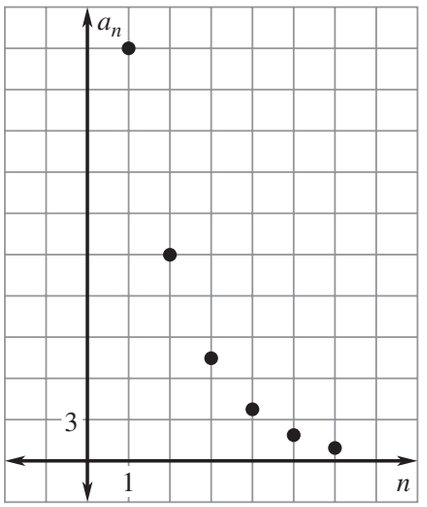
29. $a_n = -2(6)^{n-1}$



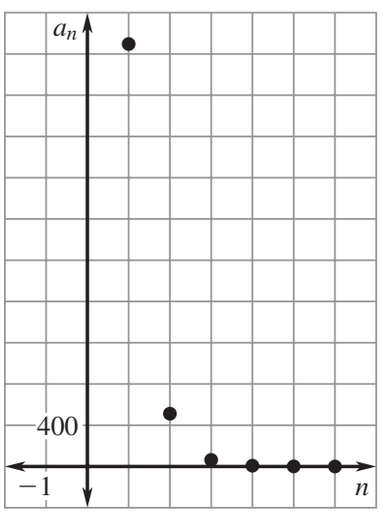
30. $a_n = 3(2)^{n-1}$



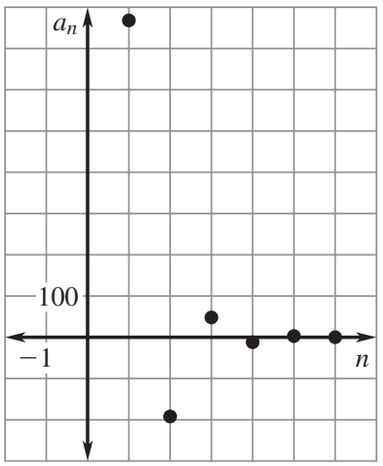
31. $a_n = 30\left(\frac{1}{2}\right)^{n-1}$



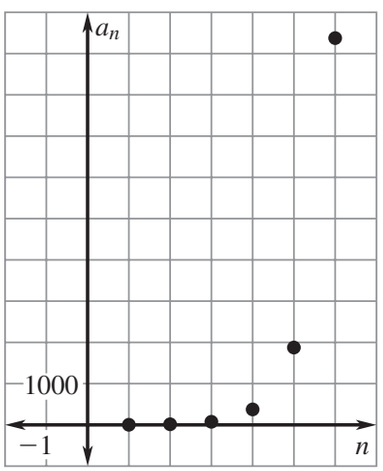
32. $a_n = 4096\left(\frac{1}{8}\right)^{n-1}$



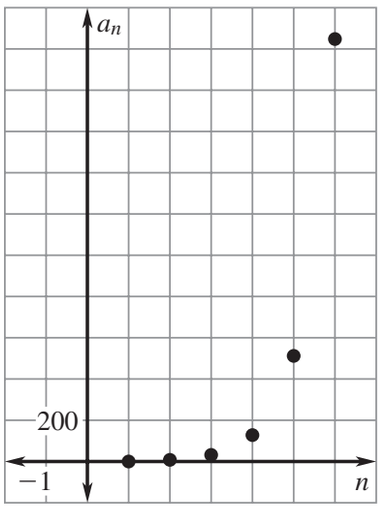
33. $a_n = 768\left(-\frac{1}{4}\right)^{n-1}$



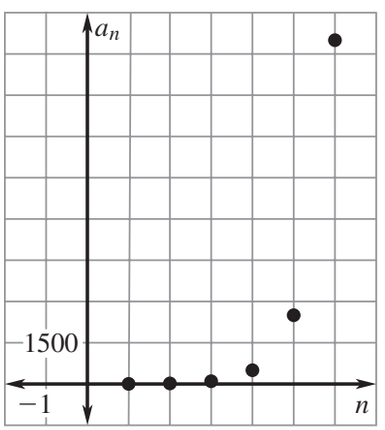
34. $a_n = 3(5)^{n-1}$



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



36. $a_n = 4(5)^{n-1}$



37. The exponent should be $n - 1$ instead of n; $a_n = 3(2)^{n-1}$.

38. r and a_1 are switched around in the formula; $a_n = a_1 r^{n-1}$, $a_n = 3(2)^{n-1}$.

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

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

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

42. $a_n = \left(\frac{10}{9}\right)(3)^{n-1}$

43. $a_n = -80\left(\frac{1}{2}\right)^{n-1}$

44. $a_n = 6(-4)^{n-1}$

45. $a_n = 6(3)^{n-1}$

46. $a_n = 7\left(\frac{1}{2}\right)^{n-1}$

47. $a_n = \frac{32}{27}\left(\frac{3\sqrt[3]{12}}{4}\right)^{n-1}$

48. 5115

49. 131,070

50. $\frac{255}{32}$

51. $\frac{1365}{256}$

52. $\frac{527{,}345}{256}$

53. 838,861

54. C

55. *Sample answer:* $\frac{100}{31}, \frac{200}{31}, \frac{400}{31}, \frac{800}{31}, \frac{1600}{31}$

56. a. $S_5 = \left(\frac{1-x^5}{1-x}\right)$

b. $S_4 = 3x\left(\frac{1-16x^8}{1-2x^2}\right)$

12.3 Problem Solving

57. a. $a_n = 5(2)^{n-1}$

b. 75 skydivers

58. a. $a_n = 32\left(\frac{1}{2}\right)^{n-1}; 1 \le n \le 6$

b. 63 games

59. a. $a_n = 1024\left(\frac{1}{2}\right)^{n-1}$

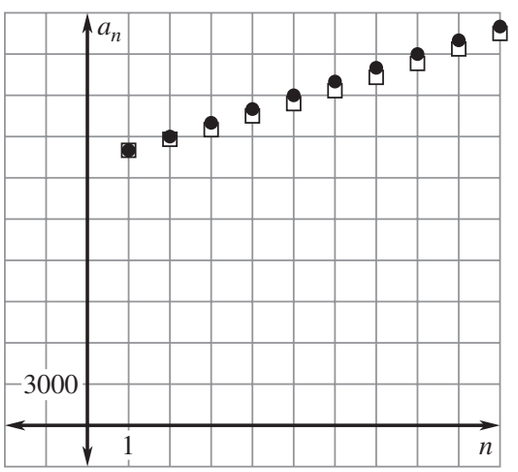
b. 11. *Sample answer:* On the 11th pass, there is only 1 term to choose from so it must be the answer.

60. a. $a_n = (8)^{n-1}$; 2,396,745 squares

b. $a_n = \frac{8}{9}\left(\frac{8}{9}\right)^{n-1}$; about 0.2433

61. a. $a_n = 19{,}000 + 1000n$, arithmetic; $b_n = 20{,}000(1.04)^{n-1}$, geometric

b.



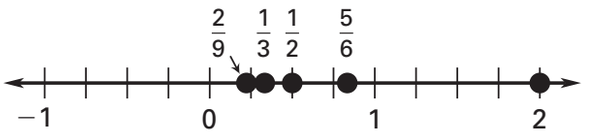
c. Company A: \$590,000; Company B: about \$595,562

d. 19 yr

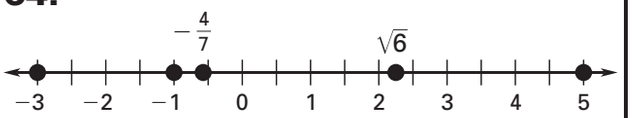
62. \$139,521.58

12.3 Mixed Review

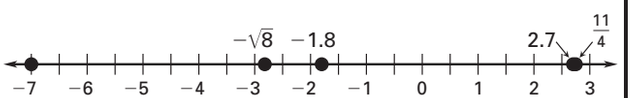
63.



64.



65.



66. $-\frac{5}{9}$

67. $\frac{7}{10}$

68. $\frac{8}{13}$

69. 0, 9

70. $-9, -2$

71. 16

72. 210

73. 378

74. 9

75. 333

76. -128

77. 1084

12.1–12.3 Mixed Review of Problem Solving

1. a. $a_n = 45{,}000(1.035)^{n-1}$

b. \$51,638.54

c. \$2,323,020.48

2. a. $a_n = (2n - 1)\pi$

b. $\sum_{i=2}^{n}(2i - 1)\pi$

c. π, 4π, 16π; it quadruples the area.

3. $2 + 4n$; arranging the tables with their short ends together creates room for 4 more chairs with each table that is added, where arranging the tables with their long ends together creates room for 2 more chairs with each table that is added.

4. *Sample answer:* $\sum_{i=1}^{8}\frac{19}{14} + \frac{23}{14}i$

5. 105 pieces of chalk;

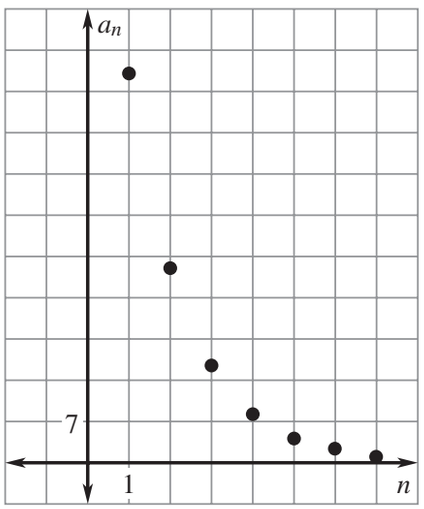
	1	0	5
	⁄	⁄	
⊙	⊙	⊙	⊙
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

6. $a_n = 2 + 7n$; 72 in.; change the formula to be $a_n = 2 + 7(n - 1)$

7. a. Geometric; there is a constant ratio of $\frac{1}{2}$ between terms.

b. $a_n = 66\left(\frac{1}{2}\right)^{n-1}$

c.



exponential decay

d. 14 h

8. *Sample answer:* 3, 6, 9, 12, 15; $\frac{45}{31}, \frac{90}{31}, \frac{180}{31}, \frac{360}{31}, \frac{720}{31}$