pp. 414-415 (#4-38 evens)

4. $\sum_{i=0}^{5} i^2$; The others are equal to 91.

6. 5, 4, 3, 2, 1, 0

8. 3, 10, 29, 66, 127, 218

10. $-1, -4, -9, -16, -25, -36$

12. 16, 25, 36, 49, 64, 81

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

16. geometric; $a_5 = 2^4 = 16$; $a_n = 2^{n-1}$

18. arithmetic; $a_5 = 7.8(5) + 1.2 = 40.2$; $a_n = 7.8n + 1.2$

20. $-4(1), 4(2), -4(3), 4(4)$; $a_5 = -4(5) = -20$; $a_n = (-1)^n 4n$

22. $\frac{2(1)-1}{10(1)}, \frac{2(2)-1}{10(2)}, \frac{2(3)-1}{10(3)}, \frac{2(4)-1}{10(4)}$;

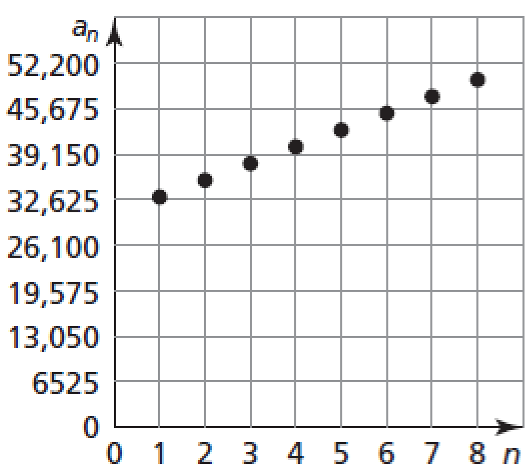
$a_5 = \frac{2(5)-1}{10(5)} = \frac{9}{50}$; $a_n = \frac{2n-1}{10n}$

24. $\frac{2(1)}{1+2}, \frac{2(2)}{2+2}, \frac{2(3)}{3+2}, \frac{2(4)}{4+2}$; $a_5 = \frac{2(5)}{5+2} = \frac{10}{7}$; $a_n = \frac{2n}{n+2}$

26. $(1)^2 + 0.2, (2)^2 + 0.2, (3)^2 + 0.2, (4)^2 + 0.2$;
$a_5 = (5)^2 + 0.2 = 25.2$; $a_n = n^2 + 0.2$

28. C; The pattern is 4(1), 4(2), 4(3), so the nth figure has $4n$ squares.

30. $a_n = 2400n + 30{,}600$



32. $\sum_{i=1}^{5} (6i - 1)$

34. $\sum_{i=1}^{\infty} (i^2 - 2)$

36. $\sum_{i=1}^{\infty} \frac{i}{i + 3}$

38. $\sum_{i=1}^{5} (-2)^i$

pp. 415-416 (#40-52 evens, #53-61)

40. 105

42. 90

44. 50

46. $\frac{523}{210}$

48. 136

50. 2109

52. The term $i = 1$ is not included in the series;

$$\sum_{i=2}^{4} i^2 = 30 - 1 = 29$$

Answer Presentation Tool

1-64

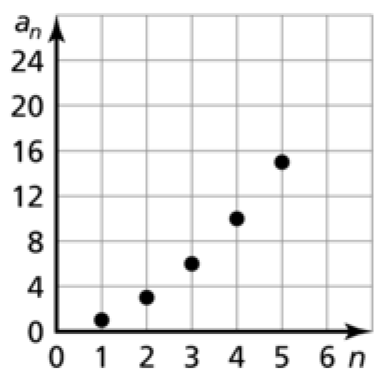
ALL EVEN ODD

53. **a.** $50.50

b. 316 days

54. 105 push-ups; The nth term of the series is $a_n = 10n + 15$.

55. $a_n = \frac{1}{2}(n)(n + 1)$



56. n^2; Each section of the array represents a number in the series.

57. yes; Subtract 3 from the sum.

58. **a.** 60, 90, 108, 120, 128.6

b. $T_n = 180(n - 2)$

c. 1800°

59. **a.** true;

$$\sum_{i=1}^{n} ca_i = ca_1 + ca_2 + ca_3 + \cdots + ca_n$$

$$= c(a_1 + a_2 + a_3 + \cdots + a_n)$$

$$= c\sum_{i=1}^{n} a_i$$

b. true;

$$\sum_{i=1}^{n} (a_i + b_i) = (a_1 + b_1) + (a_2 + b_2) + \cdots + (a_n + b_n)$$

$$= a_1 + a_2 + \cdots + a_n + b_1 + b_2 + \cdots + b_n$$

$$= \sum_{i=1}^{n} a_i + \sum_{i=1}^{n} b_i$$

c. false; $\sum_{i=1}^{2} (2i)(3i) = 30, \left(\sum_{i=1}^{2} 2i\right)\left(\sum_{i=1}^{2} 3i\right) = 54$

d. false; $\sum_{i=1}^{2} (2i)^2 = 20, \left(\sum_{i=1}^{2} 2i\right)^2 = 36$

60. $\sum_{i=1}^{n} i^3 = \frac{n^2(n+1)^2}{4}$

61. **a.** $a_n = 2^n - 1$

b. 63; 127; 255

pp. 422-423 (#2-46 evens)

2. What sequence has an nth term of $a_n = 2n + 1$?
3, 5, 7, 9, …; 1, 3, 5, 7, …

4. arithmetic; The common difference is -6.

6. not arithmetic; The differences are not constant.

8. not arithmetic; The differences are not constant.

10. arithmetic; The common difference is $\frac{1}{3}$.

12. When $d > 0$, the terms increase. When $d < 0$, the terms decrease.

14. $a_n = 5n + 2$; 102

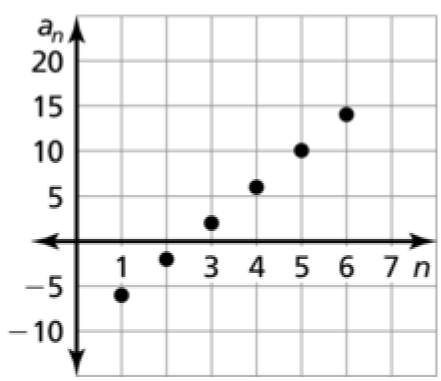
16. $a_n = -7n + 93$; -47

18. $a_n = \frac{3}{4}n - \frac{11}{4}$; $\frac{49}{4}$

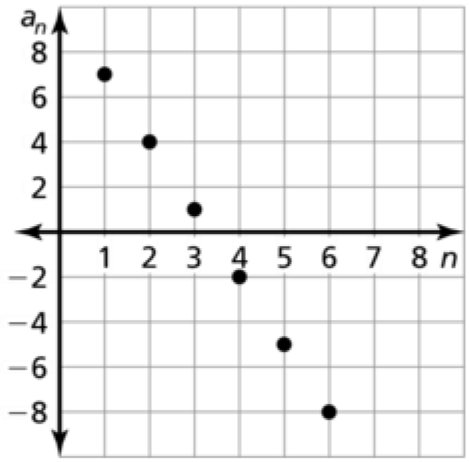
20. $a_n = -0.9n + 12.6$; -5.4

22. The first term and common difference were switched;
$a_n = (22) + (n - 1)(-13)$; $a_n = 35 - 13n$

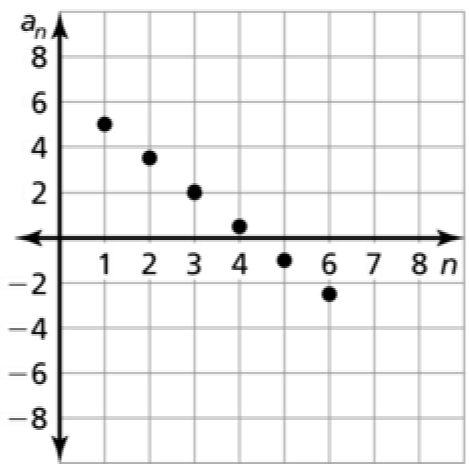
24. $a_n = 4n - 10$



26. $a_n = -3n + 10$



28. $a_n = -\frac{3}{2}n + \frac{13}{2}$



30. A

32. $a_n = 9n - 5$

34. $a_n = -7n + 41$

36. $a_n = -5n + 22$

38. $a_n = 0.4n + 4.2$

40. $a_n = -5n + 20$

42. $a_n = 7n - 12$

44. $a_n = 8n - 1$

46. the common difference doubles; Doubling two numbers doubles the difference.

pp. 423-424 (#48-52 evens, #53-64)

48. 1586

50. -2077

52. 152.1

53. -1026

54. -1474

55. **a.** $a_n = 2n + 1$

b. 63 band members

56. **a.** $6n$

b. 271 cells

57. $1 + \sum_{i=1}^{4} 8i$; 81

58. D; The points lie on a line and the domain is discrete.

59. no; Doubling the difference does not necessarily double the terms.

60. 3, 7, 11, 19, 23, 31, 43, 47, 59, 67

61. 22,500; $\sum_{i=1}^{150} (2i - 1) = 150\left(\frac{1 + 299}{2}\right)$

62. **a.** $n = 17$

b. $n = 23$

c. $n = 9$

d. $n = 15$

63. $\left(\frac{2y}{n} - x\right)$ seats

64. $x = \frac{2}{3}; -\frac{8}{3}$

pp. 430-431 (#2-46 evens)

2. If the graph is exponential, then the sequence is geometric.

4. $S_n = a_1\left(\frac{1 - r^n}{1 - r}\right)$

6. geometric; The common ratio is $\frac{1}{3}$.

8. not geometric; The ratios are not constant.

10. geometric; The common ratio is -5.

12. geometric; The common ratio is $\frac{1}{4}$.

14. When $r > 1$, the absolute values of the terms increase. When $0 < r < 1$, the absolute values of the terms decrease.

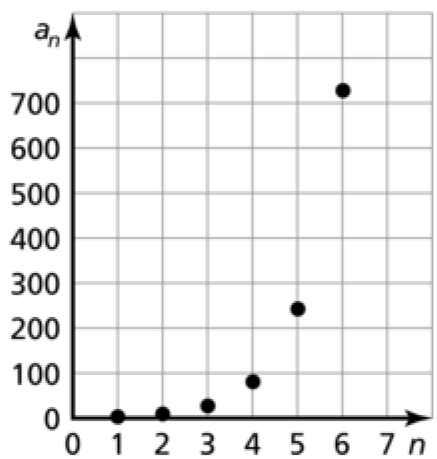
16. $a_n = 6(4)^{n-1}$; $a_7 = 24{,}576$

18. $a_n = 375\left(\frac{1}{5}\right)^{n-1}$; $a_7 = \frac{3}{125}$

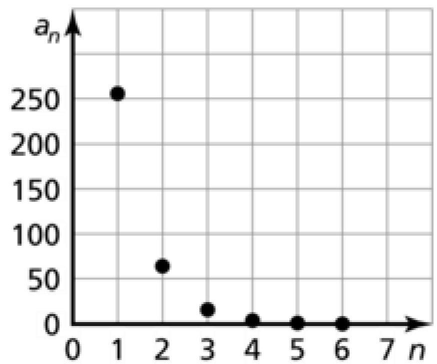
20. $a_n = 2\left(\frac{3}{4}\right)^{n-1}$; $a_7 = \frac{729}{2048}$

22. $a_n = 1.5(-5)^{n-1}$; $a_7 = 23{,}437.5$

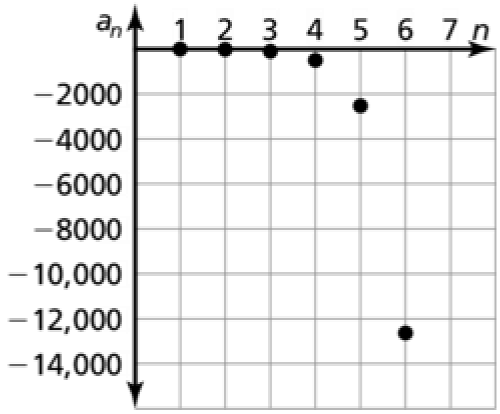
24. $a_n = 3^n$



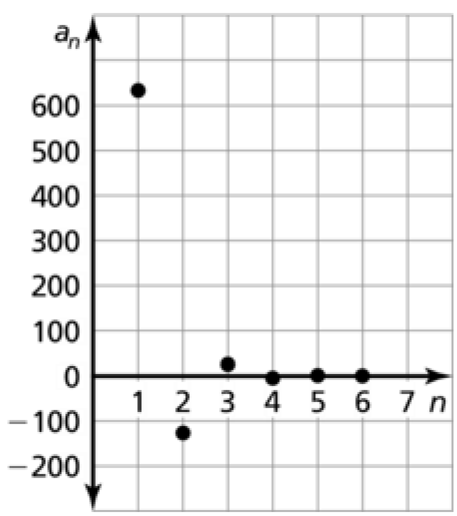
26. $a_n = 256\left(\frac{1}{4}\right)^{n-1}$



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



30. $a_n = 625\left(-\frac{1}{5}\right)^{n-1}$



32. The formula should be $a_n = a_1 r^{n-1}$; $a_n = 8(6)^{n-1}$

34. $a_n = 11(2)^{n-1}$

36. $a_n = -2(5)^{n-1}$ or $a_n = 2(-5)^{n-1}$

38. $a_n = (49)^{n-1}$

40. $a_n = 192\left(-\frac{1}{4}\right)^{n-1}$

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

44. $a_n = 48\left(\frac{1}{4}\right)^{n-1}$

46. $a_n = 7(-3)^{n-1}$

pp. 431-432 (#54-66 all)

55. The graph of a_n consists of discrete points and the graph of f is continuous.

56. **a.** $\dfrac{1 - x^5}{1 - x}$

b. $\dfrac{3x - 48x^9}{1 - 2x^2}$

57. \$276.25

58. \$1013.37

59. **a.** $a_n = 32\left(\frac{1}{2}\right)^{n-1}$; $1 \leq n \leq 6$; The number of games must be a whole number.

b. 63 games

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

b. 75 skydivers

61. **a.** $a_n = 8^{n-1}$; 2,396,745 squares

b. $b_n = \left(\frac{8}{9}\right)^n$; about 0.243 square units

62. **a.** B; $0 < r < 1$

b. A; $r > 1$

63. \$132,877.70

64. perimeters: $3, 4, \dfrac{16}{3}, \dfrac{64}{9}$; geometric sequence;

areas: $\dfrac{\sqrt{3}}{4}, \dfrac{\sqrt{3}}{3}, \dfrac{10\sqrt{3}}{27}, \dfrac{94\sqrt{3}}{243}$; not a geometric sequence; The perimeters have a common ratio.

65. no; The total amount repaid for loan 1 is about \$205,000 and the total amount repaid for loan 2 is about \$284,000.

66. **a.** $L = \frac{M}{1+i}$; $L = \frac{M}{1+i} + \frac{M}{(1+i)^2}$

b. $L = M\sum_{k=1}^{t}\left(\frac{1}{1+i}\right)^k$; $M = \frac{L}{\sum_{k=1}^{t}\left(\frac{1}{1+i}\right)^k}$

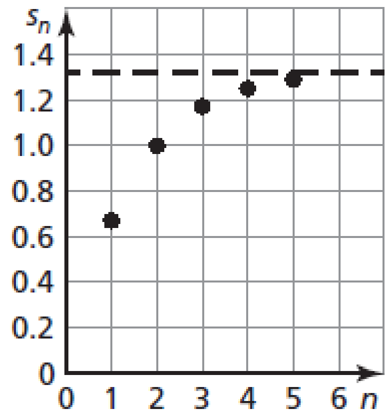
c. $\sum_{k=1}^{t}\left(\frac{1}{1+i}\right)^k = \left(\frac{1}{1+i}\right)\left[\frac{1-\left(\frac{1}{1+i}\right)^t}{1-\left(\frac{1}{1+i}\right)}\right] = \left[\frac{1-(1+i)^{-t}}{i}\right]$,

so $M = \frac{L}{\left[\frac{1-(1+i)^{-t}}{i}\right]} = L\left[\frac{i}{1-(1+i)^{-t}}\right]$

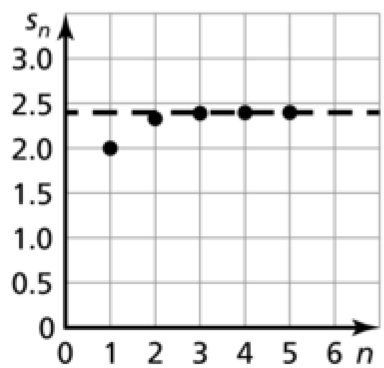
pp. 439-440 (#2-24 evens; #25-31)

2. The series has a sum when $|r| < 1$.

4. $S_1 \approx 0.67, S_2 = 1, S_3 \approx 1.17, S_4 \approx 1.25, S_5 \approx 1.29$; S_n appears to approach $\frac{4}{3}$.



6. $S_1 = 2, S_2 \approx 2.33, S_3 \approx 2.39, S_4 \approx 2.40, S_5 \approx 2.40$; S_n appears to approach 2.40.



8. The sum does not exist.

10. The sum does not exist.

12. $-\frac{25}{3}$

14. The sum does not exist.

16. The value of r is $\frac{2}{3}$; 12

18. $S_n = \dfrac{350{,}000}{1 - (1 - 0.12)} \approx \$2{,}916{,}667$

20. $\frac{4}{9}$

22. $\frac{625}{999}$

24. $\dfrac{130{,}000}{999} = 130\dfrac{130}{999}$

25. *Sample answer:* $\sum_{i=1}^{\infty} 3\left(\frac{1}{2}\right)^{i-1}$; $\sum_{i=1}^{\infty} 2\left(\frac{2}{3}\right)^{i-1}$; $\frac{3}{1-\frac{1}{2}} = 6$ and $\frac{2}{1-\frac{2}{3}} = 6$

26. 1.5; The partial sums appear to approach 1.5.

27. \$5000

28. $\frac{32}{3}$; $\sum_{i=1}^{\infty} 8\left(\frac{1}{4}\right)^{i-1}$

29. yes; At 2 seconds, both distances are 40 feet.

30. yes; $\sum_{i=1}^{\infty} 9(0.1)^{i} = 1$

31. **a.** $a_n = \frac{1}{4}\left(\frac{3}{4}\right)^{n-1}$

b. 1 ft^2; As n increases, the area of the removed triangles gets closer to the area of the original triangle.

pp. 447-448 (#2-40 evens)

2. An explicit rule gives a_n as a function of n and a recursive rule gives the beginning term(s) of a sequence and a recursive equation tells how a_n is related to one or more preceding terms.

4. $a_1 = 1, a_2 = -4, a_3 = -9, a_4 = -14, a_5 = -19, a_6 = -24$

6. $f(0) = 10, f(1) = 5, f(2) = 2.5, f(3) = 1.25, f(4) = 0.625,$ $f(5) = 0.3125$

8. $a_1 = 1, a_2 = -9, a_3 = 71, a_4 = 5031, a_5 = 25{,}310{,}951,$ $a_6 = 640{,}644{,}240{,}524{,}000$

10. $f(1) = 2, f(2) = 3, f(3) = 6, f(4) = 18, f(5) = 108,$ $f(6) = 1944$

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

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

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

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

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

22. $a_1 = -3, a_n = a_{n-1} + n$

24. $f(1) = 8, f(n) = \dfrac{f(n-1)}{2}$

26. $f(1) = 4, f(n) = f(n-1) - 2$

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

30. $a_1 = -10, a_n = a_{n-1} - 8$

32. $a_1 = 4, a_n = a_{n-1} - 5$

34. $a_1 = -7, a_n = 6a_{n-1}$

36. $a_1 = -0.9, a_n = a_{n-1} + 0.5$

38. $a_1 = \frac{1}{4}, a_n = 5a_{n-1}$

40. $a_1 = 35{,}000, a_n = 1.04a_{n-1}$

pp. 448-450 (#42-52 evens, #53-55, #58-70)

42. $a_n = 7n + 9$

44. $a_n = 13(4)^{n-1}$

46. $a_n = -4(0.65)^{n-1}$

48. $a_n = -5\left(\frac{1}{4}\right)^{n-1}$

50. $a_n = 25{,}600(0.86)^{n-1}$

52. A; An explicit rule is $a_n = 0.01(1.01)^{n-1}$.

53. **a.** $a_1 = 50{,}000$, $a_n = 0.8a_{n-1} + 5000$

b. 35,240 members

c. The number stabilizes at about 25,000 people.

54. **a.** $a_1 = 34$, $a_n = 0.6a_{n-1} + 16$

b. 37.84 oz

c. The amount stabilizes at 40 ounces.

55. *Sample answer:* You have saved \$100 for a vacation. Each week, you save \$5 more. $a_1 = 100$, $a_n = a_{n-1} + 5$

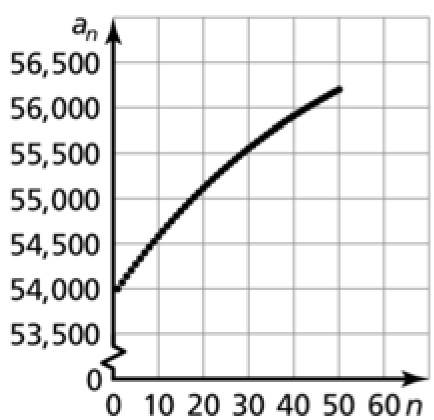
58. **a.** \$9683.38

b. \$174.50

59. 144 rabbits; When $n = 12$, each formula produces 144.

60. **a.** $a_1 = 54{,}000$, $a_n = 0.98a_{n-1} + 1150$

b. The number stabilizes at 57,500 books; The graph appears to approach $y = 57{,}500$.



61. **a.** $a_1 = 9000$, $a_n = 0.9a_{n-1} + 800$

b. The number stabilizes at 8000 trees.

62. **a.** $a_1 = 325, a_n = 0.4a_{n-1} + 325$

b. $541\frac{2}{3}$ mg

c. The maintenance level doubles; the new level is $1083\frac{1}{3}$ milligrams.

63. **a.** 1, 2, 4, 8, 16, 32, 64; geometric

b. $a_n = 2^{n-1}$; $a_1 = 1, a_n = 2a_{n-1}$

64. The terms 4, 2, 1, eventually repeat.

65. 15 months; \$213.60; $a_1 = 3000$,

$a_n = \left(1 + \frac{0.1}{12}\right)a_{n-1} - 213.59$

66. **a.** The values alternate between positive and negative and get closer to zero.

b. $-1 < r < 0$; The sign of a_n alternates between positive and negative and the absolute value decreases.

67. **a.** 3, 10, 21, 36, 55

b. quadratic

c. $a_n = 2n^2 + n$

68. no; *Sample answer:* The Fibonacci sequence is defined by a recursive rule.

69. **a.** $T_n = \frac{1}{2}n^2 + \frac{1}{2}n$; $S_n = n^2$

b. $T_1 = 1, T_n = T_{n-1} + n$; $S_1 = 1, S_n = S_{n-1} + 2n - 1$

c. $S_n = T_{n-1} + T_n$

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

b. about \$294,544

p. 452-454 (#2-32 evens) Review

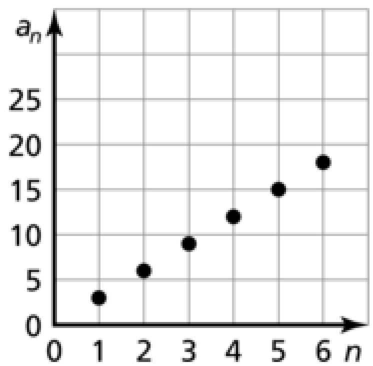
2. $\sum_{i=1}^{12} (3i + 4)$

4. -729

6. 650

8. yes; The terms have a common difference of -8.

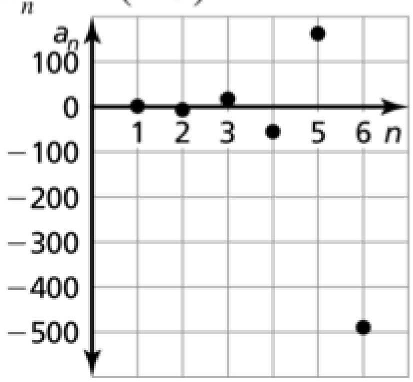
10. $a_n = 3n$



12. 2070

14. yes; The terms have a common ratio of 2.

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



18. 855

20. -1.6

22. $a_1 = 7, a_2 = 18, a_3 = 29, a_4 = 40, a_5 = 51, a_6 = 62$

24. $f(0) = 4, f(1) = 6, f(2) = 10, f(3) = 16, f(4) = 24, f(5) = 34$

26. $a_1 = 2, a_n = a_{n-1}(n - 1)$

28. $a_1 = 105, a_n = \frac{3}{5}a_{n-1}$

30. $a_n = 8(-5)^{n-1}$

32. $P_1 = 11{,}120, P_n = 1.04P_{n-1}$