SEQUENCES & SERIES – Homework Solutions

Problem Solving: Using the Strategies, p. 423

1. 1, 1, 1, 2, 5; 1, 1, 2, 2, 2; 1, 1, 1, 3, 3 **2. a)** (3, 2, 4), (1, 8, 3), (−3, −4, 2) **b)** (1, −5, −8), (4, −2, −5), (−2, 1, −20) **3.** Divide the coins into groups of three and weigh one group against another. If they balance, the third group contains the counterfeit coin; if they do not balance, the lighter group contains the counterfeit. From the identified group, weigh one coin against another. If they balance, the coin not weighed is the counterfeit; if they do not balance, the lighter coin is the counterfeit.
5. a) 1, 2 **b)** $\frac{3}{2}$ **6.** 60 **7.** 51% **8.** 150 **9.** 7π cm^2

Chapter 6

Getting Started, p. 426

1. a) The next term is the previous term plus 3; 16, 19, 22. **b)** The next term is twice the previous term; 48, 96, 192. **c)** The next term is the previous term plus 1 more than the difference between the previous two terms; 22, 29, 37. **d)** Alternately multiply by 3 and divide by 2 to obtain subsequent terms; 27, 13.5, 40.5. **e)** Alternately add 1 and multiply by 3 to obtain subsequent terms; 31, 93, 94. **f)** The next term is the sum of the previous two terms; 47, 76, 123. **g)** The terms are consecutive odd-numbered multiples of 9; 81, 99, 117. **h)** The differences between successive terms are consecutive odd numbers beginning with 3; 37, 50, 65. **i)** The next term is the difference between the previous two terms; −9, 16, −25. **2. a)** every third letter in the alphabet; M, P, S **b)** In the alphabet, alternately go forward 3, then back 2, to obtain subsequent letters; G, E, H. **c)** In the alphabet, alternately go forward 2, then forward 1, to obtain subsequent letters; L, M, O. **d)** Letters and numbers alternate. The next letter is the next in reverse alphabetical order; the next number is the previous number plus 1 more than the difference between the previous two numbers; W, 19, V. **3. a)** 26; 32 **b)** Beginning with 8 asterisks, each subsequent diagram has 6 more asterisks than the previous diagram. **c)** $6n + 2$ **d)** 392; 602 **4. a)** 64; 256 **b)** Each subsequent diagram has 4 times the number of triangles as the previous diagram. **c)** 262 144 **d)** 4^{n-1}

Review of Prerequisite Skills, p. 427

1. a) 128 **b)** 81 **c)** 2187 **d)** 64 **e)** 4096 **f)** 96 **g)** −250 **h)** 384 **i)** −8 **2. a)** $15x^6$ **b)** $8y^2$ **c)** $-4x^4$ **d)** 12 **e)** $28t^8$ **f)** $-44g^8$ **3. a)** 4 **b)** 25 **c)** −8 **d)** −243 **e)** 16 **f)** 189 **4. a)** 18 **b)** 54 **c)** 9 **d)** −9 **e)** $\frac{1}{8}$ **f)** 36 **g)** $-\frac{3}{4}$ **h)** 4 **5. a)** $-2x - 22$ **b)** $3y^2 - 15y - 14$ **c)** $z - 16$ **d)** $15t + 31$ **6. a)** 2 **b)** 35 **c)** 37 **d)** −53 **e)** 1 **f)** −4 **7. a)** $-\frac{1}{2}$ **b)** 9 **c)** 15 **d)** −5 **e)** −8 **f)** 8 **8. a)** 30 **b)** −13 **c)** 0 **d)** 7.5 **e)** 13 **9. a)** 4 **b)** 7 **c)** 5 **d)** 7 **e)** 4 **f)** 5 **11. a)** (7, 3) **b)** (−1, −2) **c)** $\left(\frac{1}{2}, 0\right)$ **d)** (1, −4) **e)** (8, 9) **f)** (6, −10)

~~Section 6.1, pp. 433–435~~ SEQUENCES

1. a) $t_1 = 3$, $t_2 = 6$, $t_3 = 9$, $t_4 = 12$, $t_5 = 15$ **b)** $t_1 = 6$, $t_2 = 8$, $t_3 = 10$, $t_4 = 12$, $t_5 = 14$ **c)** $t_1 = 3$, $t_2 = 1$, $t_3 = -1$, $t_4 = -3$, $t_5 = -5$ **d)** $f(1) = 9$, $f(2) = 8$, $f(3) = 7$, $f(4) = 6$, $f(5) = 5$ **e)** $t_1 = 2$, $t_2 = 4$, $t_3 = 8$, $t_4 = 16$, $t_5 = 32$ **f)** $f(1) = 0$, $f(2) = 3$, $f(3) = 8$, $f(4) = 15$, $f(5) = 24$ **2. a)** $t_n = 5n$; 25, 30, 35 **b)** $t_n = n + 1$; 6, 7, 8 **c)** $t_n = 7 - n$; 2, 1, 0 **d)** $t_n = n^2$; 25, 36, 49 **e)** $t_n = 2n$; 10, 12, 14 **f)** $t_n = -3(2)^{n-1}$; −48, −96, −192 **g)** $t_n = n - 2$; 3, 4, 5 **h)** $t_n = 0.1n$; 0.5, 0.6, 0.7 **i)** $t_n = \frac{n}{n+1}$; $\frac{5}{6}, \frac{6}{7}, \frac{7}{8}$ **j)** $t_n = nx$; $5x$, $6x$, $7x$ **k)** $t_n = 1 + (n-1)d$; $1 + 4d$, $1 + 5d$, $1 + 6d$ **3. a)** 0, 3, 6, 9 **b)** 0, 1, 4, 9 **c)** 1, $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ **d)** 2, $\frac{3}{2}, \frac{4}{3}, \frac{5}{4}$ **e)** 0, 3, 8, 15 **f)** −1, 1, −1, 1 **g)** 1, 2, 4, 8 **h)** 1, 3, 7, 15 **i)** 0, $\frac{1}{3}, \frac{1}{2}, \frac{3}{5}$ **j)** 1, −1, 1, −1 **k)** $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}$ **l)** $\frac{3}{2}, \frac{5}{4}, \frac{9}{8}, \frac{17}{16}$ **4. a)** 19, 37 **b)** 67, 83 **c)** 27, 62 **d)** −7, −23 **e)** 13, 53 **f)** 1, 5 **g)** 1, 144 **5. a)** 0, 1, 2, 3; $t_n = n - 1$ **b)** −3, −1, 1, 3; $t_n = 2n - 5$ **c)** 3, 6, 11, 18; $t_n = n^2 + 2$ **d)** 1, 3, 9, 27; $t_n = 3^{n-1}$ **6.** 156; 176 **7. a)** 202.5 t **b)** 207 t **c)** 288 t **8. a)** 10.25 cm, 10.5 cm, 11.5 cm **b)** 20
9. a) Beginning with Venus, double the term that is a multiple of 3, add 4, then divide by 10 to obtain subsequent terms in the sequence. **b)** $\frac{0+4}{10}, \frac{3+4}{10}, \frac{6+4}{10}, \frac{12+4}{10}, \frac{24+4}{10}, \frac{48+4}{10}, \frac{96+4}{10}, \frac{192+4}{10}, \frac{384+4}{10}, \frac{768+4}{10}$ **c)** Mercury: 0.4 AU, Venus: 0.7 AU, Earth: 1 AU, Mars: 1.6 AU, Minor Planets: 2.8 AU, Jupiter: 5.2 AU, Saturn: 10 AU, Uranus: 19.6 AU, Neptune: 38.8 AU, Pluto: 77.2 AU **d)** Neptune
10. a) 1020 kJ, 1100 kJ, 1300 kJ **b)** $t_n = 1000 + 20n$
11. a) 30, 32, 34, 36, 38 **b)** $t_n = 28 + 2n$ **c)** 148 **12.** No; many different sequences have these numbers as the first three terms. Three examples: 1, 2, 4, 1, 2, 4, 1, … ; 1, 2, 4, 7, 11, 16, … ; 1, 2, 4, 8, 16, 32, … **13.** Answers will vary.
14. a) \$48 000, \$38 400 **b)** $V(n) = 60\,000(0.8)^n$ **c)** 8

~~Section 6.2, pp. 441–446~~ ARITHMETIC SEQUENCES

1. a) 15, 19, 23 **b)** 15, 9, 3 **c)** −8, −3, 2 **d)** 4, −3, −10 **e)** 10, 11.4, 12.8 **f)** $\frac{9}{4}, \frac{11}{4}, \frac{13}{4}$ **2. a)** 8, 11, 14, 17 **b)** −5, −3, −1, 1 **c)** 3, 7, 11, 15 **d)** 5, 4, 3, 2 **e)** −7, −12, −17, −22 **f)** 2, $\frac{5}{2}$, 3, $\frac{7}{2}$ **3. a)** 17 **b)** 49 **c)** −35 **d)** 1.5 **e)** 78.5 **f)** $\frac{23}{3}$ **4. a)** $a = 5$, $d = 4$

b) not arithmetic **c)** not arithmetic **d)** $a = -1$, $d = -3$ **e)** not arithmetic **f)** not arithmetic **g)** $a = -4$, $d = 1.5$ **h)** not arithmetic **i)** $a = x$, $d = x$ **j)** first term: c, common difference: $2d$ **5. a)** 7, 9, 11, 13, 15 **b)** 3, 7, 11, 15, 19 **c)** −4, 2, 8, 14, 20 **d)** 2, −1, −4, −7, −10 **e)** −5, −13, −21, −29, −37 **f)** $\frac{5}{2}$, 3, $\frac{7}{2}$, 4, $\frac{9}{2}$ **g)** 0, −0.25, −0.5, −0.75, −1 **h)** $8, 8 + x, 8 + 2x, 8 + 3x, 8 + 4x$ **i)** $6, 7 + y, 8 + 2y, 9 + 3y, 10 + 4y$ **j)** $3m, 2m + 1, m + 2, 3, 4 - m$ **6. a)** $t_n = 2n + 4$; $t_{10} = 24$, $t_{34} = 72$ **b)** $t_n = 4n + 8$; $t_{18} = 80$, $t_{41} = 172$ **c)** $t_n = 7n + 2$; $t_9 = 65$, $t_{100} = 702$ **d)** $t_n = 3n - 13$; $t_{11} = 20$, $t_{22} = 53$ **e)** $t_n = -5n + 1$; $t_{18} = -89$, $t_{66} = -329$ **f)** $t_n = \frac{2n-1}{2}$; $t_{12} = \frac{23}{2}$, $t_{21} = \frac{41}{2}$ **g)** $t_n = -6n + 11$; $t_8 = -37$, $t_{14} = -73$ **h)** $t_n = 3n + 4$; $t_{15} = 49$, $t_{30} = 94$ **i)** $t_n = -2n + 12$; $t_{13} = -14$, $t_{22} = -32$ **j)** $t_n = x + 4(n - 1)$, $t_{14} = x + 52$, $t_{45} = x + 176$ **7. a)** 49 **b)** 41 **c)** 36 **d)** 42 **e)** 35 **f)** 45 **g)** 44 **8. a)** $a = 4$, $d = 3$; $t_n = 3n + 1$ **b)** $a = -3$, $d = 5$; $t_n = 5n - 8$ **c)** $a = 42$, $d = 2$; $t_n = 2n + 40$ **d)** $a = -19$, $d = 7$; $t_n = 7n - 26$ **e)** $a = 131$, $d = -28$; $t_n = -28n + 159$ **f)** $a = 229$, $d = -9$; $t_n = -9n + 238$ **g)** $a = 1.3$, $d = 0.4$; $t_n = 0.4n + 0.9$ **h)** $a = 5$, $d = -0.5$; $t_n = -0.5n + 5.5$ **9. a)** 14 **b)** $t_n = 5n + 9$ **10. a)** 35, 28, 21, 14 **b)** $t_n = -7n + 42$ **11. a)** 5, 20, 35, 50, 65 **b)** 740; 2990 **12.** 2 **13. a)** 2, 8, 14, 20, 26 **b)** 10, 3, −4, −11, −18 **14. a)** $a = 1896$, $d = 4$ **b)** 1940, 1944; they were cancelled as a result of World War II. **c)** 12, 13 **d)** Answers may vary. **15.** 88 **16.** 7 **17. a)** 140 km **b)** 220 km **c)** $60 + 80t$ km **18.** 2016, 2023, 2030 **19. a)** \$45 **b)** \$285 **20.** \$39 200, \$42 600, \$45 800 **21. a)** $t_n = 11.54 + 0.83n$ **b)** 22.33 mm **22. a)** 45 **b)** $t_n = 47 - 2n$ **c)** 23 **23. a)** $a = 8$, $d = 2$ **b)** $t_n = 6 + 2n$ **c)** 36; 1440 m **24.** 101 **25. a)** 16 **b)** $t_n = 4 + 3n$ **c)** 79 **d)** 45th **26. a)** 248.55 **b)** 13:12 **27.** 3.8 **28. a)** The first differences all equal d, and so are constant. **b)** The domain is {1, 2, 3, …}. **29. a)** 10:18:48, 10:20:30 **b)** 436 **30. a)** 10:25:24, 10:30:30 **b)** 146 **31. a)** 10:23:45, 10:28:00 **b)** 175 **32.** 6, 8, 10 **33.** 5, 11, 17 **34. a)** Equal; the common value is $2a + 3d$. **b)** Answers may vary; the sum of the second and fifth terms equals the sum of the first and sixth terms. **35.** 319 **36.** $5x + y$ **37. a)** 5 **b)** 4 **c)** −1 **d)** 8 **e)** −2 **38. a)** 2 **b)** 5 **c)** 0 or 4 **39.** $a = 3 - 22x$, $d = 4.5x$, $t_n = 3 - 22x + (n - 1)4.5x$

40. $t_n - t_{n-1} = [a + (n-1)d] - [a + (n-2)d]$
$= (a - a) + d[(n-1) - (n-2)] = d$.

Section 6.3, pp. 452–454 GEOMETRIC SEQUENCES

1. a) neither; 25, 36 **b)** geometric; 16, 32 **c)** arithmetic; 35, 42 **d)** neither; 16, 22 **e)** arithmetic; 4, 0 **f)** geometric; 2, 1 **g)** neither; $\frac{1}{3}$, $-\frac{4}{3}$ **h)** geometric; 40.5, 121.5 **2. a)** 3; 81, 243, 729 **b)** 2; 80, 160, 320 **c)** −4; 512, −2048, 8192 **d)** −1; 7, −7, 7 **e)** 10; 5000, 50 000, 500 000 **f)** 2; $\frac{16}{3}$, $\frac{32}{3}$, $\frac{64}{3}$ **g)** $\frac{1}{2}$; 4, 2, 1 **h)** $-\frac{1}{2}$; 50, −25, 12.5 **3. a)** 4, 12, 36, 108, 324 **b)** 20, 80, 320, 1280, 5120 **c)** 1024, 512, 256, 128, 64 **d)** 0.043, 0.43, 4.3, 43, 430 **e)** 8, −8, 8, −8, 8 **f)** −10, 50, −250, 1250, −6250 **4. a)** 4, 8, 16, 32 **b)** 10, 30, 90, 270 **c)** 2, −4, 8, −16 **d)** 5, −15, 45, −135 **e)** −3, −6, −12, −24 **f)** −2, 6, −18, 54 **g)** 0.5, 2, 8, 32 **h)** −1, 1, −1, 1 **i)** 200, 100, 50, 25 **j)** −1000, 100, −10, 1 **5. a)** $t_n = 2(2)^{n-1}$; $t_7 = 128$, $t_{12} = 4096$ **b)** $t_n = 5^{n-1}$; $t_6 = 3125$, $t_9 = 390\ 625$ **c)** $t_n = 4(3)^{n-1}$; $t_8 = 8748$, $t_{10} = 78\ 732$ **d)** $t_n = 64(0.5)^{n-1}$; $t_7 = 1$, $t_{10} = 0.125$ **e)** $t_n = 6(0.1)^{n-1}$; $t_6 = 0.000\ 06$, $t_8 = 0.000\ 000\ 6$ **f)** $t_n = -3(-2)^{n-1}$; $t_7 = -192$, $t_9 = -768$ **g)** $t_n = 729\left(-\frac{1}{3}\right)^{n-1}$; $t_6 = -3$, $t_{10} = -\frac{1}{27}$ **h)** $t_n = 4(-10)^{n-1}$; $t_8 = -40\ 000\ 000$, $t_{12} = -400\ 000\ 000\ 000$ **6. a)** 7 **b)** 10 **c)** 10 **d)** 8 **e)** 10 **f)** 7 **g)** 8 **h)** 8 **7. a)** $t_n = 4(3)^{n-1}$ **b)** $t_n = -3(-2)^{n-1}$ **c)** $t_n = 512(0.5)^{n-1}$ **d)** $t_n = 4^{n-1}$ or $t_n = -(-4)^{n-1}$ **e)** $t_n = 5(2)^{n-1}$ **f)** $t_n = 891\left(\frac{1}{3}\right)^{n-1}$ **8.** 8, $8\sqrt{3}$, 16 **9. a)** 20 000 cm³, 16 000 cm³, 12 800 cm³, 10 240 cm³, 8192 cm³ **b)** 0.8 **c)** 6553.6 cm³, 5242.88 cm³ **10.** 325 779 **11.** 2% **12.** 6 **13.** 4096 **14. a)** 3, 6, 9, 12, 15 **b)** 3, 6, 12, 24, 48 **c)** The graph of the arithmetic sequence lies on a straight line, whereas the graph of the geometric sequence lies on an exponential curve. **15.** 7 **16. a)** $A_n = A_0(0.5)^n$ **b)** 2.5 mg **17.** Yes; the resulting sequence may be obtained from the original by replacing the parameter a by its previous value times this number. **18. a)** \$1000 **b)** \$1562.50 **19. a)** non-linear **b)** The first differences of the terms of a geometric sequence are not constant. **20. a)** 38.01 cm **b)** 32.64 cm

21. $t_n \div t_{n-1} = \frac{ar^{n-1}}{ar^{n-2}} = r$ **22. a)** 10 **b)** 4 **23.** Yes, provided the common ratio is not too large. For example, the terms 10, 15, 22.5 are in geometric progression and can be used as side lengths for a triangle.

24. $y = \frac{x^2}{w}$ **25. a)** 4 **b)** 30 **c)** $\sqrt{mn}$ **26. a)** $a = 3$, $r = 2$, $t_n = 3(2)^{n-1}$ **b)** $a = 6$, $r = -2$; $t_n = 6(-2)^{n-1}$ **27. a)** $a = 5x^2$, $r = x^2$; $f(n) = 5x^{2n}$ **b)** $a = 1$, $r = 2x$; $f(n) = (2x)^{n-1}$ **28. a)** $t_n = (2x)^n$; $t_{10} = 1024x^{10}$ **b)** $t_n = \frac{1}{2}\left(\frac{x}{2}\right)^{n-1}$; $t_6 = \frac{x^5}{64}$ **c)** $t_n = (x^2)^{n-3}$; $t_{25} = x^{44}$ **d)** $t_n = 3x^{10}\left(-\frac{1}{x}\right)^{n-1}$; $t_{20} = -\frac{3}{x^9}$

Career Connection: Accounting, p. 456

1. a) \$14 406 **b)** \$6174

Section 6.4, pp. 461–464

1. a) 4, 7, 10, 13, 16 **b)** 3, 1, −1, −3, −5 **c)** −1, −2, −4, −8, −16 **d)** 48, 24, 12, 6, 3 **e)** 6, 10, 16, 24, 34 **f)** −2, −4, −7, −12, −23 **g)** 2, −1, −6, −13, −22 **h)** −3, 10, −16, 36, −68 **2. a)** 3, 5, −2, 7, −9 **b)** −2, 3, −1, 5, 3 **c)** 2, 1, −3, −10, −23 **d)** 1, −2, −2, 4, −8 **e)** −1, 2, 4, 8, 24 **f)** 1, 1, 2, 5, 29

3. a) 12, 18, 24, 30, 36, 42 **b)** 4, 12, 36, 108, 324, 972 **c)** 1.5, 2.5, 4, 6.5, 10.5, 17 **d)** −1, 1, −1, −1, 1, −1 **4. a)** 5, 6, 7, 8, 9, 10 **b)** 80, 40, 20, 10, 5, 2.5 **c)** −1, 0, 3, 12, 39, 120 **d)** 1, 1, 0, −1, −1, 0 **5. a)** $t_n = -4n + 5$ **b)** $t_n = 2(3)^{n-1}$ **c)** $t_n = 20\left(-\frac{1}{2}\right)^{n-1}$ **d)** $t_n = \left(\frac{1}{2}\right)^n$ **6.** The explicit formula for the sequence, $t_n = -2n + 12$, shows that the sequence is arithmetic. **7.** The explicit formula for the sequence, $t_n = 20(0.5)^{n-1}$, shows that the sequence is geometric. **8.** Neither; there is neither a common difference nor a common ratio between consecutive terms. **9. a)** 1, 6, 15, 28, 45, 66 **c)** 91, 120 **10. a)** 20, 22, 24, 26, 28, 30, 32, 34 **b)** $t_n = 2n + 18$ **11. a)** \$3000, \$1200, \$480, \$192, \$76.80, \$30.72 **b)** 60% **c)** $t_n = 3000(0.4)^{n-1}$ **12. a)** 1, 4, 9, 16, 25, 36 **b)** They are perfect squares. **c)** $t_n = n^2$ **13. a)** $t_n = \frac{3}{2} - \frac{1}{n}$ **b)** $t_n = 2 - \frac{2}{n}$ **c)** $t_n = 1 + \frac{1}{n}$ **15. a)** $x, \frac{x^2}{2}, \frac{x^3}{4}, \frac{x^4}{8}, \frac{x^5}{16}$ **b)** $t_n = x\left(\frac{x}{2}\right)^{n-1}$ **16.** 0 **17. a)** $t_n = 2^{n-1}$, $t_n = -5(3)^{n-1}$, $t_n = 4(0.5)^{n-1}$ **b)** The recursion formula $t_1 = a$, $t_n = rt_{n-1}$ yields the geometric sequence $t_n = ar^{n-1}$. **c)** $t_n = 1000(0.1)^{n-1}$ **18. a)** $t_n = 2n + 3$, $t_n = -2n + 8$, $t_n = 5n - 13$ **b)** The recursion formula $t_1 = a$, $t_n = t_{n-1} + d$ yields the arithmetic sequence $t_n = a + (n-1)d$. **c)** $t_n = -6n + 25$ **19. a)** 1.4 m, 0.98 m, 0.69 m, 0.48 m, 0.34 m **b)** $t_1 = 1.4$, $t_n = 0.7t_{n-1}$ **c)** $t_n = 1.4(0.7)^{n-1}$ **20. a)** Transfer the top disk to peg B; transfer the next disk to peg C; transfer the disk from peg B to peg C. **b)** 7, 15, 31 **c)** $t_1 = 1$, $t_n = 2t_{n-1} + 1$ **d)** $t_n = 2^n - 1$ **e)** 255

~~Section 6.5, pp. 469–471~~ ARITHMETIC SERIES

1. a) 19 900 **b)** 15 050 **c)** −8900 **d)** −14 850 **2. a)** 110 **b)** 1150 **c)** 2550 **d)** 414 **e)** 780 **f)** 180 **3. a)** 10 098 **b)** 28 920 **c)** 400 **d)** 3275 **e)** −3960 **f)** −3738 **g)** 3382.5 **h)** −84 **4. a)** 135 **b)** 234 **c)** −40 **d)** −550 **e)** 132 **f)** 2015 **g)** 270 **h)** −270.3 **5. a)** 1275 **b)** 10 000 **c)** 8550 **d)** 10 100 **6.** 790 **7. a)** 25 250 **b)** 4410 **8.** For the arithmetic series $t_n = a + (n-1)d$, the first term is a and the last term is $a + (n-1)d$. The number of terms is n. Then $\frac{n}{2}[2a + (n-1)d] = n \times \frac{a + [a + (n-1)d]}{2}$. **9.** 4950 **10.** 228 **11. a)** \$1400 **b)** \$53 850 **c)** fourth **d)** \$414 000 **12.** 9, 10, 11; 8, 10, 12; 7, 10, 13; 6, 10, 14 **13.** 122.5 m **14.** 312 **15.** 5900 m **16. a)** 5 **b)** \$60 **17. a)** 57 **b)** 105 **18.** 20 **19.** 888 **20.** 295 **21.** 110°, 114°, 118°, 122°, 126° **22.** Answers may vary. 18, 19, 20, 21, 22; 16, 18, 20, 22, 24; 10, 15, 20, 25, 30; 0, 10, 20, 30, 40 **23.** 8, 11, 14 **24.** 10, 304 **25.** −2 or 18 **26.** 2, 5, 8, 11, 14 **27. a)** $130x$ **b)** $10x + 55y$

~~Section 6.6, pp. 476–478~~ GEOMETRIC SERIES

1. a) 4095 **b)** 5461 **c)** 11 718 **d)** −3280 **e)** 513 **f)** 504 **g)** $\frac{43/2}{3}$ **h)** 0.656 25 **2. a)** 16 400 **b)** −59 048 **c)** 1441 **d)** 7.9375 **e)** 90 910 **f)** −1302 **3. a)** 511 **b)** 3280 **c)** 342 **d)** 2735 **e)** 1093 **f)** 1333.3332 **4.** 818.4 **5.** 429 496 730 **6.** 2046 **7.** 177 144 cm^2 **8. a)** 40 920 cm **b)** 34 952 500 cm^2 **9.** 5460 **10.** \$165 984 **11.** 153 m **12. a)** 13 **b)** 2 **c)** 160 **13. a)** \$10 485.75 **b)** 37 days **c)** Eventually, too much money per day must be set aside. **14.** 664.78 cm **15.** 508 cm^2 **16.** 63 m **17.** 2, 8, 32 or 50, −40, 32 **18.** 21 845 **19.** $\frac{3(x^{30} - 1)}{x^2 - 1}$, $x \neq \pm 1$; 45 if $x = \pm 1$. **20. a)** $2^{64} - 1$

Review of Key Concepts, pp. 480–485

1. a) 3, 5, 7, 9, 11 **b)** −2, 1, 6, 13, 22 **c)** 5, 3, 1, −1, −3 **d)** 2, 8, 26, 80, 242 **2. a)** 4 **b)** 195 **3. a)** 26, 66 **b)** −13, −29 **c)** 44, 95 **d)** 5, 16 **4. a)** $t_n = 4n$; 48 **b)** $t_n = 2n - 1$; 23 **c)** $t_n = n^2 + 1$; 145 **d)** $t_n = -5n - 1$; −61 **5. a)** 15.6 mm **b)** 16.2 mm **c)** 17.4 mm **6. a)** 27, 33, 39 **b)** −9, −14, −19 **c)** 4, 6.5, 9 **d)** $-\frac{1}{2}, -1, -\frac{3}{2}$ **7. a)** 7, 12, 17, 22 **b)** 3, 7, 11, 15 **c)** 3, 0, −3, −6 **d)** −2, −7, −12, −17 **e)** $\frac{1}{3}, 1, \frac{5}{3}, \frac{7}{3}$ **f)** 4.2, 4.4, 4.6, 4.8 **8. a)** 3, 8, 13, 18, 23 **b)** −5, −3, −1, 1, 3 **c)** 4, 1, −2, −5, −8 **d)** 0, −2.3, −4.6, −6.9, −9.2 **9. a)** $t_n = 2n + 1$; 61 **b)** $t_n = -4n + 2$; −98 **c)** $t_n = 7n - 11$; 115 **10. a)** 34 **b)** 32 **11. a)** $a = -15$, $d = 4$; $t_n = 4n - 19$ **b)** $a = 18$, $d = -2$; $t_n = -2n + 20$ **12. a)** 14, 16 **b)** $t_n = 2n + 6$ **c)** 56 **d)** 43 **13. a)** $t_n = 1987 + 4n$ **b)** 2127 **14. a)** neither; 125, 216 **b)** geometric; 81, 243 **c)** arithmetic; 30, 36 **d)** geometric; 4, −2 **e)** neither; 0, −6 **f)** arithmetic; 1.8, 1.5 **15. a)** 6, 24, 96, 384, 1536 **b)** 5, −10, 20, −40, 80 **c)** −3, 15, −75, 375, −1875 **d)** 10, 1, 0.1, 0.01, 0.001 **16. a)** 3, 6, 12, 24, 48 **b)** 2, −6, 18, −54, 162 **c)** 4, −8, 16, −32, 64 **d)** −1, −4, −16, −64, −256 **e)** −2, 4, −8, 16, −32 **f)** −1000, −500, −250, −125, −62.5 **17. a)** $t_n = 3(2)^{n-1}$; 1536 **b)** $t_n = 2(4)^{n-1}$; 32 768 **c)** $t_n = 27\left(\frac{1}{3}\right)^{n-1}$; $\frac{1}{9}$ **d)** $t_n = (-3)^{n-1}$; 729 **18. a)** 11 **b)** 8 **19. a)** $a = 3$, $r = 2$; $t_n = 3(2)^{n-1}$ or $a = -3$, $r = -2$; $t_n = -3(-2)^{n-1}$ **b)** $a = -2$, $r = 3$; $t_n = -2(3)^{n-1}$ **20.** 112 million **21. a)** $A_n = A_0(0.5)^n$ **b)** 12.5 mg **22. a)** 19, 11, 3, −5, −13 **b)** −5, −2, 1, 4, 7 **c)** −1, 2, −4, 8, −16 **d)** 8, 4, 2, 1, 0.5 **e)** 3, 3, 6, 9, 15 **f)** −12, −6, 3, 15, 30 **g)** 11, 18, 27, 38, 51 **h)** −1, 1, −1, −1, 1 **23. a)** 2, 8, 32, 128, 512; geometric **b)** 0, 1, 5, 18, 58; neither **c)** −3, −7, −11, −15, −19; arithmetic **24. a)** $t_n = 3n - 8$ **b)** $t_n = 3(4)^{n-1}$ **25. a)** $t_1 = 3$, $t_n = t_{n-1} + n + 1$ **b)** 21, 28 **c)** $t_n = \frac{(n+1)(n+2)}{2}$ **26. a)** \$2.80 **b)** \$0.20 **c)** $F = 2.80 + 2n$, where F is the fare in dollars and n is the number of kilometres travelled. **d)** \$11.80 **27. a)** 1010 **b)** 100 **c)** 1161 **28. a)** 847 **b)** −260 **c)** 808.5 **29. a)** 1425 **b)** −190 **30.** −1275 **31.** 8 cm, 11 cm, 14 cm **32.** 231 **33. a)** 2046 **b)** 4921 **c)** 2016 **d)** −5460 **34. a)** 9841 **b)** 258 **c)** 15.75 **d)** 0 **35.** 671 875 **36. a)** 2555 **b)** 6560 **c)** 728 **d)** 2735 **37.** 2044 cm^2 **38.** 29.5 m