Lesson 2.1.1

2-6. a: 108, 324; b: 12, 48

2-7. a: (1, 2), b: (–3, 2)

2-8. a: –6, b: –2, c: $-\frac{2}{3}$, d: undefined, e: $x = 2.25$

2-9. $27a^6b^3$

2-10. a: x^5, b: y^3, c: $\frac{1}{x^4}$, d: x^6

2-11. a: Sample answers: $(3, 0)$ and $(3, 1)$; all points on this line have 3 as an x-coordinate; $x = 3$; b: $y = -1$; c: $x = 0$

2-12. a: Find a common denominator (36), convert each fraction to 36^{ths}, subtract, simplifies to $-\frac{1}{36}$; b: Find a common denominator $(2xy)$, convert each fraction, $\frac{3y}{2xy} + \frac{8}{2xy} = \frac{3y+8}{2xy}$.

2-13. $t(n) = 1000(2)^n$

2-14. a: $5^2 = 25$, b: 3^{51}, c: $\frac{3 \cdot 4^4}{7}$, d: 6^{104}

2-15. Jackie squared the binomials incorrectly. It should be:
$x^2 + 8x + 16 - 2x - 5 = x^2 - 2x + 1$, $6x + 11 = -2x + 1$, $8x = -10$, and $x = -1.25$.

2-16. a: $m = 5$, b: $a = \frac{4\pi}{7} \approx 1.80$

2-17. a: $y = -2x + 7$, b: $y = -\frac{3}{2}x + 6$

2-18. a: $\frac{7m}{12}$, b: $\frac{1}{2}$, c: $\frac{8my}{x^2}$, d: $\frac{2}{5}$

2-19. a: $\frac{1}{4}$, b: $\frac{3}{4}$

Lesson 2.1.2

2-24. a: table entries: 128, 512, 2048, and 8192; rule: $y = 2 \cdot 4^x$
b: table entries (all approximate): 8.6, 10.4, 12.4, and 14.9; rule: $y = 5 \cdot (1.2)^x$

2-25. a: (–1, –2), b: (3, 1)

2-26. a: domain: all real numbers, range: $y \le 1$; b: domain: all real numbers, range: $y \ge -1$; c: domain: all real numbers, range: $y \le 0$; d: domain: all real numbers, range: $y \ge -1$

2-27. a: $(-3, -7)$, b: $(5, -1)$

2-28. a: $(x-9)(x+7)$, b: $(x-4)(2x+3)$

2-29. a: $2xy^2$, b: m^3n^3, c: $27m^3n^3$, d: $3x^3$

Lesson 2.1.3

2-36. a: Answers vary but should be close to 0.83; b: approximately 2.49 meters; c: approximately 72.3 cm; d: approximately 166 meters; e: 2nd bounce: approximately 137.8 meters, 3rd bounce: approximately 114.4 meters

2-37. a: $10(0.555) = 5.55$ feet, b: $10(0.555)^{12} \approx 0.009$ feet, c: $10\left(0.555\right)^n$ feet

2-38. a: $(1, 1)$, b: $(-1, 3)$

2-39. a: 144, 156, 168, 180; b: 264 stamps; c: $t(n) = 12n + 120$; d: $n = 31.67$; She will not be able to fill her book exactly, because 500 is not a multiple of 12 more than 120. The book will be filled after 32 months.

2-40. They are not on the same line; $m_{AB} = -\frac{1}{5}$, $m_{BC} = -\frac{1}{3}$, $m_{AC} = -\frac{1}{4}$.

2-41. a: $y = -3x + 7$, b: $y = -x - \frac{2}{5}$

Lesson 2.1.4

2-46. a: $m = 3$, b: $m = 6$, c: $m = -5$, d: $m = 1.5$

2-47. (3, 2)

2-48. a: $x = 8$, b: ≈ 30.8 units

2-49. 43 ounces

2-50. a: $x = 13$, b: $x = -2$ or 3, c: $x = -\frac{17}{19}$

2-51. a: One possibility is to find the length of one side and then to use the Pythagorean theorem to find the diagonal, b: $15\sqrt{2} \approx 21.21$ cm.

2-52. 57.99°

2-53. One possible answer is that their growth grows linearly.
a: The sequence generator is a quadratic expression.
b: Answers vary. Sample: The sequence of differences between terms turns out to be almost the same as the sequence itself.

2-54. a: Exponential, because the ratio of one rebound to the next is roughly constant.
b: Roughly geometric, because it has a multiplier (though students may say it is neither because the multiplier is not exact).

2-55. a: 1, b: 5, c: $\sqrt{10} \approx 3.16$, d: undefined, e: $x = \frac{38}{3} = 12\frac{2}{3}$

2-56. They are both partially correct. When you solve an equation, you must give all possible solutions.

2-57. (–2, 0), (–4, 0), (0, 8); $x = -3$

2-58. a: $1.03y$, b: $0.8z$, c: $1.002x$

2-59. a: $\frac{16\pi - 4\pi}{16\pi} = \frac{3}{4}$, b: $\frac{36\pi - 16\pi + 4\pi}{36\pi} = \frac{2}{3}$

2-60. a: 500 liters, b: 31.25 liters

Lesson 2.1.5

2-71. a: yes, the 91st term or $t(90) = 447$; b: no; c: yes, the 153rd term or $t(152) = 447$; d: no; e: no, $n = -64$ is not in the domain.

2-72. Justifications vary.

2-73. a: $m = 3$, $t(n) = 3n + 4$; b: $m = 5$, $t(n) = 5n + 3$; c: $m = -5$, $t(n) = -5n + 24$; d: $m = 2.5$, $t(n) = 2.5n + 7$

2-74. a: \$88.58; b: Descriptions vary, but students may say they are multiplying by 1.1 or growing by 10% each year.

2-75. $m = 13$, $b = 17$

2-76. a: $x^2 - 5x - 14$, b: $6m^2 + 11m - 7$, c: $x^2 - 6x + 9$, d: $4y^2 - 9$

2-77. a: $9x^2$, b: $18x^2$, c: $\frac{6}{x}$, d: $\frac{2}{3x}$

Lesson 2.1.6

2-86. a: 1.03, b: 0.75, c: 0.87, d: 1.0208

2-87. Technically, Mathias can never leave, either because he will never reach the door or because he cannot avoid breaking the rules. The equation for this situation is $y = 100(0.5)^x$, where x is the number of minutes that have passed and y is the distance (in meters) from the door.

2-88. a: $8m^5$, b: $2y^3$, c: $-\frac{2}{3y^5}$, d: $-8x^6$

2-89. a: $\frac{11}{12}$, b: $\frac{8+3x}{12}$, c: $\frac{2x+3}{3x}$, d: $\frac{2x+3y}{xy}$

2-90. a: $3y(y+2)$, b: $(w-2)(w-3)$, c: $(x+2)(x-2)$, d: $(3x+2)(3x-2)$

2-91. (2, –4)

Lesson 2.1.7

2-98. No; the 6th term is 160, and the 7th term is 320. Justifications vary.

2-99. yes, $x \approx 5.322$

2-100. a: Sequence 1: 10, 14, 18, 22, add 4, $t(n) = 4n + 2$
Sequence 2: 0, –12, –24, –36, subtract 12, $t(n) = -12n + 24$
Sequence 3: 9, 13, 17, 21, add 4, $t(n) = 4n + 1$
b: yes, Sequence 1: 18, 54, 162, 486, multiply by 3
Sequence 2: 6, 3, 1.5, 0.75, multiply by $\frac{1}{2}$
Sequence 3: 25, 125, 625, 3125, multiply by 5
c: Answers vary, but the point is to have students create their own rule and write terms that correspond to it.

2-101. (3, 2)

2-102. a: –4; b: 6; c: 4; d: 1040; e: $x = -3, 0, 2$; f: $x^3 - 5x - 3$

2-103. a: $y = 23500(0.85)^x$, worth \$2052.82
b: $y = 14365112(1.12)^x$, population 138,570,081

2-104. 1620

2-105. a: all real numbers; b: 0, 1, 2, 3, …; c: $x \neq 0$; d: 1, 2, 3, 4, …

Lesson 2.1.8

2-110. a: $\frac{1}{8}$; b: $\frac{3}{8}$ for exactly two "tails," although students might argue for the answer $\frac{1}{2}$ if they decide that the outcome "three tails" satisfies the given condition.

2-111. $t(n) = n + 2$, $t(n) = -\frac{1}{3}n + 3$

2-112. a: $t(n) = 3n$, b: $t(n) = -3n + 10$, c: $t(n) = -20(\frac{1}{2})^{(n-5)}$ or $t(n) = -640(\frac{1}{2})^n$, d: $t(n) \approx 222.22(3)^n$ or $t(n) = 2000(3)^{(n-2)}$, e: $t(n) = 12(3)^{(n-4)}$ or $t(n) = \frac{4}{27}(3)^n$, f: $t(n) = 2n$

2-113. a: $m\angle A = 28.07$, b: 40 cm

2-114. $x = 4.03$

2-115. a: $x^2 + 2x$, b: $2x^6y^3$, c: $\frac{375b^9}{4c^3}$, d: $-x^2 + 19x + 2$

2-116. mean 148.2, median 150.5, no mode

2-117. $\Delta MAT \cong \Delta MHT$ by AAS

Lesson 2.2.1

2-122. Answers vary but are equivalent to: a: $4x^2 - 12x + 14$, b: $\frac{81y^4}{x^4}$

2-123. a: 3, b: 4, c: 1, d: 5, e: 2

2-124. They are both correct: $\frac{x^{12}y^3}{64}$. Preferences vary.

2-125. a: They both have the solution $x = 2$.
b: She divided both sides of the equation by 150 and used the Distributive Property.
c: Answers vary. One way to rewrite the equation is $t - 2 = 5$.

2-126. $m = 15$, $b = -3$

2-127. a: $(4, 8, 4\sqrt{3})$, $(5, 10, 5\sqrt{3})$
b: The long leg is $\sqrt{3}n$ units long, and the hypotenuse is $2n$ units long.

2-128. a: 15, 21, 27, 33, $t(n) = 6n - 3$; b: 27, 81, 243, 729, $t(n) = 3^n$;
c: Sequences and rules vary.

2-129. This is a scalene triangle, because the sides have lengths $\sqrt{29}$, $\sqrt{17}$, and $\sqrt{20}$.

Lesson 2.2.2

2-135. a: not equivalent, b: equivalent, c: equivalent, d: equivalent, e: not equivalent, f: not equivalent

2-136. a: equal if $x = 0$, e: equal if $x = 0$ or $x = 1$, f: equal if $a = 1$ or $a = 0$

2-137. a: Possibilities include $x - 2 = 4$ or $2x - 4 = 8$.
b: They have the solution $x = 6$; c: $3 - x = 7$, $x = -4$.

2-138. a: $t(n) = -3n + 17$, points along a line with y-intercept (0, 17) and slope –3
b: $t(n) = 50(0.8)^n$, points along a decreasing exponential curve with y-intercept (0, 50)

2-139. odd numbers; 46^{th} term: 91; n^{th} term: $2n - 1$

2-140. a: 4; b: –30; c: 12; d: $-2\frac{1}{4}$; e: $x = -4, \frac{1}{3}$

2-141. (0, 0) and (–6, 0)

2-142. a: $2x^2 + 6x$, b: $x^2 - 2x - 15$, c: $2x^2 - 5x - 3$, d: $x^2 + 6x + 9$

Lesson 2.2.3

2-149. a: $n = -2$; b: $x = -4, 1$

2-150. a: equivalent, b: equivalent, c: equivalent, d: not equivalent, e: not equivalent, f: not equivalent

2-151. d: equal if $a = 0$ or $b = 0$, e: equal if $x = 1$, f: equal if $x = 5$ and $y = 2$

2-152. a: $2x^3 + 2x^2 - 3x - 3$, b: $x^3 - x^2 + x + 3$, c: $2x^2 + 12x + 18$, d: $4x^3 - 8x^2 - 3x + 9$

2-153. $10 = 15m + b$ and $106 = 63m + b$; $m = 2$, $b = -20$, $t(n) = 2n - 20$

2-154. a: $t(n) = 450000(1.03)^n$; b: They will make \$154,762.37 or 34.39% profit.

2-155. $5xy(x + 2)(x + 5)$

2-156. a: –6, –14, –22, –30, $t(n) = 18 - 8n$; b: $\frac{2}{5}$, $\frac{2}{25}$, $\frac{2}{125}$, $\frac{2}{625}$, $t(n) = 50(\frac{1}{5})^n$;
c: Sequences and rules vary.