Lesson 3.1.1

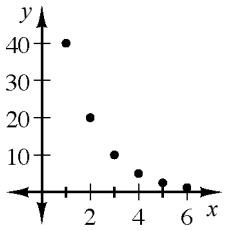
3-7. a: $x = 3$, b: $x = 5$, c: $x = 2$, d: $x = 3$

3-8. a: If s is the price of a can of soup and b is the cost of a loaf of bread, then Khalil's purchase can be represented by $4s + 3b = \$11.67$ and Ronda's by $8s + b = \$12.89$.
b: soup = \$1.35, bread = \$2.09

3-9. sometimes true; true only when $x = 0$

3-10. $\frac{3 \pm \sqrt{65}}{4}$, or 2.78 and –1.27

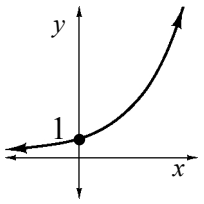
3-11. a: It can be geometric, because if each term is multiplied by $\frac{1}{2}$, the next term is generated.
b: graph shown at right
c: No, because the sequence approaches zero, and half of a positive number is still positive.

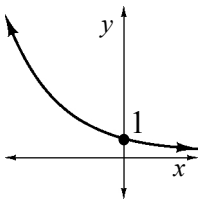


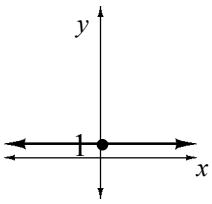
3-12. a: 90 cm, b: 37.97 cm, c: $t(n) = 160(0.75)^n$

3-13. a: $9x^4y^2z^8$, b: $\frac{n^4}{3m}$, c: p^4q^7, d: $\frac{r^3}{s^6t^3}$

3-14. a: $\frac{7}{20}$, b: $\frac{12-5y}{4y}$, c: $\frac{m^2}{2n^2}$, d: $\frac{50x}{y}$

3-15. a: 

b: 

c: 

3-16. a: $t(n) = 96 + 12n$, b: $t(n) = \frac{1}{5}(2)^n$, c: $t(n) = 3780 - 39n$, d: $t(n) = 585(0.2)^n$

3-17. a: (2, 0) and (–1, 0), b: (–5, 0) and (–3, 0)

3-18. a: 1.25, b: 0.82, c: 1.39, d: 0.06

3-19. a: $6x^3y^2z^7$, b: $7m^4p$, c: $243r^5s^{10}t^{15}$, d: $4a^3b^3$

3-20. $m = 4$, $b = -5$

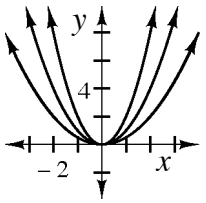
3-21. a: 6, b: 14, c: 7, d: 10

Lesson 3.1.2

3-26. a: table entries: 58.982, 188.744; rule: $y = 1.8(3.2)^x$
b: table entries: 35, 1715, 12,005; rule: $y = 5 \cdot 7^x$

3-27. Answers vary but should include table, graph, and situation.

3-28. They are all parabolas, with $y = 2x^2$ rising most rapidly and $y = \frac{1}{2}x^2$ most slowly. See solution graph at right.



3-29. a: $(x + 7)(x - 7)$, b: $(2x + 1)(2x - 1)$, c: $(xy + 9z)(xy - 9z)$, d: $2x(x + 2)(x - 2)$

3-30. a: They will both work, b: $x = 2$, c: $x = 1.2$.

3-31. a: $x = 3$, b: $x = 1$, c: $x = 20$, d: $x = 210$

3-32. 0.16

3-33. domain: $0 \le x \le 12$; range: $0 \le y \le 12$, $y = 12 - x$

Lesson 3.1.3

3-39. a: table entries: 15, 375, 1875; rule: $y = 15 \cdot 5^x$
b: table entries: 151, 120.8, 61.85; rule: $y = 151(0.8)^x$

3-40. a: 8%, 1.08; b: cost $= 150(1.08)^8 = \$277.64$; c: \$55.15 (an answer of \$50.41 means a multiplier of 0.92 was used)

3-41. a: $y = 125000(1.0625)^t$, b: \$504, 052.30

3-42. a: 94 years, b: From 1966 to 1999, 429 marbles were added, which means there were 13 marbles added per year. c: 17, d: $t(n) = 17 + 13n$, e: In the year 2058, when the marble collection is 153 years old, it will contain more than 2000 marbles.

3-43. a: (4, –1), b: (–1, –2), c: (b), d: (a)

3-44. $x = \frac{11}{5}$ or 2.2

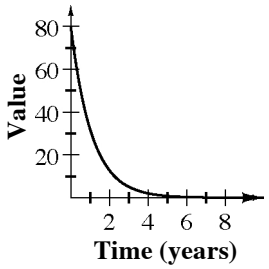
3-45. $(2x - 1)(x + 2)$

3-46. a: arithmetic, $t(n) = 3n - 2$; b: neither; c: geometric, $r = 2$;
d: arithmetic, $t(n) = 7n - 2$; e: arithmetic, $t(n) = x + (n - 1)$; f: geometric, $r = 4$

3-47. $P(heads) = \frac{1}{2}$; $P(tails) = \frac{1}{2}$

Lesson 3.1.4

3-53. **a: 0.40**
b: \$32, \$2.05
c: $V(t) = 80(0.4)^t$
d: According to this model, it never will; but in reality, a DVD would have no value if it breaks or if there is no longer a mechanism to play it
e: See graph at right.



3-54. **Answers vary.**

3-55. **a: $16x^8y^4$, b: $-\frac{x^2y^3}{12}$, c: $\frac{16x^7}{3y}$, d: $125x^5y^3$**

3-56. **a: 2, 4, 8, 16; b: 2^n; c: $\frac{1}{a^{-n}} = a^n$**

3-57. **a: $x = 3$, b: $x = 4$, c: $x = -\frac{3}{2}$**

3-58. **Terry is correct, because x is the same as $1x$.**

3-59. **a: $\frac{1}{k^5}$, b: 1, c: x^3, d: p^{-2}, e: y, f: $\frac{1}{x^6}$, g: $\frac{1}{a^2b}$, h: x**

3-60. **a: $x(x+8)$, b: $6x(x+8)$, c: $2(x+8)(x-1)$, d: $2x(x+8)(x-8)$**

3-61. **a: x^2-6x+9, b: $4m^2+4m+1$, c: x^3-2x^2-3x, d: $2y^3-y^2+14y-7$**

Lesson 3.1.5

3-64. **$y = 4(1.75)^x$**

3-65. **a: $y = 500(1.08)^x$; b: \$1712.97; c: $x \geq 0$, $y \geq 500$**

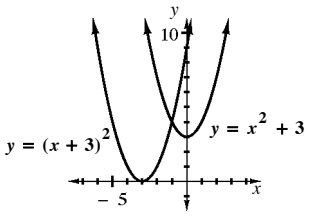
3-66. **a: $\frac{3x^3}{y^5}$, b: $\frac{m^4}{4q^4}$**

3-67. **a: $3y + 5 = 14$, $y = 3$; b: $3y + 5 = 32$, $y = 9$**

3-68. **a: 4, b: 2, c: –2, d: 5**

3-69. **a: sometimes true (when $x = 0$); b: always true; c: sometimes true (for all values of x and for all y except $y = 0$); d: never true**

3-70. Both have the same shape as $y = x^2$, but one is shifted up 3 units and the other is shifted left 3 units. See graphs at right.



3-71. a: $x = 0$, 1, 2 and $y = -2$, 0, 1; b: $-1 \le x \le 1$ and $-1 \le y \le 2$; c: $x \le 2$ and $y \ge -2$; d: x: all real numbers and $y \ge -1$

Lesson 3.1.6

3-78. a: $y = 226(1.02)^x$, 275.5 million; b: 335.8 million; c: It is off by about 20%, which means population growth has slowed; d: during the year 2055.

3-79. a: 7, b: 103.82, c: 9, d: 1.5, e: ± 1.75, f: $\frac{3}{2}$

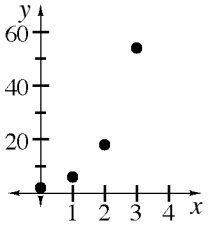
3-80. a: -3, b: 3, c: -2, d: -3

3-81. Note that students are not expected to have a particular method developed to solve these yet. Rather, they are expected to devise a method that works. They are most likely to use some form of substitution. Answers: a: $a = 6$, $b = 2$; b: $a = 2$, $b = 4$.

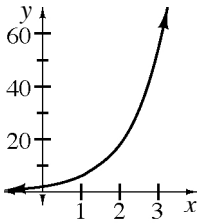
3-82. a: arithmetic, $t(n) = 11.4 + 0.8n$; b: geometric, $t(n) = 100(0.9)^n$; c: possible rules: $t(n) = 1$, $t(n) = 1 + 0n$, $t(n) = 1^n$; d: neither (no rule expected)

3-83. a: 2, 6, 18, 54

b: graph:



c: graph:



domain: non-negative integers

d: They have the same shape, but (b) is discrete and (c) is continuous.

3-84. $(-3, -6)$

3-85. $\frac{4}{9}$

3-86. a: A: $(-30.1, 0)$, C: $(0, 16)$

b: $AB \approx 30.1$, so the area is ≈ 240.8 square units and the perimeter is ≈ 80.2 units.

Lesson 3.2.1

3-95. a: $y = 2 \cdot 4^x$, b: $y = 4(0.5)^x$

3-96. a: $a = 3, b = 5$; b: $a = 2, b = 3$

3-97. a: -4, b: 2, c: 3, d: 10

3-98. possibilities: 8, 2^3, $(16^3)^{1/4}$, $(16^{1/4})^3$, $\sqrt[4]{16^3}$, etc.

3-99. a: 16, b: 3125, c: 2187

3-100. a: $x = 0.7$, b: $x = \frac{2}{3}$, c: $x = 0.8$

3-101. a: 120, b: \$22,204

3-102. $(31)^2 = 961$ square units

3-103. a: $(-8, 2)$, b: $(\frac{5}{3}, -1)$

3-104. equation: $y = 4x - 12$; intercepts: (3, 0) and (0, –12)

Lesson 3.2.2

3-109. a: $y = 5 \cdot 1.5^x$, b: $y = 0.5(0.4)^x$

3-110. Note that students will very likely use Guess and Check for part (b).
a: No solution, because 1 multiplied by itself repeatedly will always equal 1.
b: $x = \frac{8}{3}$, c: $x \approx 3.17$, d: $x = 2$, e: $x = \frac{13}{3}$

3-111. a: $(2x+1)(2x-1)$, b: $(2x+1)^2$, c: $(2y+1)(y+2)$, d: $(3m+1)(m-2)$

3-112. a: 3, b: 5, c: 4, d: $\frac{1}{2}$, e: $\frac{1}{4}$, f: $\frac{1}{6}$, g: $\frac{1}{2}$, h: 4, i: a

3-113. a: $\frac{2x-3}{15}$, b: $\frac{5x+3}{x^2}$, c: 7, d: $\frac{1}{3m^2}$

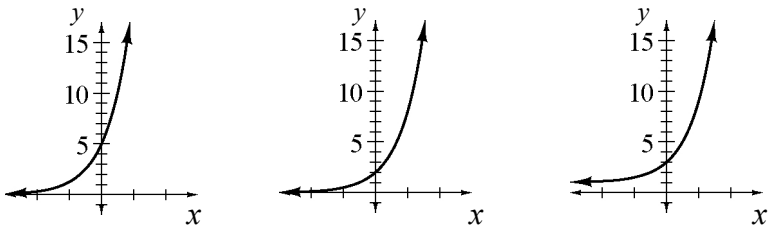
3-114. 34.08 units

3-115. a: $\frac{3}{2}$; b: 3; c: 6; d: 2; e: never, (0, 3); f: $\frac{2^x}{x}$

3-116. a: $\frac{5}{10} = \frac{1}{2}$, b: $\frac{3}{10}$, c: $\frac{2}{10} = \frac{1}{5}$

Lesson 3.2.3

3-121. See graphs below. The effect of adding +1 would be a vertical stretch; it would shift the graph up one unit.



3-122. $y = 7.68(2.5)^x$

3-123. It will take Billy 35 years and Michael 48 years.

3-124. a: $(x-9)(x+8)$, b: $(3x+10)(3x-10)$, c: $2(x+2)(x-2)$, d: $(3x+1)(x-4)$

3-125. a: arithmetic, $t(n) = 9.1 + 1.2n$; b: geometric, $t(n) = (\frac{1}{2})^n$; c: neither, $t(n) = n^2$; d: geometric, $t(n) = (1.1)^n$

3-126. $m\angle A = 30^\circ$, $x = 70\sqrt{3}$

3-127. a: not equivalent, equal for $x = 0$ and $y = 0$; b: equivalent; c: not equivalent, equal for $x = 0$ and $y = 0$; d: not equivalent, equal for $x = 0$ and $y = 0$

3-128. 80, 82, 85

3-129. $x = 3, -1$; $x = -1$ is extraneous.

3-130. $\Delta GOR \cong \Delta RFG$ by ASA