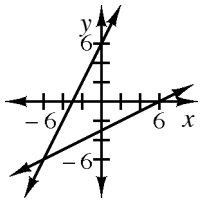
Lesson 5.1.1

5-8. **a:** $y = 2(x + 3)$ **b:** Yes, $y = x$. See graph at right.



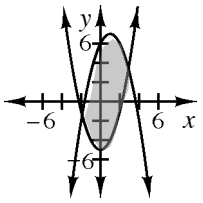
5-9. **a:** 9 **b:** 4 **c:** $x \approx 1.89$

5-10. $x = \sin^{-1}(0.75) \approx 48.59°$; to check: $\sin(48.59°) \approx 0.75$

5-11. x must equal y.

5-12. **a:** $x = \frac{12}{5}$ **b:** $x = \frac{5}{2}$ **c:** $x = 8$ **d:** $x = \frac{80}{3}$

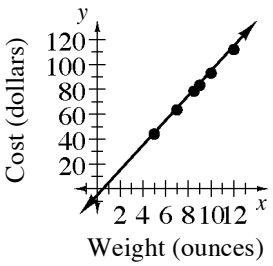
5-13. The area between an upward parabola with vertex $(0, -5)$ and the downward parabola with vertex $(1, 7)$. See graph at right.



5-14. **a and b:** See graph at right.

c: Possible equation: $y = 10x - 5$

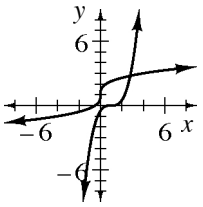
d: For this equation, approximately \$495.



5-15. ≈ 17.74 feet

Lesson 5.1.2

5-26. See graph at right.

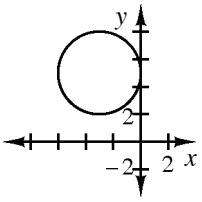


5-27. **a:** $y = \frac{1}{3}(x+8)$ **b:** $y = 2(x-6)$ **c:** $y = 2x-6$

5-28. $x \approx 0.53$

5-29. **a:** $x^2 - 5x - 14$ **b:** $6m^2 + 11m - 7$ **c:** $x^2 - 6x + 9$ **d:** $4y^2 - 9$

5-30. $(x+3)^2 + (y-5)^2 = 9$. See graph at right.



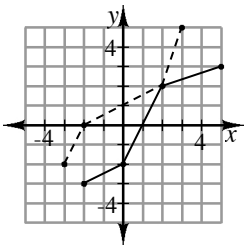
5-31. **a:** $\frac{x-3}{x(x-4)}$ **b:** $\frac{4}{x-2}$

c: 2 **d:** $\frac{x-1}{x+1}$

5-32. **a:** $f(x) \approx 1.5(1.048)^x$

b: ≈ \$425.04

5-33. See graph at right.
For $f(x)$, domain: $-2 \le x \le 5$, range: $-3 \le y \le 3$
For $f^{-1}(x)$, domain: $-3 \le x \le 3$, range: $-2 \le y \le 5$



5-34. **a:** $L(x) = x^2 - 1$, $R(x) = 3(x+2)$

b: 30

c: Order does matter – show by substituting numbers; output is 224 if $x = 3$ for $L(R(x))$.

5-35. **a:** The system has no solution.

b: The graphs do not intersect, they are parallel lines.

5-36. If she adds nothing else to the account and it just sits there making interest, she will have \$440.13 on her eighteenth birthday.

5-37. **a:** $x^2 - 10x - 56$ **b:** $4m^2 + 8m - 5$

c: $x^2 - 81$ **d:** $9y^2 + 12y + 4$

5-38. **a:** $(2, 0), (-1, 0)$ **b:** $(-5, 0), (-3, 0)$

5-39. $x = 2.5$

Lesson 5.1.3

5-48. 121 **b:** 17

5-49. **a:** $2x^3+2x^2-3x-3$ **b:** x^3-x^2+x+3

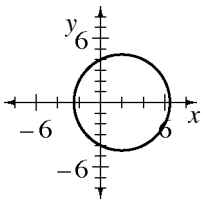
c: $2x^2+12x+18$ **d:** $4x^3-8x^2-3x+9$

5-50. **a:** $x=-\frac{10}{7}$ **b:** $x=\frac{1}{3}$ or $x=1$

c: $x=115$ **d:** $x=0$ or $x=4$

5-51. **a:** $y=\pm\sqrt{x-3}$ **b:** $y=4\left(\sqrt[3]{x}-6\right)$ **c:** $y=\frac{x^2+6}{5}$

5-52. $(x-2)^2+y^2=20$; circle, $x^2+y^2=r^2$, center $(2, 0)$ and radius ≈ 4.5; See graph at right.



5-53. 70

5-54. **a:** 3 **b:** $y-4$ **c:** $\frac{1}{3x}$ **d:** $\frac{x}{x-2}$

Lesson 5.2.1

5-60. Domain: $x > 0$; Range: $-\infty < y < \infty$; x-intercept: $(1, 0)$ no y-intercept; asymptote at $x = 0$

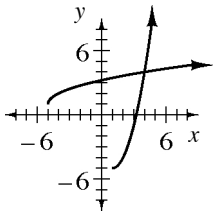
5-61. **a:** undefined **b:** $x \neq 7$ **c:** $g(3) = 11$ **d:** $f(g(3)) = -\frac{1}{2}$

5-62. **a:** $e(x) = (x-1)^2 - 5$

b: One machine undoes the other so $e(f(-4)) = -4$.

c: They would be reflections of each other across the line $y = x$.

d: See graph at right.



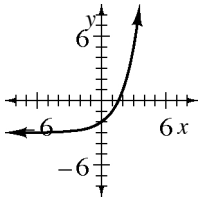
5-63. See graph at right.

a: Domain: all real numbers, range: $y > -3$

b: No

c: $(0, -2)$, $(1.585, 0)$

d: Sample: $y + a = 2^x$, where $a \leq 0$.



5-64. **a:** $x \approx 36.78$ **b:** $x \approx 31.43$

5-65. **a:** B = 0.07(0.3x) or B = 0.021x

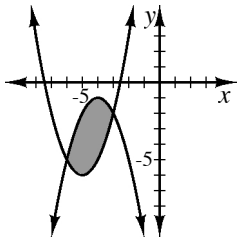
b: S = 0.09(0.7x) or S = 0.063x

c: 0.084x = 5000; \$59,523.81

5-66. **a:** $(x + 7)(x - 7)$ **b:** $6x(x + 8)$

c: $(x - 9)(x + 8)$ **d:** $2x(x + 2)(x - 2)$

5-67. The region between the two parabolas, see graph at right.



Lesson 5.2.2

5-73. $x = 2^y$, no, yes, yes; They have the same graph or give the same table of (x, y) values, or one is just a rewritten equation of the other.

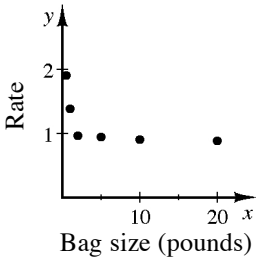
5-74. **a:** $x = \log_5(y)$ **b:** $x = 7^y$ **c:** $x = \log_8(y)$

d: $\mathrm{K} = \log_{\mathrm{A}}(\mathrm{C})$ **e:** $\mathrm{C} = \mathrm{A}^{\mathrm{K}}$ **f:** $\mathrm{K} = \left(\frac{1}{2}\right)^{\mathrm{N}}$

5-75. **a:** \$1.90, 1.38, 0.96, 0.94, 0.90, 0.88

b: decrease

c: Smaller size. Note: Sketching a graph of rate with respect to bag size like the one at right may help here.



5-76. Answers will vary. Possible answers:

a: Factor and use the Zero Product Property (rewrite), (–8, 0) and (1, 0)

b: Take the square root (undo)

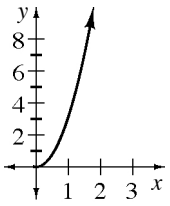
c: Quadratic Formula

d: Complete the square (rewrite)

5-77. $x = -4$

5-78. **a:** $x = 17\sqrt{3} \approx 29.44$ **b:** $x = 4\sqrt{2} \approx 5.66$

5-79. See graph at right. domain: $x \geq 0$, range: $y \geq 0$, x- and y-intercept: $(0, 0)$, no asymptotes, half of parabola: $y = \pi x^2$



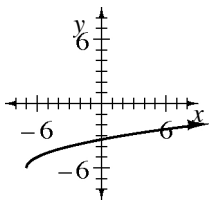
5-80. **a:** A good sketch would be a parabola opening upwards with a locator point at (–6, –7).

b: Shift the graph up 9 units.

c: The graph is the same except the region below the x-axis is reflected across the axis so that the graph is entirely above the x-axis.

d: See graph at right.

e: $y = \sqrt{x+7} - 6$



Lesson 5.2.3

5-84. Possible answer: $y = 2^x + 15$

5-85. $y = \log_7 x$

5-86. $n \approx 3.66$

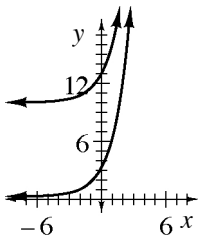
5-87. $(x+2)^2 + (y-3)^2 = 4r^2$

5-88. \$0.66

5-89. See graphs at right.

a: The second is just the first shifted up ten units.

b: $y = km^x + b$



5-90. **a:** $x = 10$ or $x = -8$ **b:** $x = 2$ or $x - 4$

c: $-2 < x < 4$ **d:** $x \geq 3$ or $x \leq -13$

5-91. **a:** $x(x + 8)$ **b:** $(xy + 9z)(xy - 9z)$

c: $2(x + 8)(x - 1)$ **d:** $(3x + 1)(x - 4)$

5-92. **a:** 2 **b:** $\frac{1}{x+2}$ **c:** $\frac{x-4}{(x-2)(x-1)}$ **d:** $\frac{4x+16}{x(x+2)}$

Lesson 5.2.4

5-96. **a:** 12 because $12^{.926628408} = 10$ **b:** Answers will vary

5-97. **a:** $x = 25$ **b:** $x = 2$ **c:** $x = 343$ **d:** $x = \sqrt{3}$ **e:** $x = 3$ **f:** $x = 4$

5-98. Less than one; Answers will vary.

5-99. $x \approx 17.973$

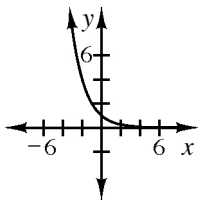
5-100. **a:** $(2x + 1)(2x - 1)$ **b:** $(2x+1)^2$ **c:** $(2y + 1)(y + 2)$ **d:** $(3m + 1)(m - 2)$

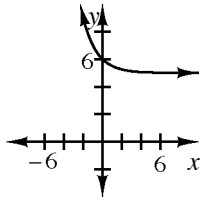
5-101. **a:** $-1 < x < 3$ **b:** $x \leq 1$ or $x \geq 2$

5-102. No; $\log_3 2 < 1$ and $\log_2 3 > 1$

5-103. **a:** $a = \frac{y}{b^x}$

b: b is the x^{th} root of $\frac{y}{a}$, or $b = \sqrt[x]{\frac{y}{a}}$.





5-104. See graphs at right.

Lesson 5.2.5

5-112. $f(g(x)) = g(f(x)) = x$; They are inverses.

5-113. No. For $f(x) = mx + b, f(a) + f(b) = ma + b + mb + b = m(a + b) + 2b$ and $f(a + b) = m(a + b) + b$.

5-114. $x \approx 1.585$

5-115. **a:** $t(n)$ is arithmetic, $h(n)$ is geometric, $q(n)$ is neither

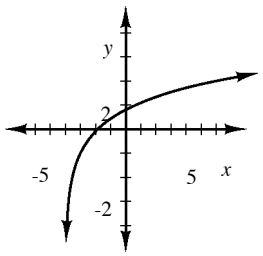
b: No, because $h(n)$ is increasing much faster than the other two.

c: $h(1) = q(1) = 12$ and $t(2) = h(2) = 36$; continuous graphs for $t(n)$ and $q(n)$ intersect but not for an integer n. $h(n)$ is increasing much faster than $q(n)$.

5-116. $s(n) = (50 + 7n)^2 - 6(50 - 7n) + 17$ **,** neither, it is quadratic and there is no common difference or multiplier.

5-117. **a:** $\frac{1}{10}$ **b:** 10^{x+m}

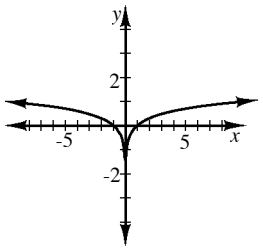
5-118. See graph at right.



5-119. (–3, 0, 5)

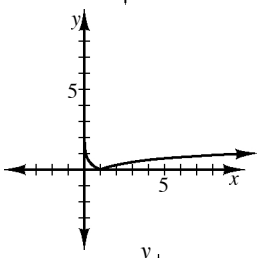
5-120. $m \approx 2.19$

5-121. **a and b:** $g(f(x)) = |\log x|$ or $f(g(x)) = \log|x|$, see graphs at right.



c: The log of an absolute value is very different from the absolute value of a log.

d: See graph at right. Note that $x = 0$ is an asymptote



5-122. $\frac{1}{2}$ no matter where X is placed.

5-123. $x \approx 1.68$

5-124. **a:** $\frac{6x-21}{(x-4)(x+1)}$ **b:** $\frac{5+6x}{2(x-5)}$ **c:** $\frac{1}{x+1}$ **d:** $\frac{5}{x^2-9}$

5-125. **a:** $b + a$ **b:** $3d + 2c^2$ **c:** $x - 1$ **d:** xy