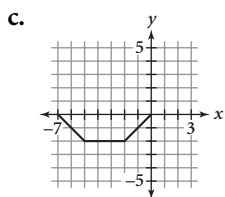
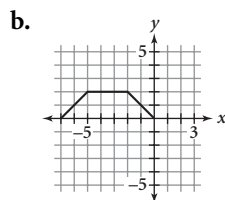
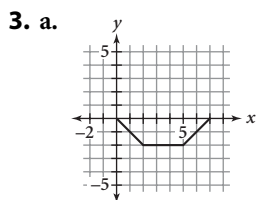


5. a. $x = 7$ or $x = -7$ b. $x = 5$ or $x = -5$
 c. $x = 8$ or $x = -8$ d. $x = 5$ or $x = -13$
 e. $x = 13$ or $x = -7$ f. $x = 5$ or $x = -19$
 g. $x = \pm\sqrt{17}$ h. $x = \pm\sqrt{30}$
 i. $x = -2 \pm \sqrt{13}$ j. $x = 2$ or $x = -10$
 k. $x = -12 \pm \sqrt{21}$ l. $x = -5 \pm \sqrt{23}$

LESSON 4.5 • Reflections and the Square Root Family

1. a. Translated left 6 units
 b. Translated up 5 units
 c. Translated down 1 unit
 d. Translated right 8 units

2. a. $y = \sqrt{x+3}$ b. $y = -x^2 + 4$
 c. $y = \sqrt{x} - 4$ d. $y = -(x+2)^2$
 e. $y = \sqrt{-x+2}$ f. $y = -(x-2)^2 + 3$



4. a. $Y_1 = \sqrt{x} - 2$, $Y_2 = -\sqrt{x} - 2$; $y = \pm\sqrt{x} - 2$
 b. $Y_1 = \sqrt{x+2}$, $Y_2 = -\sqrt{x+2}$; $y = \pm\sqrt{x+2}$
 c. $Y_1 = \sqrt{x-6} - 1$; $Y_2 = -\sqrt{x-6} - 1$;
 $y = \pm\sqrt{x-6} - 1$
 5. a. 7.8 s b. 5.1 s c. 4.3 s

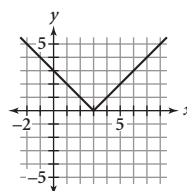
LESSON 4.6 • Stretches and Shrinks and the Absolute-Value Family

1. a. $y = \sqrt{x+3} - 4$ b. $y = -\left|\frac{x+3}{2}\right| + 1$
 c. $y = |x+3| + 2$ d. $y = -(x-5)^2 + 4$

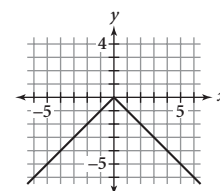
2. a. Translation right 3 units
 b. Reflection across x-axis
 c. Reflection across y-axis (same as original graph)
 d. Horizontal stretch by a factor of 4
 e. Vertical stretch by a factor of 3
 f. Horizontal shrink by a factor of $\frac{1}{3}$
 g. Reflection across x-axis and translation up 5 units

- h. Translation left 2 units and down 1 unit
 i. Vertical stretch by a factor of 1.5 and horizontal stretch by a factor of 2
 j. Reflection across x-axis and vertical shrink by a factor of 0.5
 k. Reflection across x-axis; translation left 4 units and up 6 units
 l. Vertical stretch by a factor of 2; translation right 1 unit and down 4 units

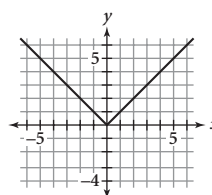
3. a. (3, 0)



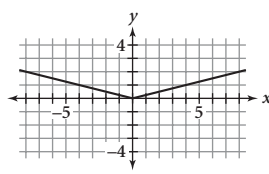
- b. (0, 0)



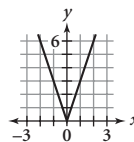
- c. (0, 0)



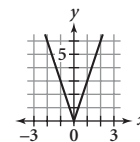
- d. (0, 0)



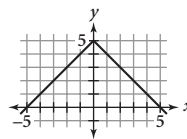
- e. (0, 0)



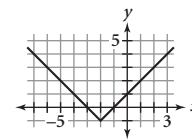
- f. (0, 0)



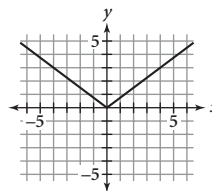
- g. (0, 5)



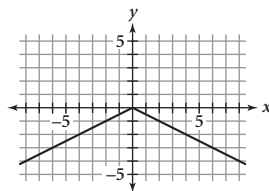
- h. (-2, -1)



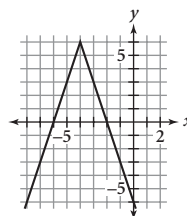
- i. (0, 0)



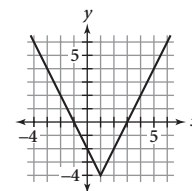
- j. (0, 0)



- k. (-4, 6)

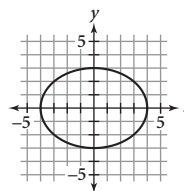
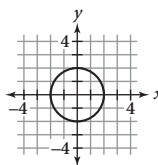


- l. (1, -2)



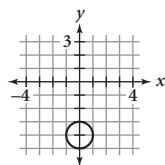
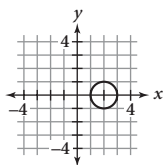
4. a. $x = 9$ or $x = -9$ b. $x = 3$ or $x = -7$
 c. $x = 12$ or $x = -2$ d. No solution
 e. $x = 9$ or $x = 1$ f. $x = 14$ or $x = -14$
5. a. $y = 2\left|\frac{x}{4}\right|$ b. $y = -4(x + 1)^2 + 2$
 c. $y = -3\sqrt{x} - 4.5$ d. $y = 2(x + 1)^2 + 3$
 e. $y = -3\sqrt{x + 2} - 1$ f. $y = 3\left|\frac{x + 2}{4}\right| + 5$

e. $\left(\frac{x}{2}\right)^2 + \left(\frac{y}{2}\right)^2 = 1$; circle
 f. $\left(\frac{x}{4}\right)^2 + \left(\frac{y}{3}\right)^2 = 1$; ellipse

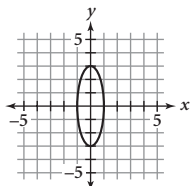


LESSON 4.7 • Transformations and the Circle Family

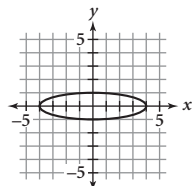
1. a. $Y_1 = \sqrt{4 - x^2}$, $Y_2 = -\sqrt{4 - x^2}$
 b. $Y_1 = \sqrt{9 - 4x^2}$, $Y_2 = -\sqrt{9 - 4x^2}$
 c. $Y_1 = \sqrt{\frac{3x - 1}{2}}$, $Y_2 = -\sqrt{\frac{3x - 1}{2}}$
2. a. $x^2 + y^2 = 4$ b. $x^2 + y^2 = 25$
 c. $(x - 2)^2 + y^2 = 1$ d. $x^2 + (y + 3)^2 = 9$
 e. $(x + 4)^2 + (y + 1)^2 = 4$
3. a. $-f(x) = -\sqrt{1 - x^2}$
 b. $f(-x) = \sqrt{1 - x^2}$
 c. $2f(x) = 2\sqrt{1 - x^2}$
 d. $f(2x) = \sqrt{1 - (2x)^2} = \sqrt{1 - 4x^2}$
4. a. x-intercepts: -1, 1; y-intercepts: -1, 1
 b. x-intercepts: -1, 1; y-intercept: 1
 c. x-intercepts: -1, 1; y-intercept: -1
 d. x-intercepts: -1, 1; y-intercept: 3
 e. x-intercepts: -1, 1; y-intercept: -2
 f. x-intercepts: -0.5, 0.5; y-intercept: 1
 g. x-intercepts: -0.25, 0.25; y-intercept: -2
 h. x-intercepts: -3, 3; y-intercept: -1
 i. x-intercepts: -4, 4; y-intercept: 2
5. a. $(x - 2)^2 + y^2 = 1$; circle b. $x^2 + (y + 4)^2 = 1$; circle



c. $x^2 + \left(\frac{y}{3}\right)^2 = 1$; ellipse



d. $\left(\frac{x}{4}\right)^2 + y^2 = 1$; ellipse



LESSON 4.8 • Compositions of Functions

1. a. $f(-3) = 4$; $f(1) = 2$; $f(5) = 0$
 b. $g(0) = -2$; $g(2) = -2$; $g(4) = -1$
 c. $\{-3, -2, -1, 1, 3, 5\}$
 d. $\{-2, -1, 0\}$
 e. 1
 f. -1
 g. 6
 h. 0
2. a. $-3(x + 2) + 5 = -3x - 1$
 b. $(2x - 2)^2 + 1 = 4x^2 - 8x + 5$
 c. $((x - 1)^2 + 4) + 3 = x^2 - 2x + 8$
 d. -43
 e. 260
 f. 729
 g. -103
 h. 2601
 i. 85
 j. $-3a^2 - 7$
 k. $9a^2 - 30a + 29$
 l. $a^4 + 4a^2 + 4$
3. a. i. $y = (x - 2)^2$
 ii. $f(x) = x^2$, $g(x) = x - 2$
 b. i. $y = \sqrt{x + 4}$
 ii. $f(x) = \sqrt{x}$, $g(x) = x + 4$
 c. i. $y = -|x| + 4$
 ii. $f(x) = x + 4$, $g(x) = -|x|$, or
 $f(x) = -x + 4$, $g(x) = |x|$
4. a. $f(x) = 1.06x$
 b. $g(x) = 0.15x$
 c. $g(f(x)) = 0.15(1.06x) = 0.159x$
 d. Marla's way: \$7.95; Shamim's way: \$7.50