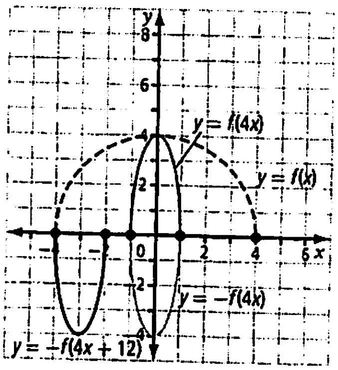
b)



6. a) $f^{-1}(x) = -2x + 10$

   b) Example: restricted domain of $f(x)$: $\{x \mid x \ge 1, x \in R\}, f^{-1}(x) = \sqrt{\frac{1}{2}x} + 1$

Chapter 2

2.1 Radical Functions and Transformations, pages 39–46

1. a) vertical stretch by a factor of 3, reflection in the y-axis, translation 4 units left and 2 units down; domain: $\{x \mid x \le -4, x \in R\}$; range: $\{y \mid y \ge -2, y \in R\}$

   b) vertical stretch by a factor of 2, reflection in the x-axis, horizontal stretch by a factor of $\frac{1}{4}$, translation of 3 units right and 5 units up; domain: $\{x \mid x \ge 3, x \in R\}$; range: $\{y \mid y \le 5, y \in R\}$

   c) vertical stretch by a factor of 4, horizontal stretch by a factor of $\frac{1}{5}$, translation of 1 unit left and 4 units down; domain: $\{x \mid x \ge -1, x \in R\}$; range: $\{y \mid y \ge -4, y \in R\}$

   d) horizontal stretch by a factor of $\frac{1}{3}$, reflection in the x-axis and y-axis, translation 2 units left; domain: $\{x \mid x \le -2, x \in R\}$; range: $\{y \mid y \le 0, y \in R\}$

2. a) $y = -3\sqrt{x - 4} - 2$

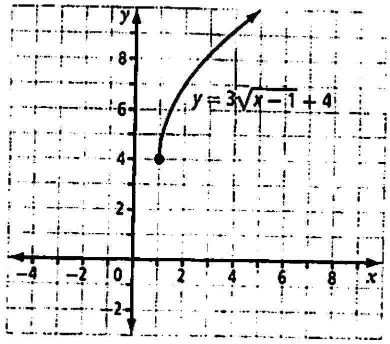
   b) $y = \sqrt{-4(x + 5)} + 3$

   c) $y = 2\sqrt{\frac{1}{3}(x + 4)} + 1$

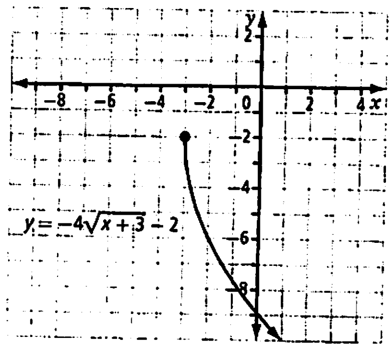
   d) $y = -3\sqrt{-2(x + 6)}$

3. a) B b) C c) D d) A

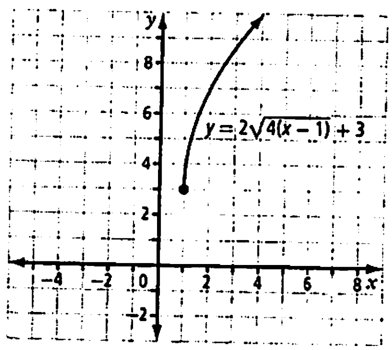
4. a)



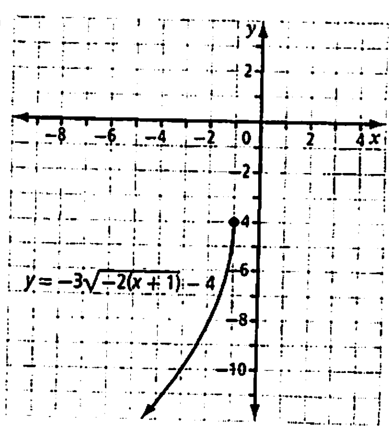
   b)



   c)

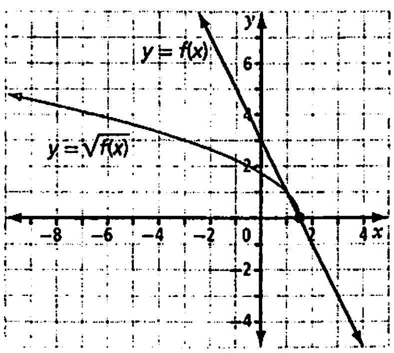


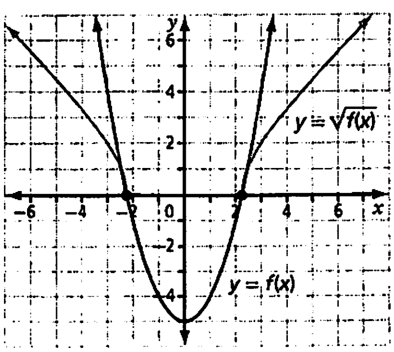
   d)

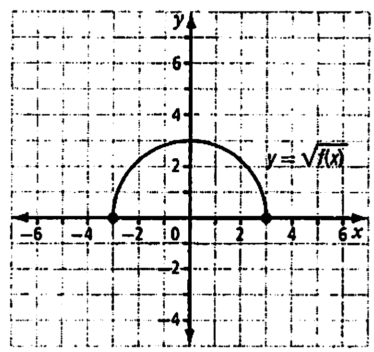


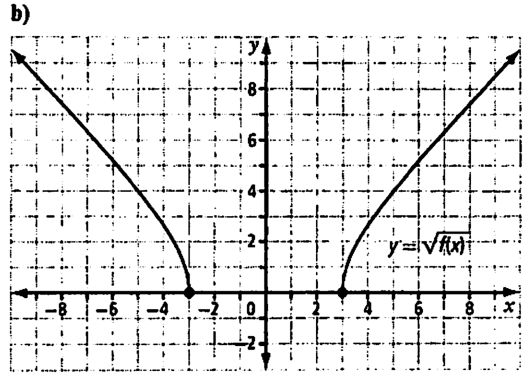
5. a) $y = 3\sqrt{(x-4)} + 1$ or $y = \sqrt{9(x-4)} + 1$
   b) $y = 2\sqrt{(x+3)} - 2$ or $y = \sqrt{4(x+3)} - 2$
   c) $y = -4\sqrt{x-2} + 3$ or $y = -\sqrt{16(x-2)} + 3$
   d) $y = -2\sqrt{x+3} - 4$ or $y = -\sqrt{4(x+3)} - 4$
6. a) vertical stretch by a factor of $\frac{1}{2}$ and horizontal stretch by a factor of $\frac{1}{6}$
   b) $y = \frac{\sqrt{6}}{2}\sqrt{x}$; vertical stretch by a factor of $\frac{\sqrt{6}}{2}$
   c) $y = \sqrt{\frac{3}{2}x}$; horizontal stretch by a factor of $\frac{2}{3}$
7. Yes. You only need to find the translations, h and k, and either the vertical or the horizontal stretch. Example: $y = 3\sqrt{(x-2)} - 3$ and $y = \sqrt{9(x-2)} - 3$ are the same function, one with a vertical stretch and the other with a horizontal stretch.

2.2 Square Root of a Function, pages 47–54

1. a) (3, 0) b) (−5, 5) c) (9, 3.9)
   d) This is not possible because you cannot take the square root of a negative number.
2. a)


   b)


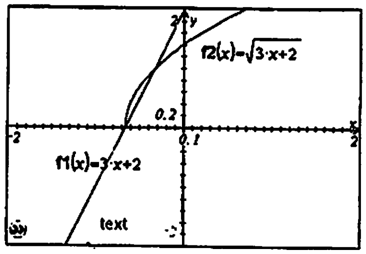
3. a) C b) A c) D d) B
4. a) $f(x)$: domain: $\{x \mid x \in R\}$; range: $\{y \mid y \in R\}$
   $\sqrt{f(x)}$: domain: $\{x \mid x \geq 2, x \in R\}$;
   range: $\{y \mid y \geq 0, y \in R\}$
   b) $f(x)$: domain: $\{x \mid x \in R\}$;
   range: $\{y \mid y \geq 2, y \in R\}$
   $\sqrt{f(x)}$: domain: $\{x \mid x \in R\}$;
   range: $\{y \mid y \geq \sqrt{2}, y \in R\}$
   c) $f(x)$: domain: $\{x \mid x \in R\}$;
   range: $\{y \mid y \geq -4, y \in R\}$
   $\sqrt{f(x)}$: domain: $\{x \mid x \leq -2 \text{ and } x \geq 2, x \in R\}$;
   range: $\{y \mid y \geq 0, y \in R\}$
   d) $f(x)$: domain: $\{x \mid x \in R\}$;
   range: $\{y \mid y \leq 3, y \in R\}$
   $\sqrt{f(x)}$: domain: $\{x \mid -\sqrt{3} \leq x \leq \sqrt{3}, x \in R\}$;
   range: $\{y \mid 0 \leq y \leq \sqrt{3}, y \in R\}$
5. a)


   b)


6. The values of 0 and 1 are unchanged when the square root is taken. That is, $1 = \sqrt{1}$ and $0 = \sqrt{0}$.
7. a) When you graph the square root of a function, the graph of $y = \sqrt{f(x)}$ is always above the graph of $y = f(x)$ between the invariant points when $f(x) = 0$ and $f(x) = 1$. This means that the value of $y = \sqrt{f(x)}$ is greater than $y = f(x)$ for the corresponding x-values.

b) Example: He could change the window settings so that the focus is more on the x-values between the invariant points. He could also use the table function on his calculator to create a table of values.

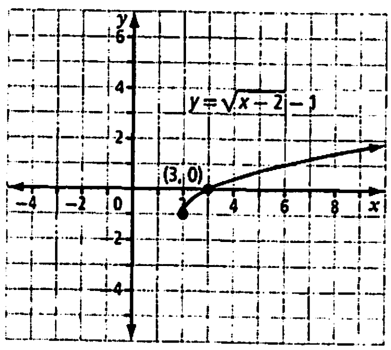
c)



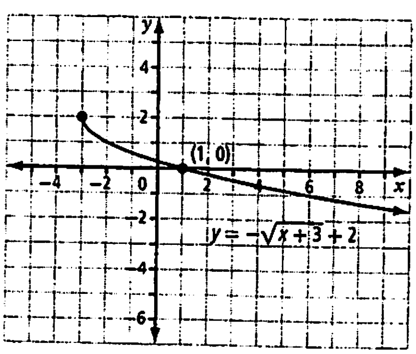
2.3 Solving Radical Equations Graphically, pages 55–62

1. **a)** $x = 22$ **b)** $x = 43$
c) $x = 20$ **d)** $x = 3$

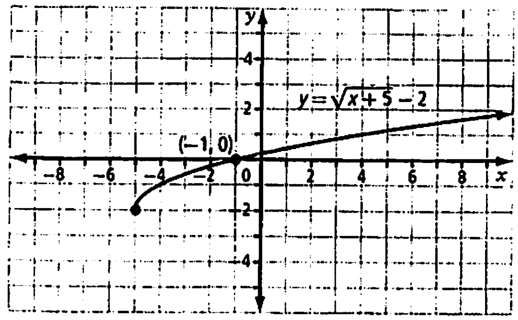
2. **a)** $x = 3$



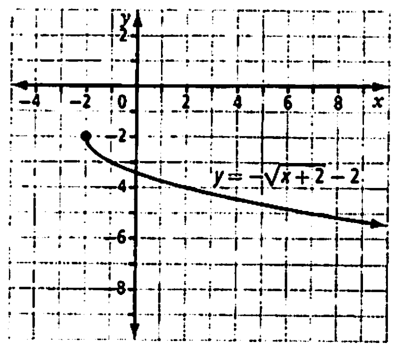
b) $x = 1$



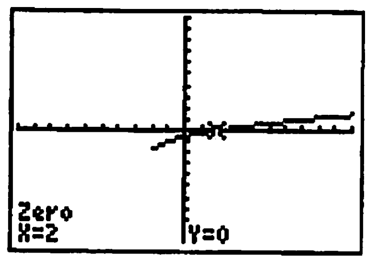
c) $x = -1$



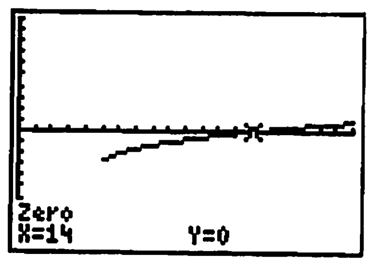
d) no solution



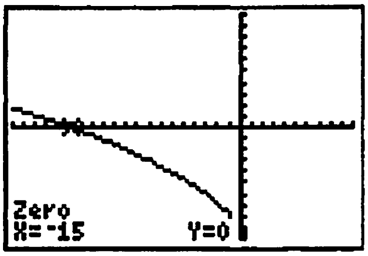
3. **a)** $x \geq 2$; $x = 2$



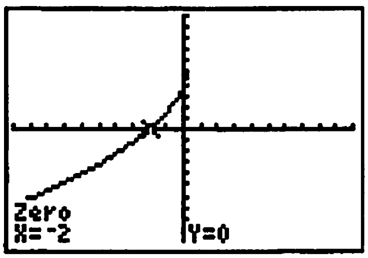
b) $x \geq 5$; $x = 14$



c) $x \le 1$; $x = -15$



d) $x \le 0.25$; $x = -2$

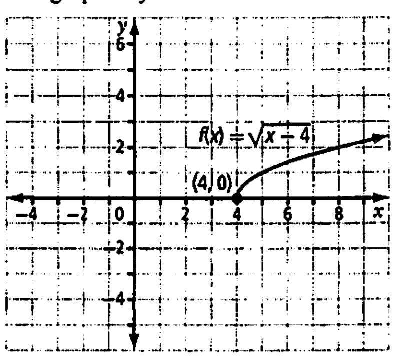


4. a) $x \ge -10$; $x = 6$ b) $x \le -2$; $x = -2$
c) $x \le 4$; $x = 4$ d) $x \le 5.2$; $x = 5$

5. a) In solving the equation algebraically you obtain $x = 7$, but when you substitute $x = 7$ into the original equation it does not satisfy the equation.

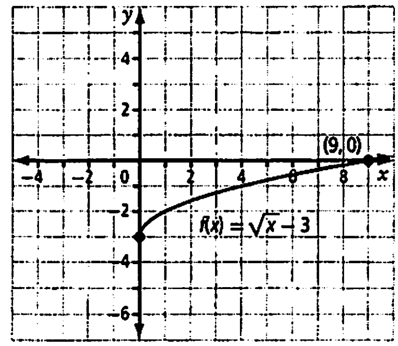
b) If you graph a single function, $y = \sqrt{2x - 5} + 3$, there is no x-intercept. If you graph two functions, $y = \sqrt{2x - 5} + 4$ and $y = 1$, there is no point of intersection.

6. a) The graph of $y = \sqrt{x}$ is translated 4 units right.



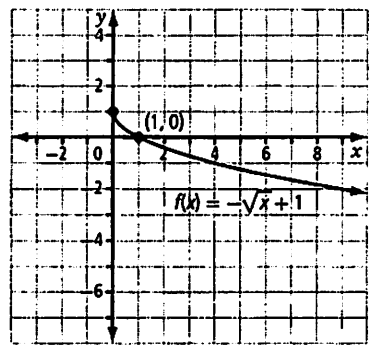
$x = 4$

b) The graph of $y = \sqrt{x}$ is translated 3 units down.



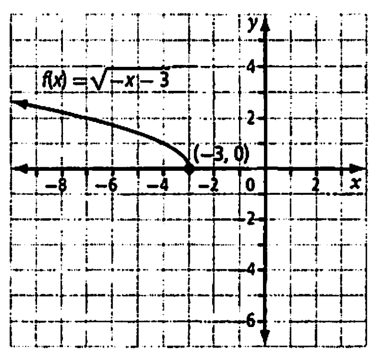
$x = 9$

c) The graph of $y = \sqrt{x}$ is reflected in the x-axis, and translated 1 unit up.



$x = 1$

d) The graph of $y = \sqrt{x}$ is reflected in the y-axis, and then translated 3 units left.



$x = -3$

7. $f(x) = \sqrt{2x} - 4$

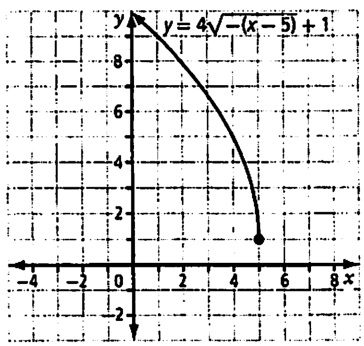
8. Her error is that she squared each term. The correct solution is

$$\sqrt{3x-1}-4=1$$
$$\sqrt{3x-1}=5$$
$$(\sqrt{3x-1})^2=5^2$$
$$3x-1=25$$
$$3x=26$$
$$x=8\tfrac{2}{3}$$

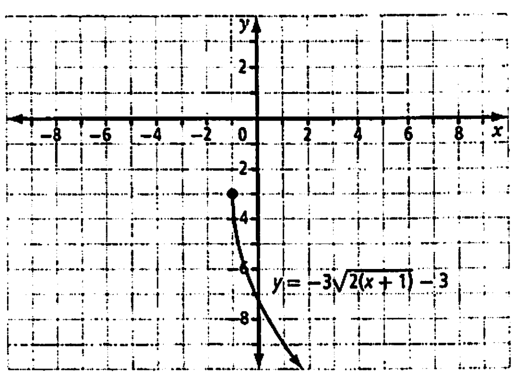
9. a) It has no solution because $\sqrt{2x+7} \neq -2$.
   b) Example: $\sqrt{4x+10}+6=2$.

Chapter 2 Review, pages 63–64

1. a) vertical stretch by a factor of 4, reflection in the y-axis, and a translation of 5 units right and 1 unit up

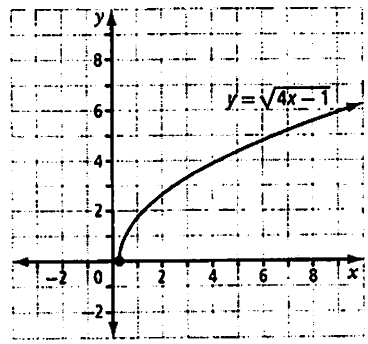


   b) vertical stretch by a factor of 3, reflection in the x-axis, horizontal stretch by a factor of 0.5, and a translation of 1 unit left and 3 units down

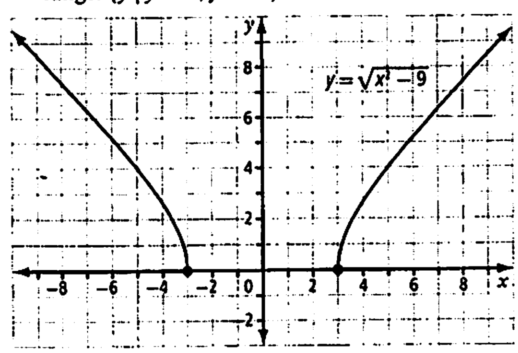


2. a) $y=-4\sqrt{x+5}+3$; domain: $\{x \mid x \geq -5, x \in R\}$; range: $\{y \mid y \leq 3, y \in R\}$
   b) $y=3\sqrt{x-2}-5$; domain: $\{x \mid x \geq 2, x \in R\}$; range: $\{y \mid y \geq -5, y \in R\}$

3. a) domain: $\{x \mid x \geq 0.25, x \in R\}$; range: $\{y \mid y \geq 0, y \in R\}$

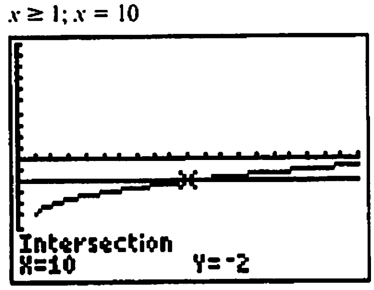


   b) domain: $\{x \mid x \leq -3 \text{ and } x \geq 3, x \in R\}$; range: $\{y \mid y \geq 0, y \in R\}$



4. a) $x = 11$ b) $x = 6$

5. a) $x \geq 1$; $x = 10$



   b) $x \geq -3$; no solution