Chapter 2

Check Your Understanding   Section 2.1

Practise

1. Explain how to transform the graph of $y = \sqrt{x}$ to obtain the graph of each function. State the domain and range in each case.

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

b) $y = -2\sqrt{4(x - 3)} + 5$

c) $y = 4\sqrt{5(x + 1)} - 4$

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

2. Write the radical function that results from applying each set of transformations to the graph of $y = \sqrt{x}$.

a) vertical stretch by a factor of 3, reflection in the x-axis, a translation of 4 units right and 2 units down

b) horizontal stretch by a factor of $\frac{1}{4}$, reflection in the y-axis, a translation of 5 units left and 3 units up

c) vertical stretch by a factor of 2, horizontal stretch by a factor of 3, translation of 4 units left and 1 unit up

d) vertical stretch by a factor of 3, horizontal stretch by a factor of $\frac{1}{2}$, reflection in the x-axis and y-axis, and translation of 6 units left

3. Match each function with its graph.

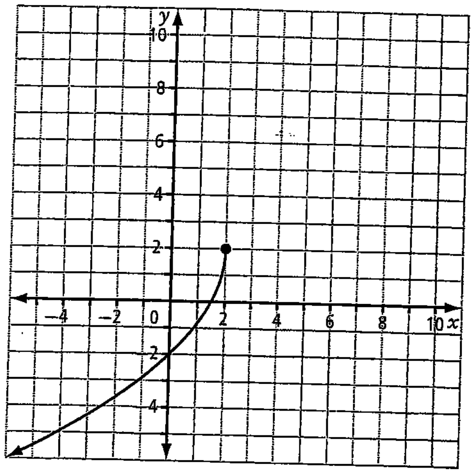
a) $y = 2\sqrt{2(x-2)} + 2$

b) $y = -2\sqrt{2(x-2)} + 2$

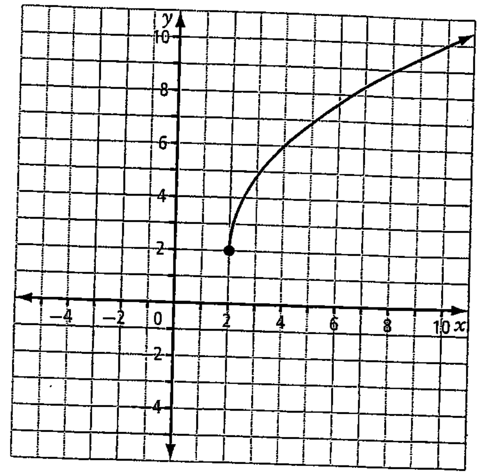
c) $y = 2\sqrt{-2(x-2)} + 2$

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

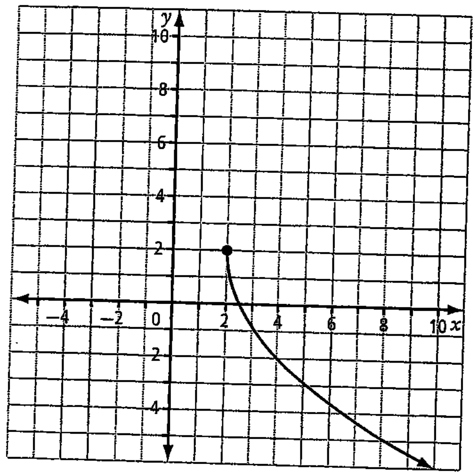
A



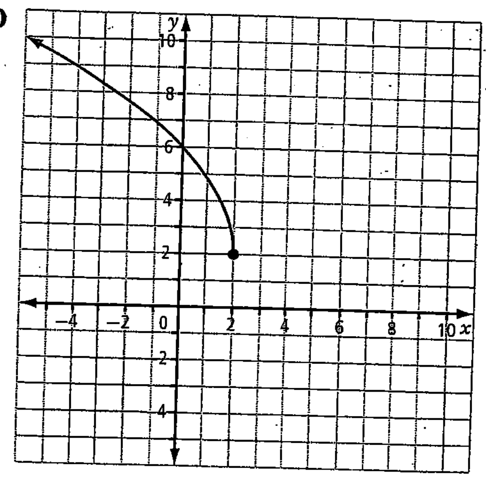
B



C



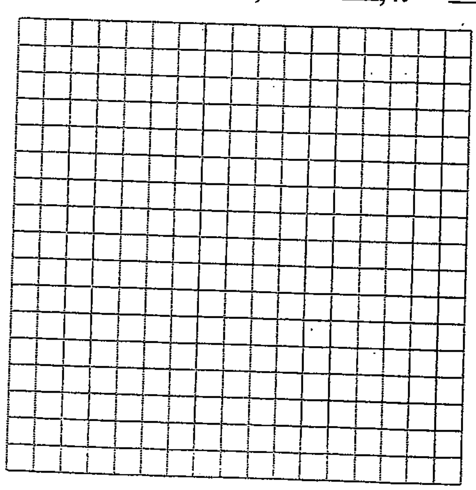
D



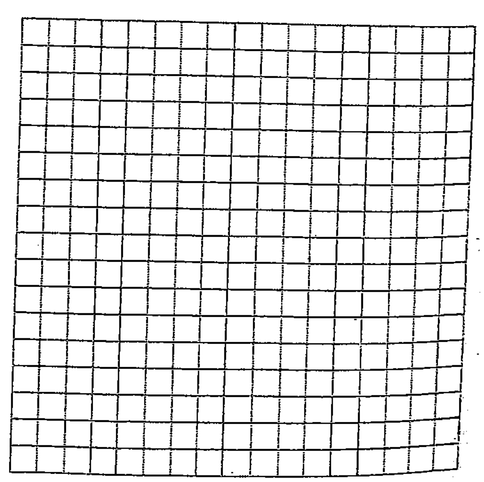
4. Sketch the graph of each function using transformations.

a) $y = 3\sqrt{x-1} + 4$

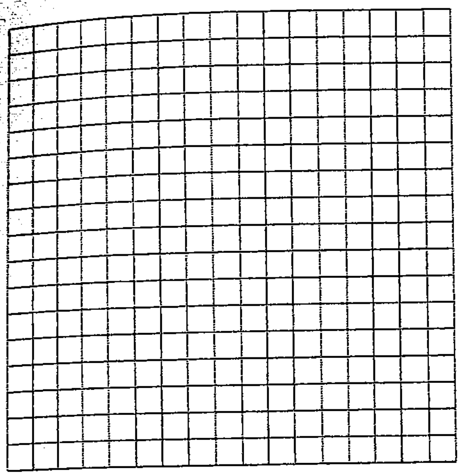
$a =$ ____, $b =$ ____, $h =$ ____, $k =$ ____



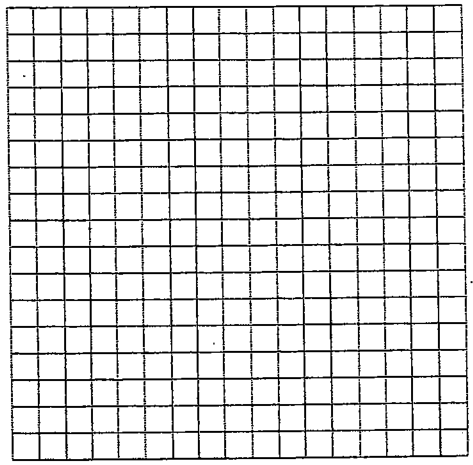
b) $y = -4\sqrt{x+3} - 2$



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



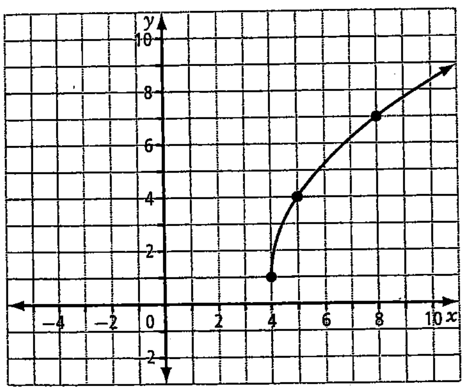
d) $y = -3\sqrt{-2(x + 1)} - 4$



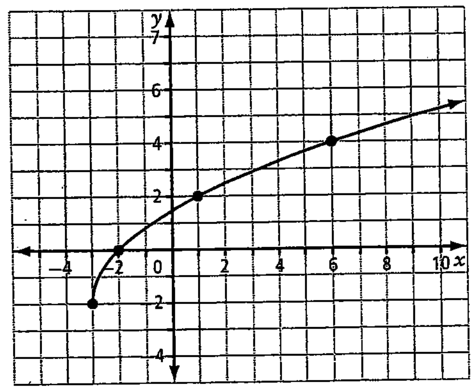
Apply

5. For each graph, write the equation of a radical function of the form $y = a\sqrt{b(x - h)} + k$.

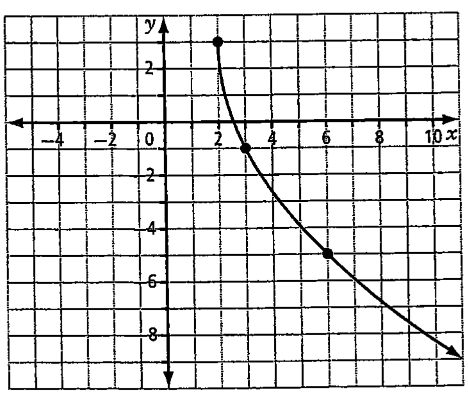
a)



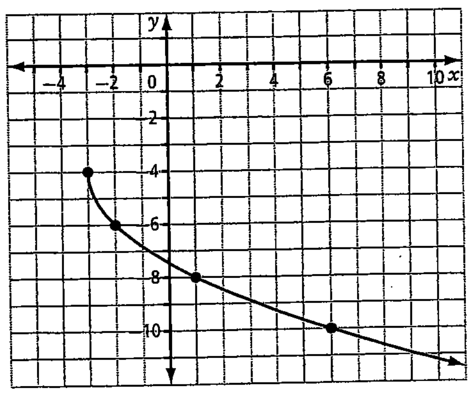
b)



c)



d)



6. Consider the function $y = \frac{1}{2}\sqrt{6x}$.

a) Describe the transformations that were applied to $y = \sqrt{x}$ to obtain this function.

b) Write a function equivalent to $y = \frac{1}{2}\sqrt{6x}$ in the form $y = a\sqrt{x}$. Describe the transformation applied to $y = \sqrt{x}$ to obtain this new function.

c) Write a function equivalent to $y = \frac{1}{2}\sqrt{6x}$ in the form $y = \sqrt{bx}$. Describe the transformation applied to $y = \sqrt{x}$ to obtain this new function.

Check Your Understanding   Section 2.3

Practise

2. Find the x-intercepts of each equation graphically. Include a sketch for each.

a) $y = \sqrt{x-2} - 1$

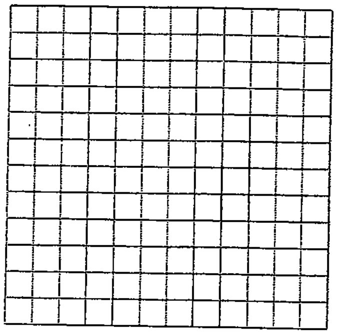
b) $y = -\sqrt{x+3} + 2$

c) $y = \sqrt{x+5} - 2$

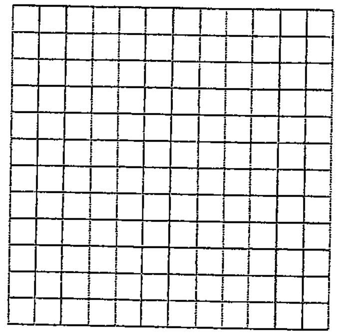
d) $y = -\sqrt{x+2} - 2$

3. Identify any restrictions on the variables. Then, Solve by graphing ~~use technology~~ to solve each equation graphically. Sketch the graph on the grid.

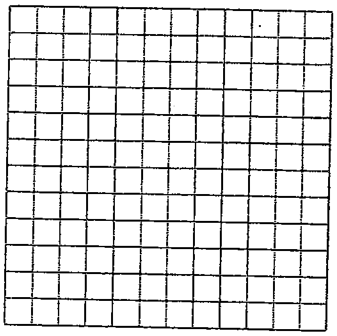
a) $\sqrt{x+2} - 4 = -2$



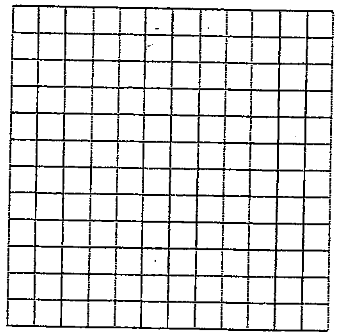
b) $\sqrt{x-5} = 3$



c) $3\sqrt{1-x} = 12$



d) $-2\sqrt{1-4x} = -6$

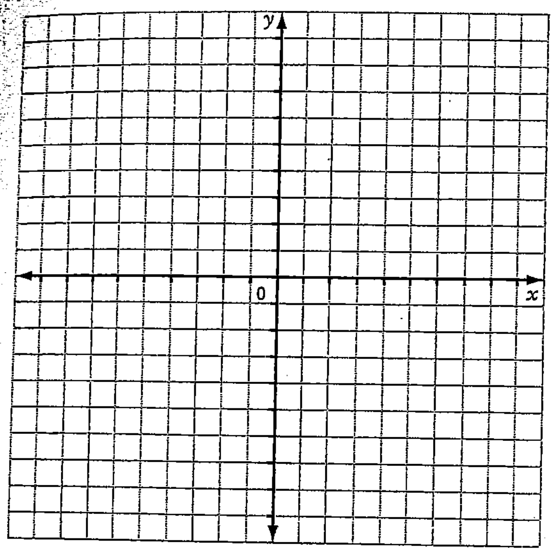


Chapter 2 Review

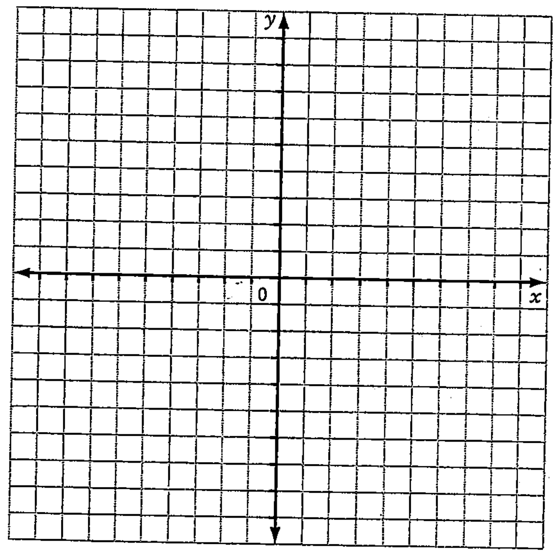
2.1 Radical Functions and Transformations, pages 39–46

1. Explain how to transform the graph of $y = \sqrt{x}$ to obtain the graph of each transformed function. Then, draw a sketch of the new function.

a) $y = 4\sqrt{-(x-5)} + 1$

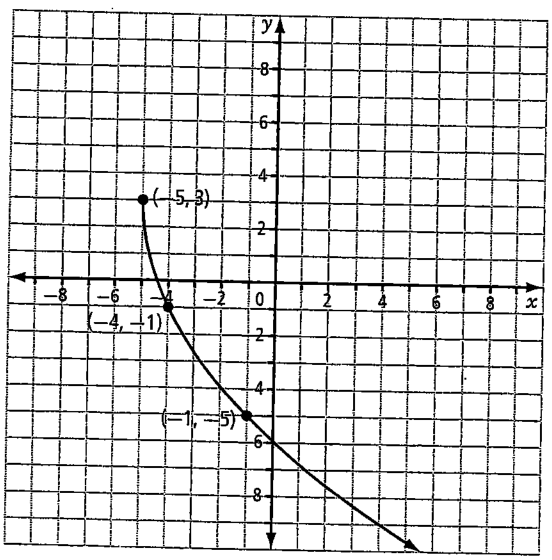


b) $y = -3\sqrt{2(x+1)} - 3$

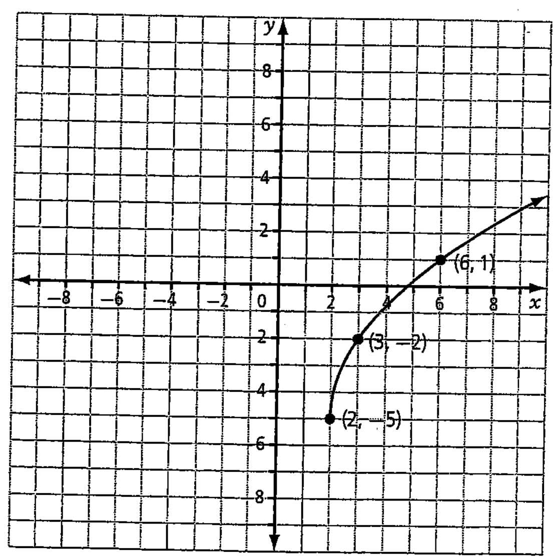


2. For each graph, write the equation of a radical function in the form $y = a\sqrt{b(x-h)} + k$. State the domain and range.

a)

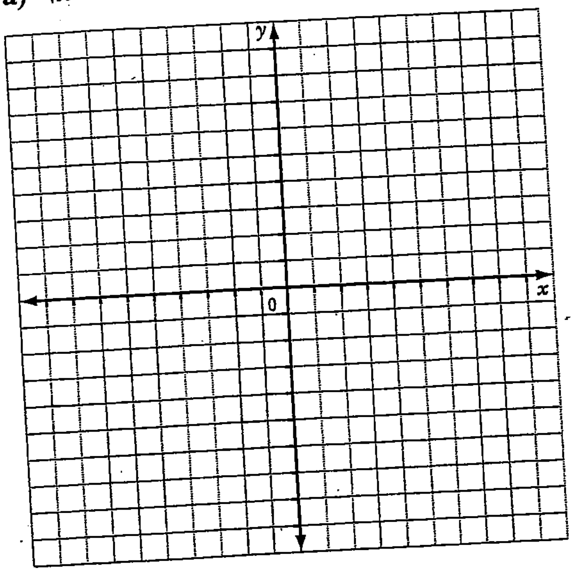


b)

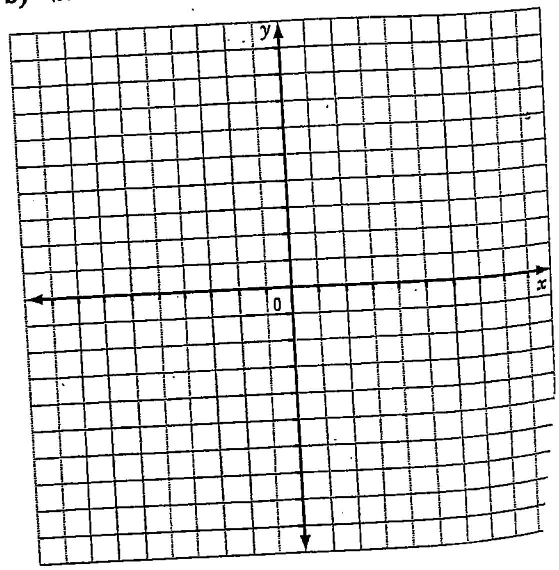


5. Identify any restrictions on the variables. Then, solve each radical equation graphically.

a) $\sqrt{x-1}-5=-2$



b) $\sqrt{x+3}=-1$



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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: $\{x \mid x \leq -4, x \in \mathrm{R}\}$; range: $\{y \mid y \geq -2, y \in \mathrm{R}\}$

   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: $\{x \mid x \geq 3, x \in \mathrm{R}\}$; range: $\{y \mid y \leq 5, y \in \mathrm{R}\}$

   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: $\{x \mid x \geq -1, x \in \mathrm{R}\}$; range: $\{y \mid y \geq -4, y \in \mathrm{R}\}$

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

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

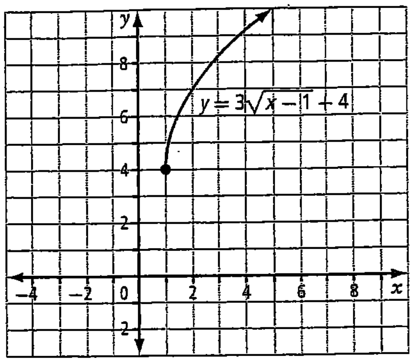
   b) $y=\sqrt{-4(x+5)}+3$

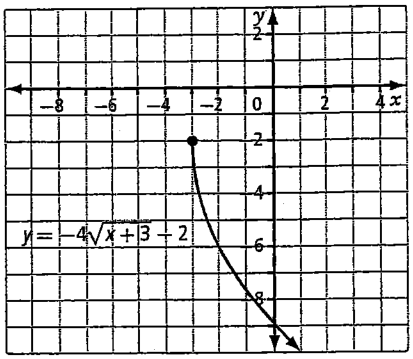
   c) $y=2\sqrt{\frac{1}{3}(x+4)}+1$

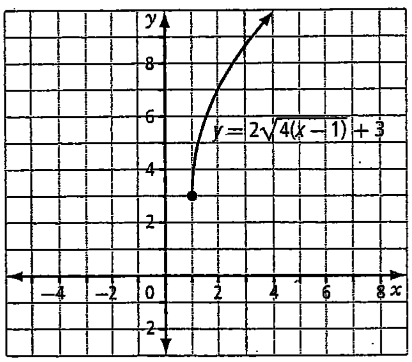
   d) $y=-3\sqrt{-2(x+6)}$

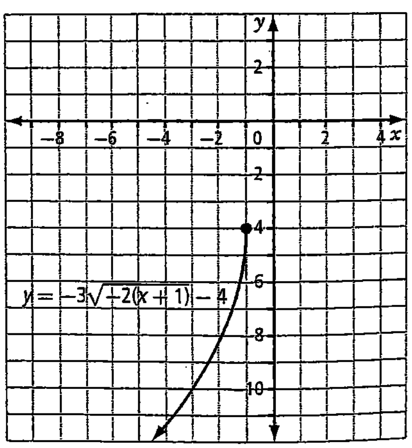
3. a) B b) C c) D d) A

Answers. Ch. 2

4. a)


b)


c)


d)


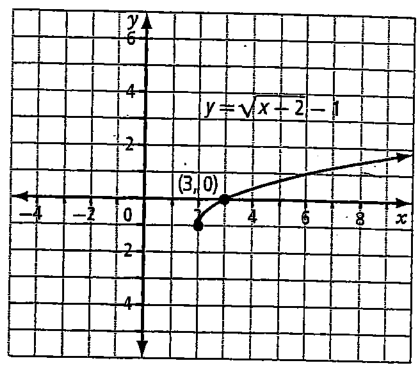
5. a) $y = 3\sqrt{(x-4)} + 1$ or $y = \sqrt{9(x-4)} + 1$
   b) $y = 2\sqrt{(x+3)} - 2$ or $y = \sqrt{4(x+3)} - 2$
   c) $y = -4\sqrt{x-2} + 3$ or $y = -\sqrt{16(x-2)} + 3$
   d) $y = -2\sqrt{x+3} - 4$ or $y = -\sqrt{4(x+3)} - 4$

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 $\frac{2}{3}$

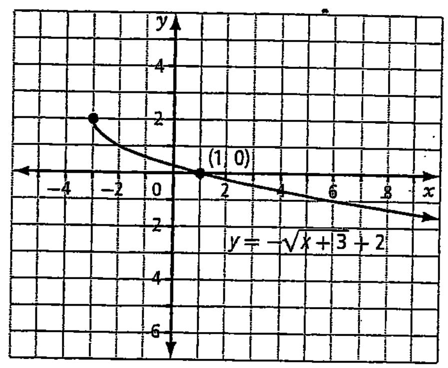
2.3 Solving Radical Equations Graphically, pages 55–62

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

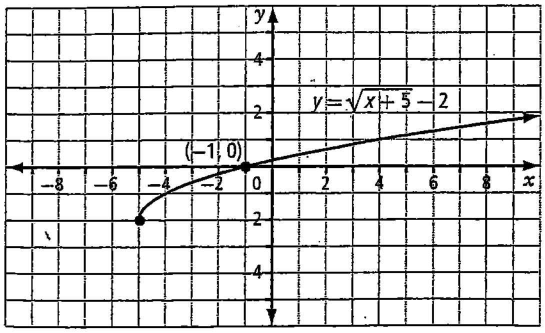
2. a) $x = 3$



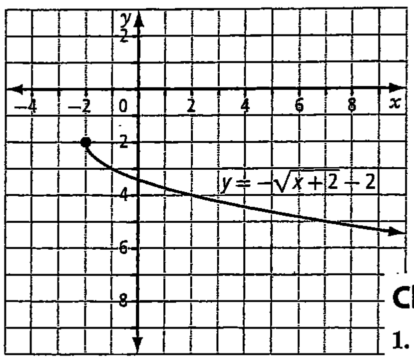
b) $x = 1$



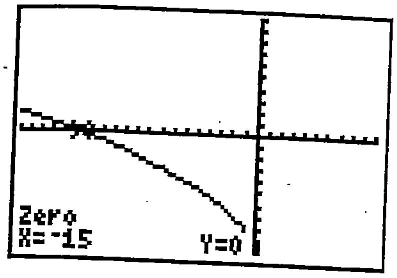
c) $x = -1$



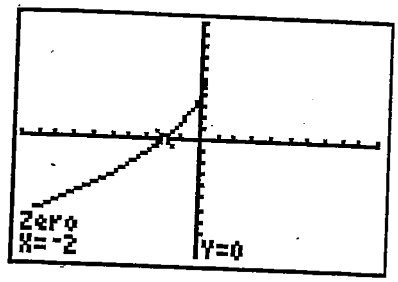
d) no solution



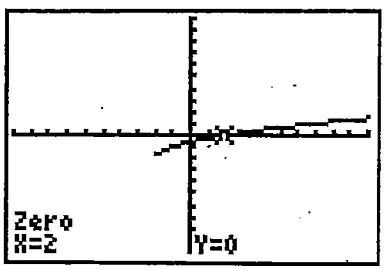
c) $x \leq 1$; $x = -15$



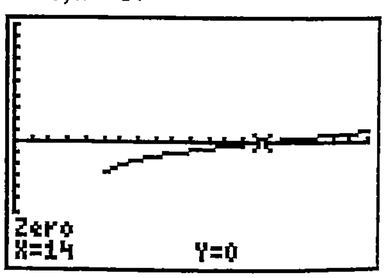
d) $x \leq 0.25$; $x = -2$



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

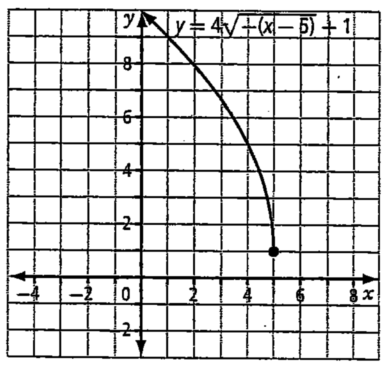


b) $x \geq 5$; $x = 14$

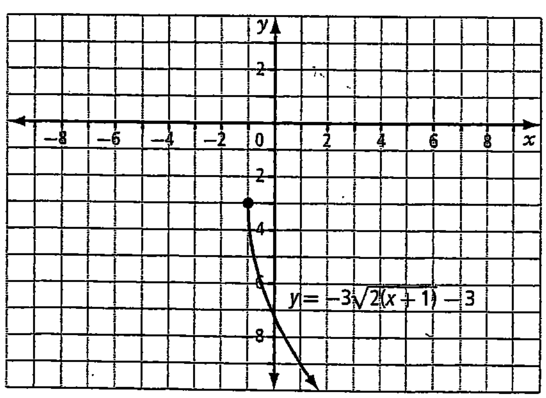


Chapter 2 Review, pages 63–64

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



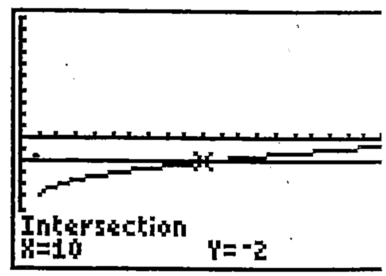
b) vertical stretch by a factor of 3, reflection in the x-axis, horizontal stretch by a factor of 0.5, and a translation of 1 unit left and 3 units down



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

b) $y = 3\sqrt{x-2} - 5$; domain: $\{x \mid x \geq 2, x \in \mathrm{R}\}$; range: $\{y \mid y \geq -5, y \in \mathrm{R}\}$

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



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