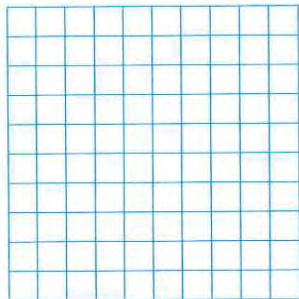


EXPLORE & REASON

Consider the formula for the area of a square: $A = s^2$.

- A. Graph the function that represents area as a function of side length.



- B. On the same set of axes, graph the function that represents side length as a function of area.

- C. **Look for Relationships** How are the two graphs related? © MP.7

HABITS OF MIND

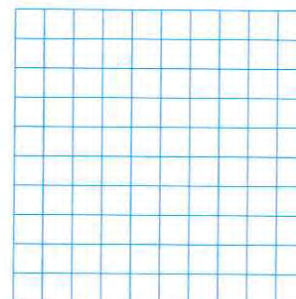
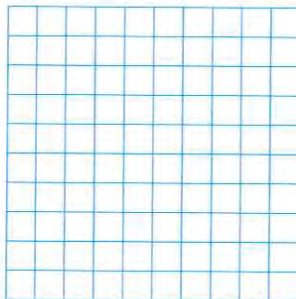
Communicate Precisely What is the domain and range of each function? © MP.6

**EXAMPLE 1** **Try It! Graph Square Root and Cube Root Functions**

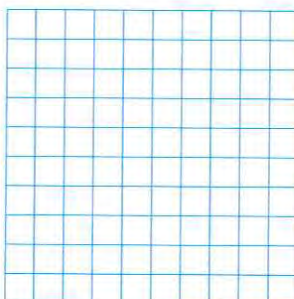
1. Graph the following functions. What is the domain and range of each function? Is the function increasing or decreasing?

a. $f(x) = \sqrt{x - 5}$

b. $g(x) = \sqrt[3]{x + 1}$

**EXAMPLE 2** **Try It! Graph a Transformation of a Radical Function**

2. Graph $f(x) = \sqrt{x}$ and $g(x) = \frac{1}{2}\sqrt{x - 1} - 3$. What transformations of the graph of f produce the graph of g ? What is the effect of the transformations on the domain and range of g ?

**HABITS OF MIND**

Use Structure How does the graph of $y = \sqrt{x - a} + b$ compare to the graph of $y = \sqrt{x}$? © MP.7



EXAMPLE 3  **Try It! Rewrite Radical Functions to Identify Transformations**

3. What transformations of the parent graph of $f(x) = \sqrt{x}$ produce the following graphs?

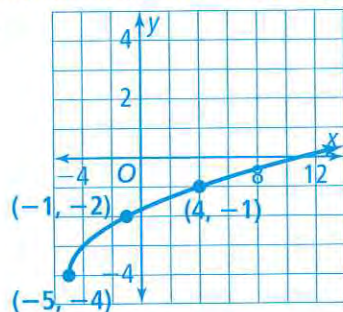
a. $m(x) = \sqrt{7x - 3.5} - 10$

b. $j(x) = -2\sqrt{12x} + 4$

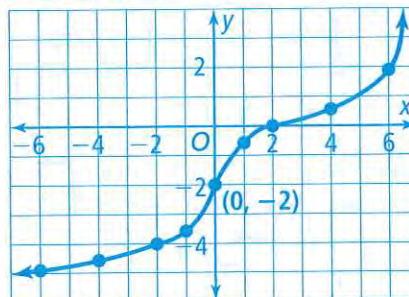
EXAMPLE 4  **Try It! Write an Equation of a Transformation**

4. What radical function is represented in each graph below?

a.



b.

**HABITS OF MIND**

Model With Mathematics What is an example of a radical function whose domain is $x \geq -3$ and range is $y \geq 2$? © MP.4

EXAMPLE 5  **Try It! Interpret a Radical Function Model**

5. Use the same function as in Example 5. Suppose Sasha's brother walks through elevations ranging from 8 ft to 48 ft. What are the minimum and maximum distances that he can see?

HABITS OF MIND

Generalize What transformations result in a cube root function being an odd function? © MP.8

Do You UNDERSTAND?

1. **ESSENTIAL QUESTION** How can you use what you know about transformations of functions to graph radical functions?

2. **Error Analysis** Parker said the graph of the radical function $g(x) = -\sqrt{x+2} - 1$ is a translation 2 units left and 1 unit down from the parent function $f(x) = \sqrt{x}$. Describe and correct the error. © MP.3

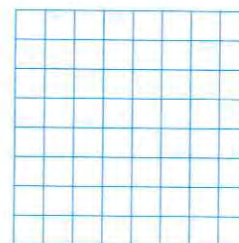
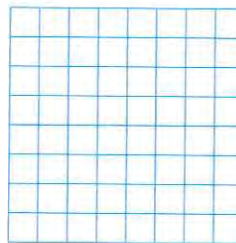
3. **Reason** What effect does a have on the graph of $f(x) = a\sqrt{x}$? © MP.2

Do You KNOW HOW?

Graph each function. Then identify its domain and range.

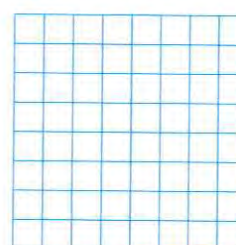
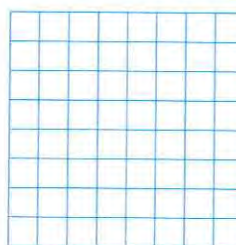
4. $f(x) = \sqrt{x-2}$

5. $f(x) = \sqrt[3]{x+2}$



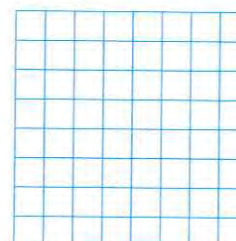
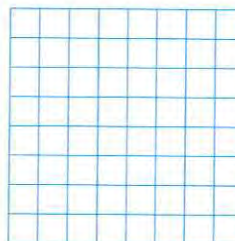
6. $f(x) = \sqrt{x+1} - 2$

7. $f(x) = \sqrt[3]{x-3} + 2$



8. $f(x) = 3\sqrt{x-5}$

9. $f(x) = \frac{1}{2}\sqrt[3]{x} + 1$



10. The volume of a cube is a function of the cube's side length. The function can be written as $V(s) = s^3$, where s is the side length and V is the volume.
- Express a cube's side length as a function of its volume, $s(V)$.
 - Graph $V(s)$ and $s(V)$. What can you conclude about the graphs? Explain.