Name____ Date__________

5.3 Graphing Radical Functions
For use with Exploration 5.3

Essential Question How can you identify the domain and range of a radical function?

1 EXPLORATION: Identifying Graphs of Radical Functions

Work with a partner. Match each function with its graph. Explain your reasoning. Then identify the domain and range of each function.

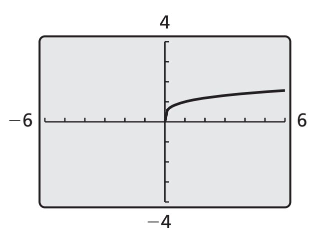
a. $f(x) = \sqrt{x}$

b. $f(x) = \sqrt[3]{x}$

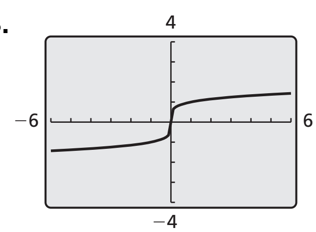
c. $f(x) = \sqrt[4]{x}$

d. $f(x) = \sqrt[5]{x}$

A.



B.



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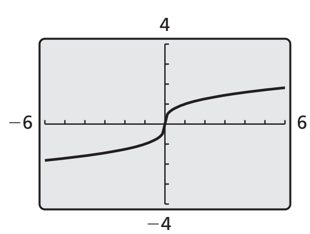
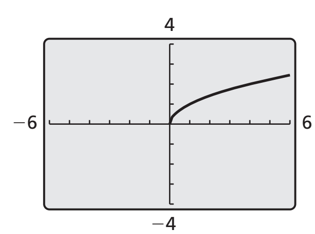


D.



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2 EXPLORATION: Identifying Graphs of Transformations

Work with a partner. Match each transformation of $f(x) = \sqrt{x}$ with its graph. Explain your reasoning. Then identify the domain and range of each function.

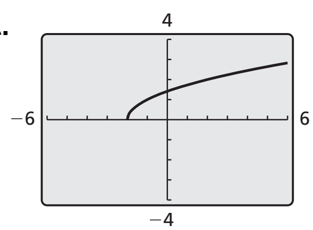
a. $g(x) = \sqrt{x + 2}$

b. $g(x) = \sqrt{x - 2}$

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

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

A.



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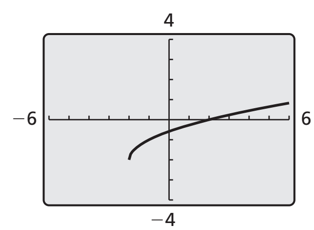
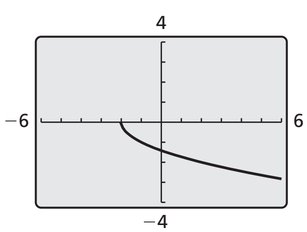
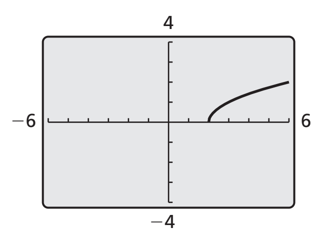


C.



D.



Communicate Your Answer

3. How can you identify the domain and range of a radical function?

4. Use the results of Exploration 1 to describe how the domain and range of a radical function are related to the index of the radical.

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5.3 Notetaking with Vocabulary

For use after Lesson 5.3

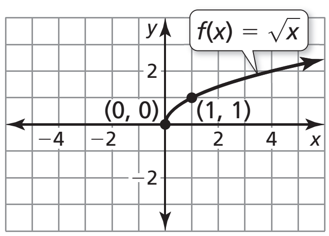
In your own words, write the meaning of each vocabulary term.

radical function

Core Concepts

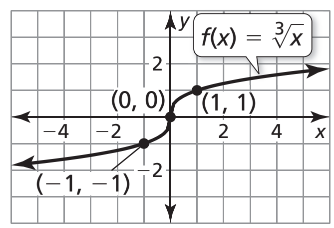
Parent Functions for Square Root and Cube Root Functions

The parent function for the family of square root functions is $f(x) = \sqrt{x}$.



Domain: $x \geq 0$, Range: $y \geq 0$

The parent function for the family of cube root functions is $f(x) = \sqrt[3]{x}$.



Domain and range: All real numbers

Notes:

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5.3 Notetaking with Vocabulary (continued)

Transformation	$f(x)$ Notation	Examples	
Horizontal Translation Graph shifts left or right.	$f(x-h)$	$g(x) = \sqrt{x-2}$ $g(x) = \sqrt{x+3}$	2 units right 3 units left
Vertical Translation Graph shifts up or down.	$f(x) + k$	$g(x) = \sqrt{x} + 7$ $g(x) = \sqrt{x} - 1$	7 units up 1 unit down
Reflection Graph flips over x- or y-axis.	$f(-x)$ $-f(x)$	$g(x) = \sqrt{-x}$ $g(x) = -\sqrt{x}$	in the y-axis in the x-axis
Horizontal Stretch or Shrink Graph stretches away from or shrinks toward y-axis.	$f(ax)$	$g(x) = \sqrt{3x}$ $g(x) = \sqrt{\frac{1}{2}x}$	shrink by a factor of $\frac{1}{3}$ stretch by a factor of 2
Vertical Stretch or Shrink Graph stretches away from or shrinks toward x-axis.	$a \bullet f(x)$	$g(x) = 4\sqrt{x}$ $g(x) = \frac{1}{5}\sqrt{x}$	stretch by a factor of 4 shrink by a factor of $\frac{1}{5}$

Notes:

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Extra Practice

In Exercises 1 and 2, graph the function. Identify the domain and range of each function.

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

2. $g(x) = 2(x - 5)^{1/2} - 4$

3. Describe the transformation of $f(x) = \sqrt[4]{2x} + 5$ represented by $g(x) = -\sqrt[4]{2x} - 5$.

4. Write a rule for g if g is a horizontal shrink by a factor of $\frac{5}{6}$, followed by a translation 10 units to the left of the graph of $f(x) = \sqrt[3]{15x + 1}$.

5. Use a graphing calculator to graph $8x = y^2 + 5$. Identify the vertex and the direction that the parabola opens.

6. Use a graphing calculator to graph $x^2 = 49 - y^2$. Identify the radius and the intercepts of the circle.

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