Name______________________________ Date__________

10.1 Graphing Square Root Functions

For use with Exploration 10.1

Essential Question What are some of the characteristics of the graph of a square root function?

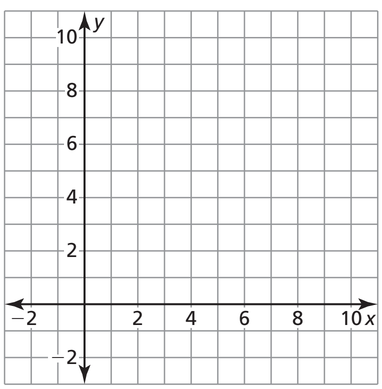
1 EXPLORATION: Graphing Square Root Functions

Work with a partner.

- Make a table of values for each function.
- Use the table to sketch the graph of each function.
- Describe the domain of each function.
- Describe the range of each function.

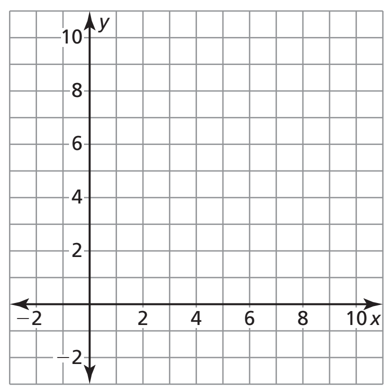
a. $y = \sqrt{x}$

x						
y						



b. $y = \sqrt{x + 2}$

x						
y						



2 EXPLORATION: Writing Square Root Functions

Work with a partner. Write a square root function, $y = f(x)$, that has the given values. Then use the function to complete the table.

a.

x	$f(x)$
–4	0
–3	
–2	
–1	$\sqrt{3}$
0	2
1	

b.

x	$f(x)$
–4	0
–3	
–2	
–1	$1 + \sqrt{3}$
0	3
1	

Communicate Your Answer

3. What are some of the characteristics of the graph of a square root function?

4. Graph each function. Then compare the graph to the graph of $f(x) = \sqrt{x}$.

a. $g(x) = \sqrt{x - 1}$ **b.** $g(x) = \sqrt{x} - 1$ **c.** $g(x) = 2\sqrt{x}$ **d.** $g(x) = -2\sqrt{x}$

Name____ Date__________

10.1 Notetaking with Vocabulary

For use after Lesson 10.1

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

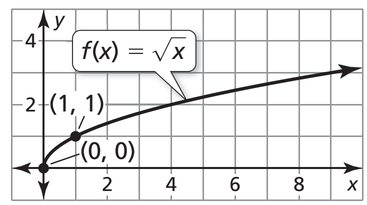
square root function

radical function

Core Concepts

Square Root Functions

A **square root function** is a function that contains a square root with the independent variable in the radicand. The parent function for the family of square root functions is $f(x) = \sqrt{x}$. The domain of f is $x \geq 0$, and the range of f is $y \geq 0$.



Notes:

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:

Name ____ Date _________

Extra Practice

In Exercises 1–3, describe the domain of the function.

1. $y = 4\sqrt{-x}$

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

3. $f(x) = \sqrt{\frac{1}{3}x} + 4$

In Exercises 4–6, graph the function. Describe the range.

4. $y = \sqrt{3x}$

5. $y = 2\sqrt{-x}$

6. $g(x) = \sqrt{x + 3} - 1$

In Exercises 7–9, graph the function. Compare the graph to the graph of $f(x) = \sqrt{x}$.

7. $r(x) = \sqrt{-\frac{1}{2}x}$

8. $s(x) = -\sqrt{x} - 2$

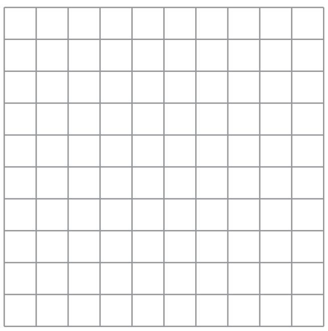
9. $t(x) = \sqrt{x + 4}$

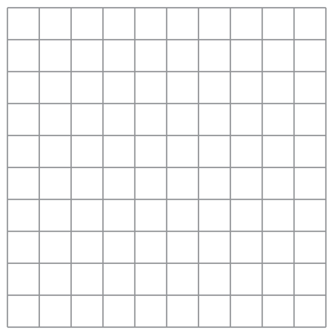
Name____ Date__________

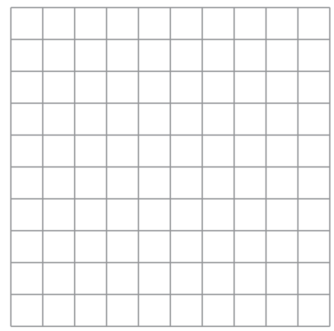
10.1 Notetaking with Vocabulary (continued)

In Exercises 10–12, describe the transformations from the graph of $f(x) = \sqrt{x}$ to the graph the of *h*. Then graph *h*.

10. $h(x) = \frac{1}{2}\sqrt{x+2} - 2$ **11.** $h(x) = 2\sqrt{x-3} + 1$ **12.** $h(x) = -\sqrt{x+4} - 4$







13. The model $S(d) = \sqrt{30df}$ represents the speed S (in miles per hour) of a car before it skids to a stop, where f is the drag factor of the road surface and d is the length (in feet) of the skid marks. The drag factor of Road Surface C is 0.8. The graph shows the speed of the car on Road Surface D. Compare the speeds by finding and interpreting their average rates of change over the interval $d = 0$ to $d = 20$.