

## NOTES: Section 6.5 – Graph Square Root and Cube Root Functions

Goals: #1 - I can graph square root functions and state their domain.

#2 - I can graph cube root functions and state their domain.

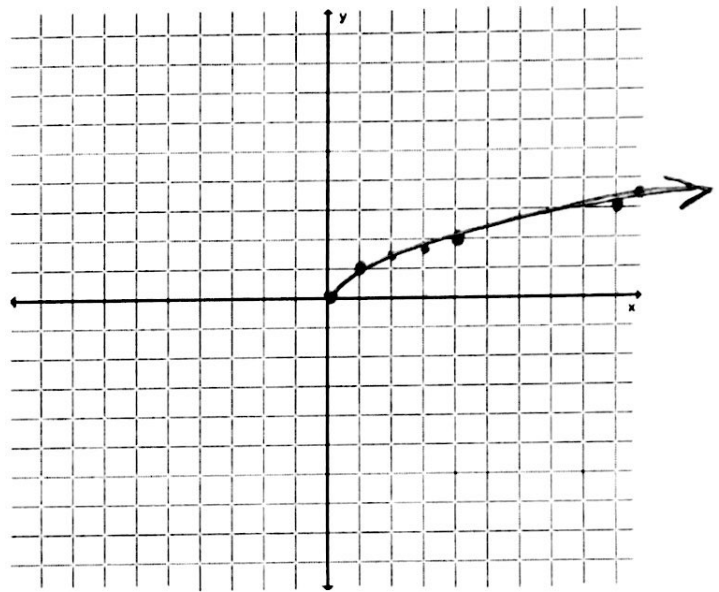


*Homework: Lesson 6.5 Worksheet*

**Exploration #1:** Work with a partner and answer the following questions. Graph the following function using a table of values.

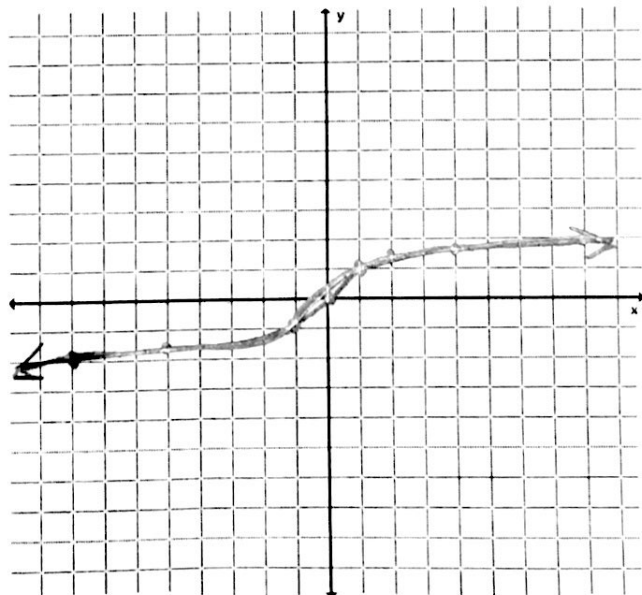
1.  $y = \sqrt{x}$

$x$	$y$
0	0
1	1
2	1.4
3	1.7
4	2
9	3
10	3.2



2.  $y = \sqrt[3]{x}$

$x$	$y$
-8	-2
-1	-1
0	0
1	1
2	1.3
4	1.6
8	2
-5	-1.7



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Notes:

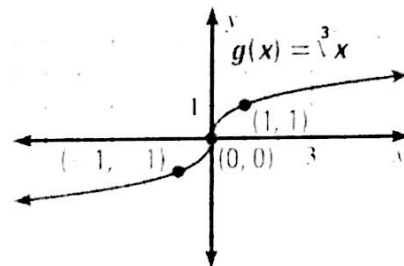
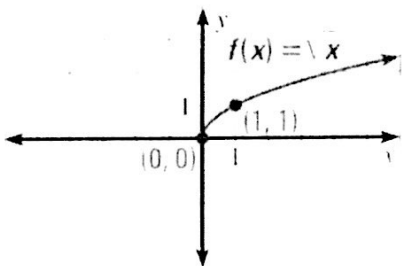
**KEY CONCEPT**

*For Your Notebook*

**Parent Functions for Square Root and Cube Root Functions**

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

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



Domain:  $[0, \infty)$   
 $x \geq 0$

Range:  $[0, \infty)$   
 $y \geq 0$

Domain:  $(-\infty, \infty)$   
 $\mathbb{R}$

Range:  $(-\infty, \infty)$   
 $\mathbb{R}$

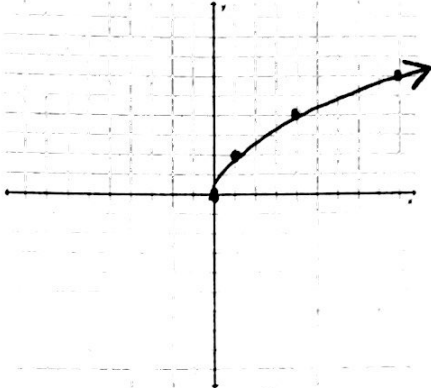
REVIEW:

Transformation	$f(x)$ Notation	Examples
Vertical Translation (shift up and down)	Shift Up $f(x) + a$ Shift Down $f(x) - a$	$\sqrt{x} + 2$ : up 2 $\sqrt[3]{x} - 2$ : down 2
Horizontal Translation (shift left and right)	Shift Left $f(x + a)$ Shift Right $f(x - a)$	$\sqrt[3]{x + 2}$ : left 2 $\sqrt{x - 2}$ : right 2
Reflection (in the x-axis)	$-f(x)$	$-\sqrt{x}$ : reflect (x-axis)
Vertical Stretch/Shrink (narrower and wider)	Narrower $a f(x)$ Wider $\frac{1}{a} f(x)$	$4 \sqrt[3]{x}$ : vertical stretch $\frac{1}{4} \sqrt{x}$ : vertical shrink

**Example #1:** Graph the function. Then state the domain and range. Lastly, compare the function with its parent function.

1.  $y = 2\sqrt{x}$

X	y
0	0
1	2
4	4
9	6



domain:  $[0, \infty)$

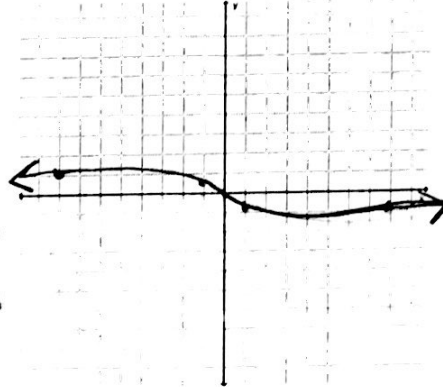
range:  $[0, \infty)$

comparison:

- vertical stretch

2.  $y = -\frac{1}{2}\sqrt[3]{x}$

X	y
-8	1
-1	$\frac{1}{2}$
0	0
1	$-\frac{1}{2}$
8	-1



domain:  $(-\infty, \infty) \mathbb{R}$

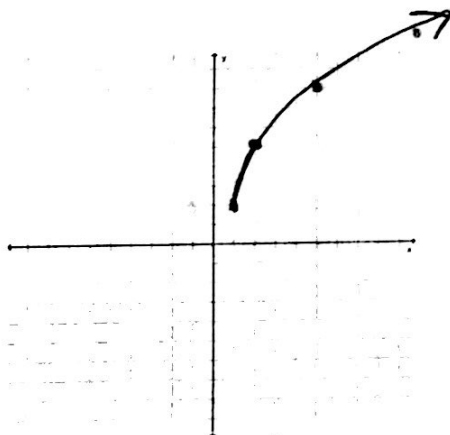
range:  $(-\infty, \infty) \mathbb{R}$

comparison:

- reflection over x-axis
- vertical shrink

3.  $y = 3\sqrt{x-1} + 2$

X	y
1	2
2	5
5	8
10	11



domain:  $[1, \infty)$

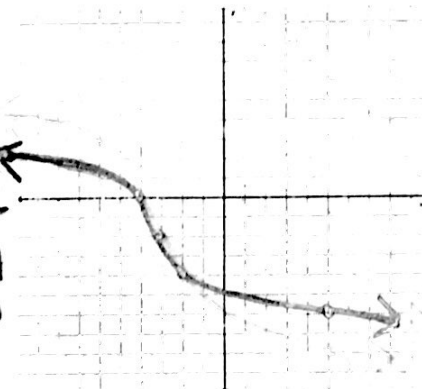
range:  $[2, \infty)$

comparison:

- vertical stretch
- right 1
- up 2

4.  $y = -2\sqrt[3]{x+3} - 2$

X	y
-11	2
-4	0
-3	-2
-2	-4
5	-6



domain:  $(-\infty, \infty)$

range:  $(-\infty, \infty)$

comparison:

- reflection over x-axis
- vertical stretch
- left 3
- down 2

Name: \_\_\_\_\_ Hour: \_\_\_\_\_ Date: \_\_\_\_\_

Example #2: Find the domain and range of the function without graphing.

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

right 3



D:  $[3, \infty)$

R:  $[0, \infty)$

2.  $y = \frac{1}{3}\sqrt[3]{x+7}$

D:  $(-\infty, \infty) \mathbb{R}$

R:  $(-\infty, \infty) \mathbb{R}$

3.  $y = 2\sqrt{x+2}$  up 2

D:  $[-2, \infty)$

R:  $[0, \infty)$

You practice: Find the domain and range of the function without graphing.

1.  $y = \sqrt[3]{x+1}$

D:  $(-\infty, \infty) \mathbb{R}$

R:  $(-\infty, \infty) \mathbb{R}$

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

right 1 down 1



D:  $[1, \infty)$

R:  $[-1, \infty)$

3.  $y = \frac{1}{6}\sqrt{x-2} + \frac{4}{3}$  up 4

right 2



D:  $[2, \infty)$

R:  $[\frac{4}{3}, \infty)$