Essential Question: How do we graph cubic and cube root functions?

Do Now: Solve for x in each equation

1. $\left(\sqrt[3]{x}\right)^3 = (3)^3$

$x = 27$

2. $2\sqrt[3]{x+1} = 6$

$\left(\sqrt[3]{x+1}\right)^3 = (3)^3$

$x + 1 = 27$

$x = 26$

3. $x^3 = -125$

$\sqrt[3]{x^3} = \sqrt[3]{-125}$

$x = -5$

4. $(x-2)^3 + 1 = 9$

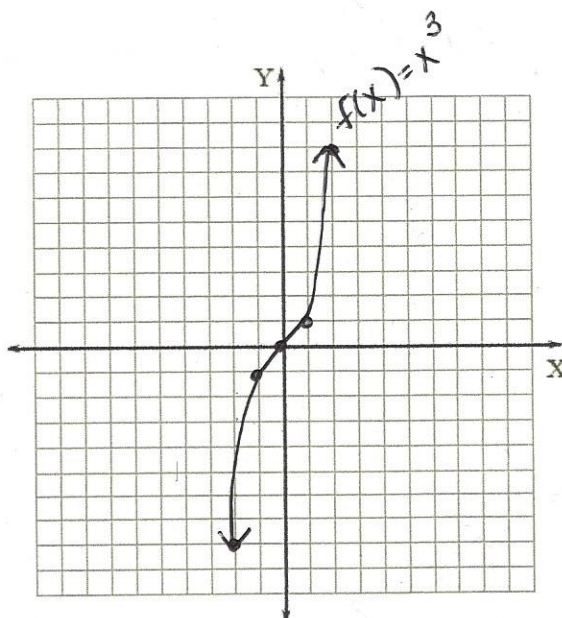$(x-2)^3 = 8$

$\sqrt[3]{(x-2)^3} = \sqrt[3]{8}$

$x - 2 = 2$

$x = 4$

A **cubic function** is any function whose rule involves x^3. (degree of 3)

Complete the table of values for the cubic function, $f(x) = x^3$. Use the table of values to complete the graph.

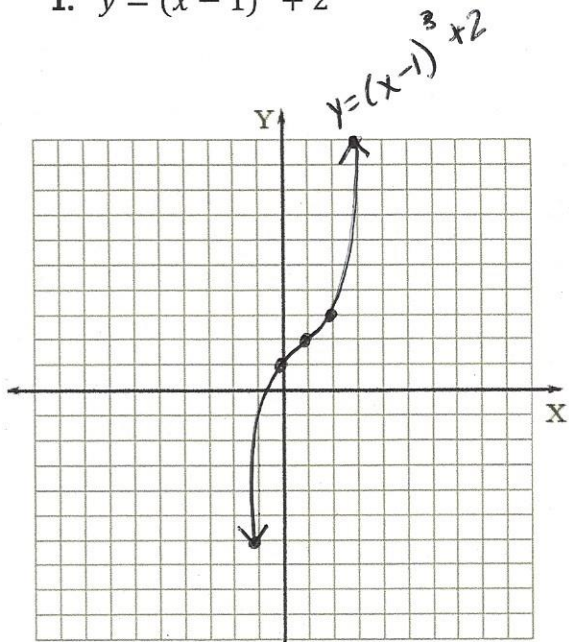| x	$f(x) = x^3$
-2	- 8
-1	- 1
0	0
1	1
2	8

$f(x) = x^3$

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

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

We call this the **PARENT FUNCTION** → the simplest function that still satisfies the definition of a certain type of function.

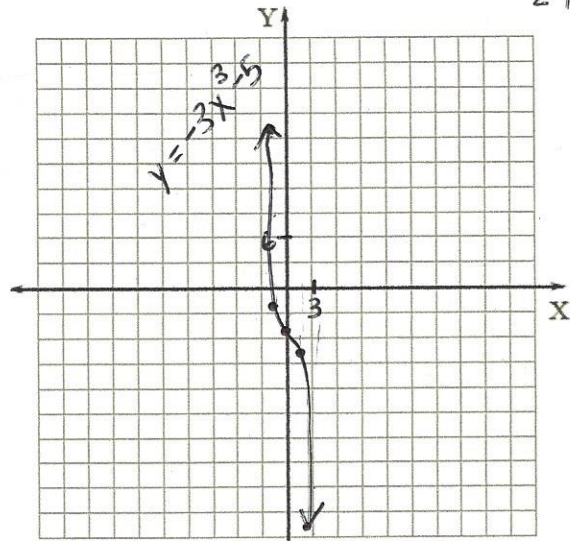*Examples:* Graph each cubic function and state the domain/range.

1. $y = (x-1)^3 + 2$

$y = (x-1)^3 + 2$

x	y
-1	-6
0	1
1	2
2	3
3	10

Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$

2. $y = -3x^3 - 5$

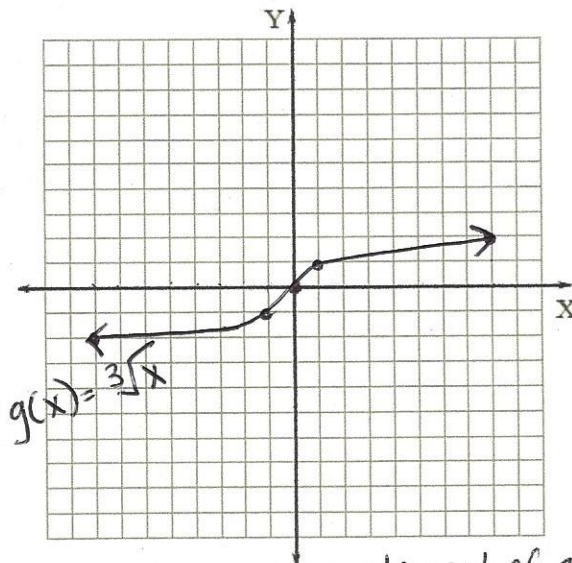| x	y
-2	19
-1	-2
0	-5
1	-8
2	-29

$y = -3x^3$

Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$

A **cube root function** is a function whose rule involves $\sqrt[3]{x}$

Complete the table of values for the parent cube root function, $g(x) = \sqrt[3]{x}$. Use the table of values to complete the graph.

x	g(x)
-8	-2
-1	-1
0	0
1	1
8	2

$g(x) = \sqrt[3]{x}$

Domain: $(-\infty, \infty)$ $x \in \mathbb{R}$ x values are an element of all real numbers

Range: $(-\infty, \infty)$ $y \in \mathbb{R}$ y values are elements of all real numbers

We call this the **PARENT FUNCTION**

Examples: Graph each cube root function and state the domain/range.
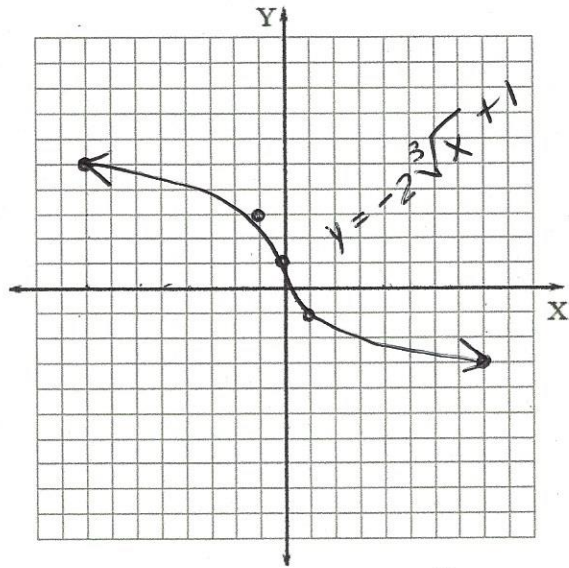
1. $y = \sqrt[3]{x} - 3$

x	y
-5	-2
2	-1
3	0
4	1
11	2

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

X	Y
-8	5
-1	3
0	1
1	-1
8	-3
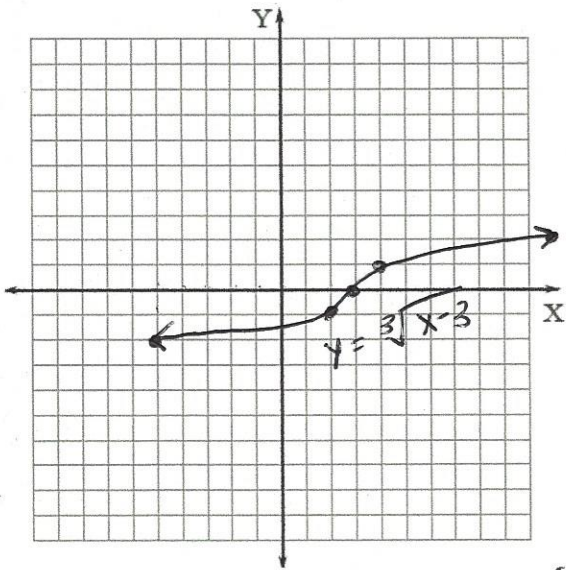
Domain: $(-\infty, \infty)$ Range $(-\infty, \infty)$

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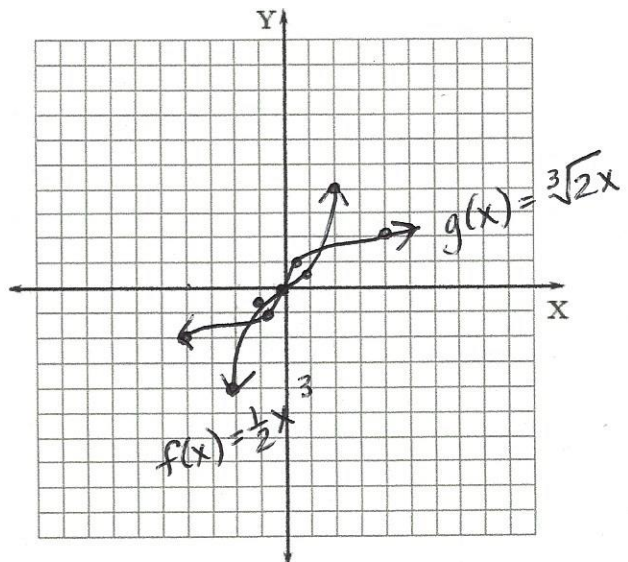

RELATIONSHIP BETWEEN CUBIC AND CUBE ROOT FUNCTIONS

Make a table of values and graph each function.

$$f(x) = \frac{1}{2}x^3 \qquad g(x) = \sqrt[3]{2x}$$

x	f(x)
-2	-4
-1	-.5
0	0
1	.5
2	4

x	g(x)
-4	-2
-.5	-1
0	0
.5	1
4	2

Do you notice a relationship between these functions?

the table of values are switched
these graphs are inverses of each other