Math-3
Lesson 1-4

Cube, and Cubed Root Functions.

What is a power?

Power: An expression formed by repeated Multiplication of the same factor.

$$3x^4$$

Exponent

Coefficient

Base

The base is used as a factor the exponent number of times.

$$3*x*x*x*x$$

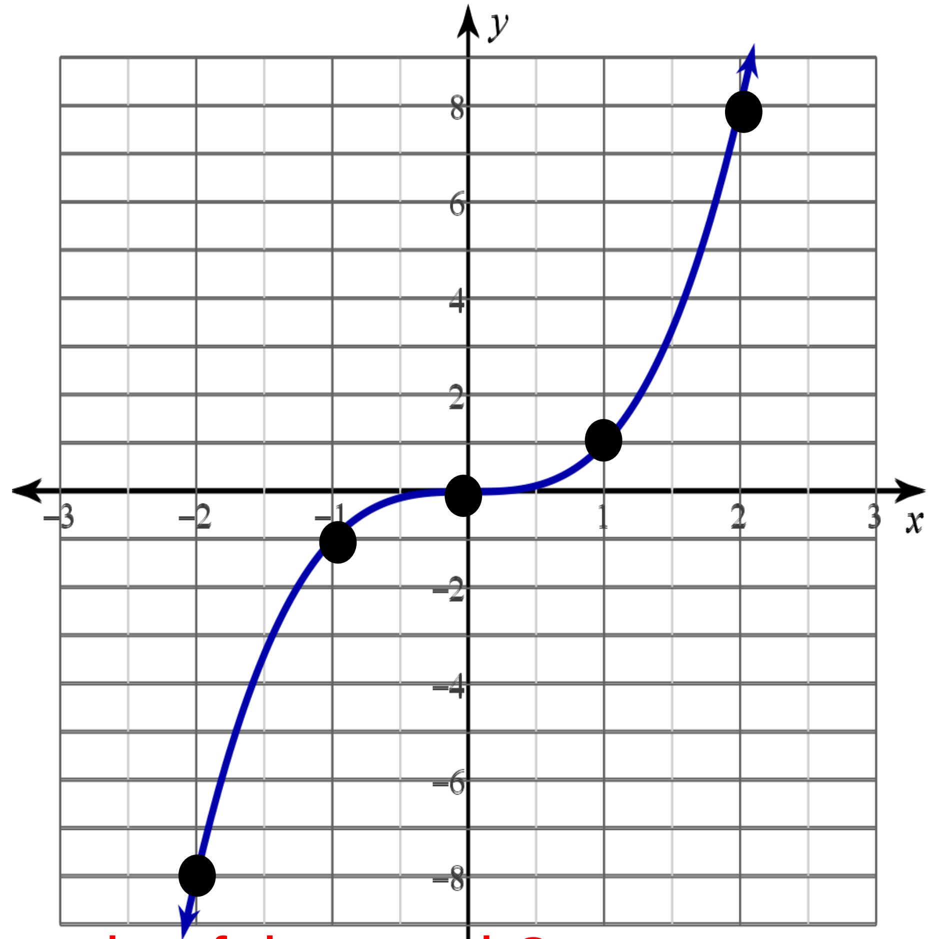
The Cube Function

$$f(x) = x^3$$

Build a table of values for each equation for domain elements: -2, -1, 0, 1, 2.

x	y
-2	-8
-1	-1
0	0
1	1
2	8

$$y = (-2)^3$$
$$y = (-1)^3$$
$$y = (0)^3$$
$$y = (1)^3$$
$$y = (2)^3$$



Domain of the graph?

$$x = (-\infty, \infty)$$

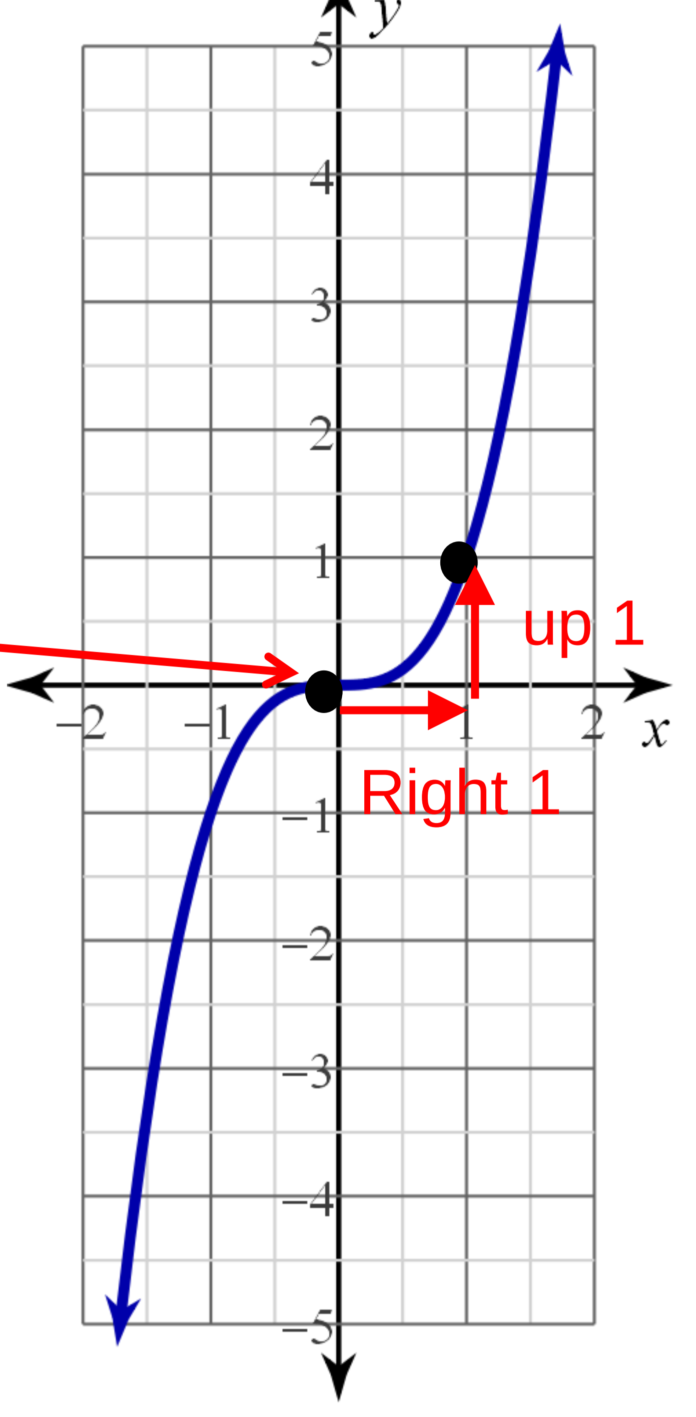
Range of the graph?

$$y = (-\infty, \infty)$$

$$f(x) = x^3$$

Inflection Point: the point where the shape of the graph changes from “concave down” (curving downward) to “concave up” (curving upward) or vice versa.

Inflection point: (0, 0)



Shape of the graph: Not vertically stretched: from the inflection point “right 1, up 1”

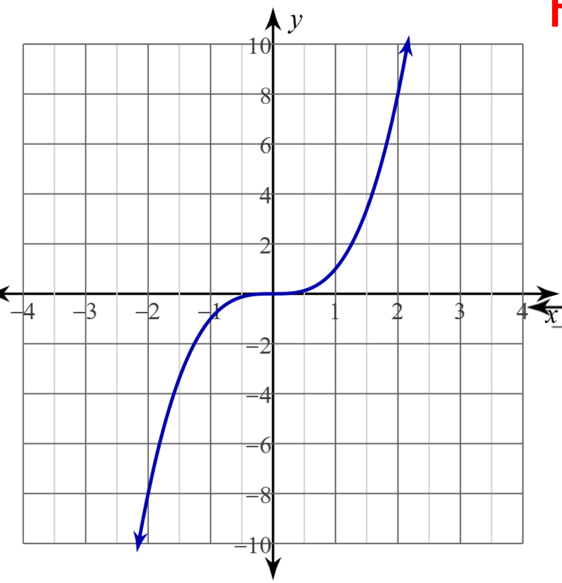
Left/right and up/down transformations move the inflection point (and the whole graph)

Describe the transformations:

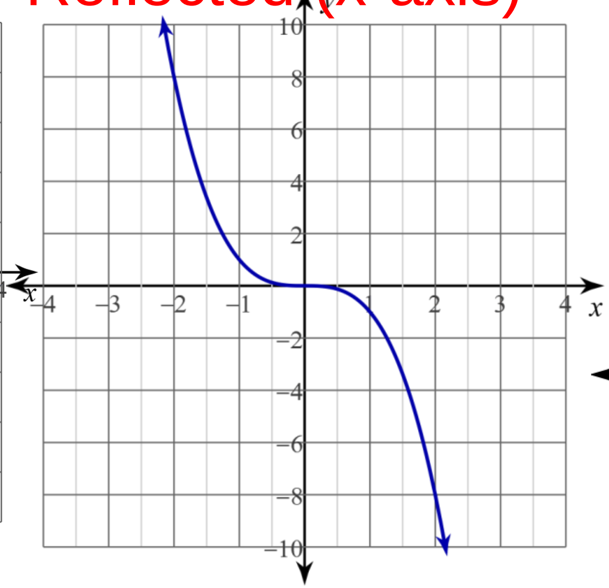
$f(x) = x^3$

$g(x) = -x^3$

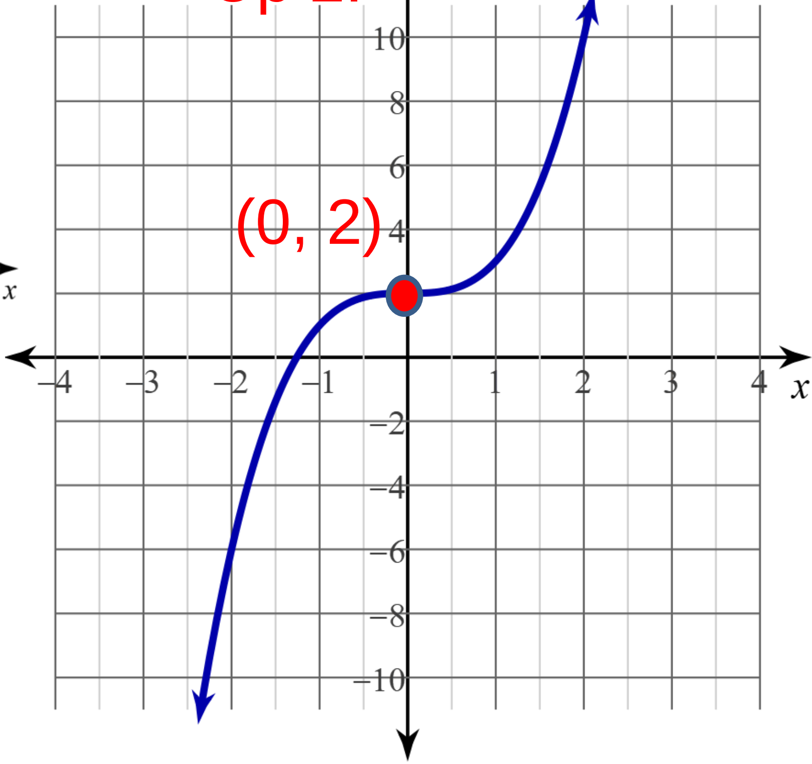
$k(x) = x^3 + 2$



Reflected (x-axis)



Up 2.



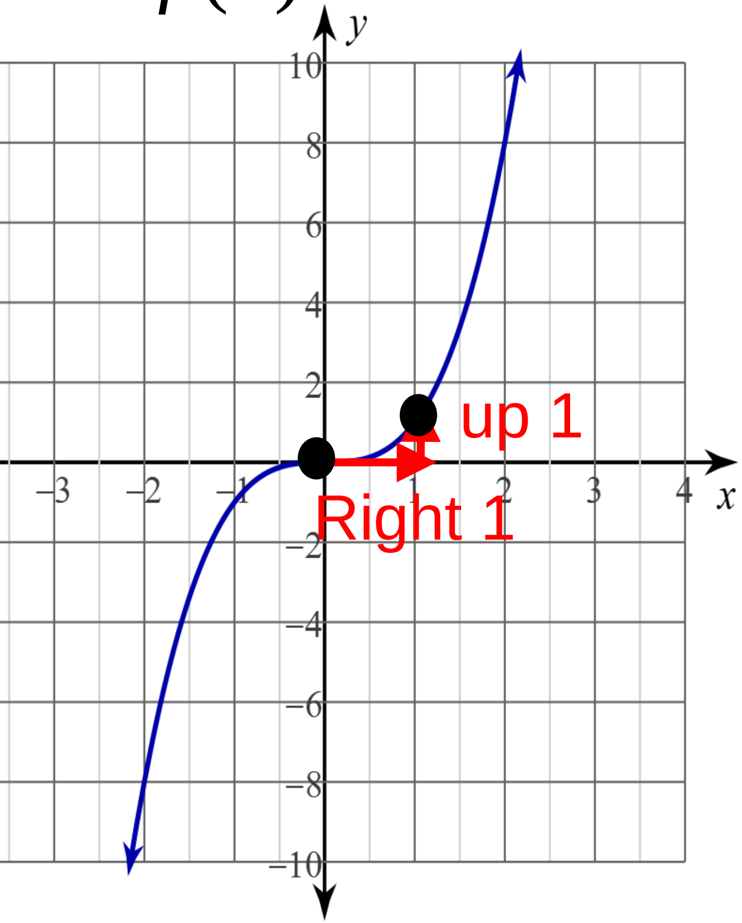
Inflection point did not move.

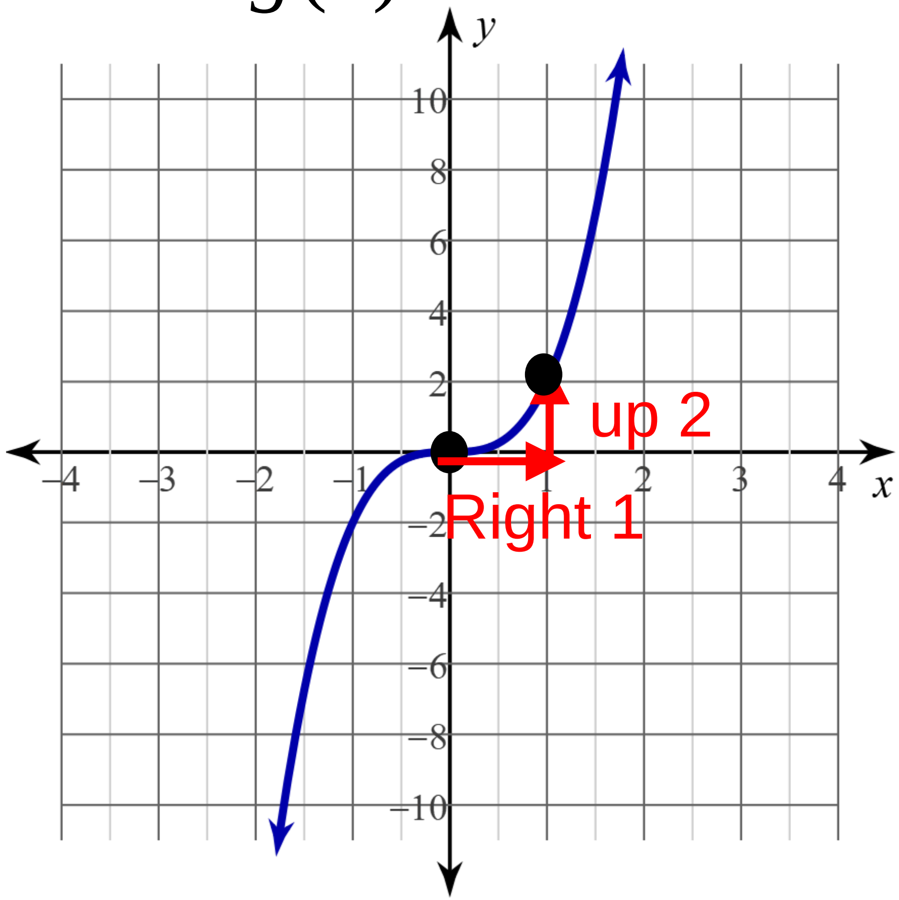
Inflection point moved, shape did not change.

Describe the transformations of the parent function given by:

$f(x) = x^3$

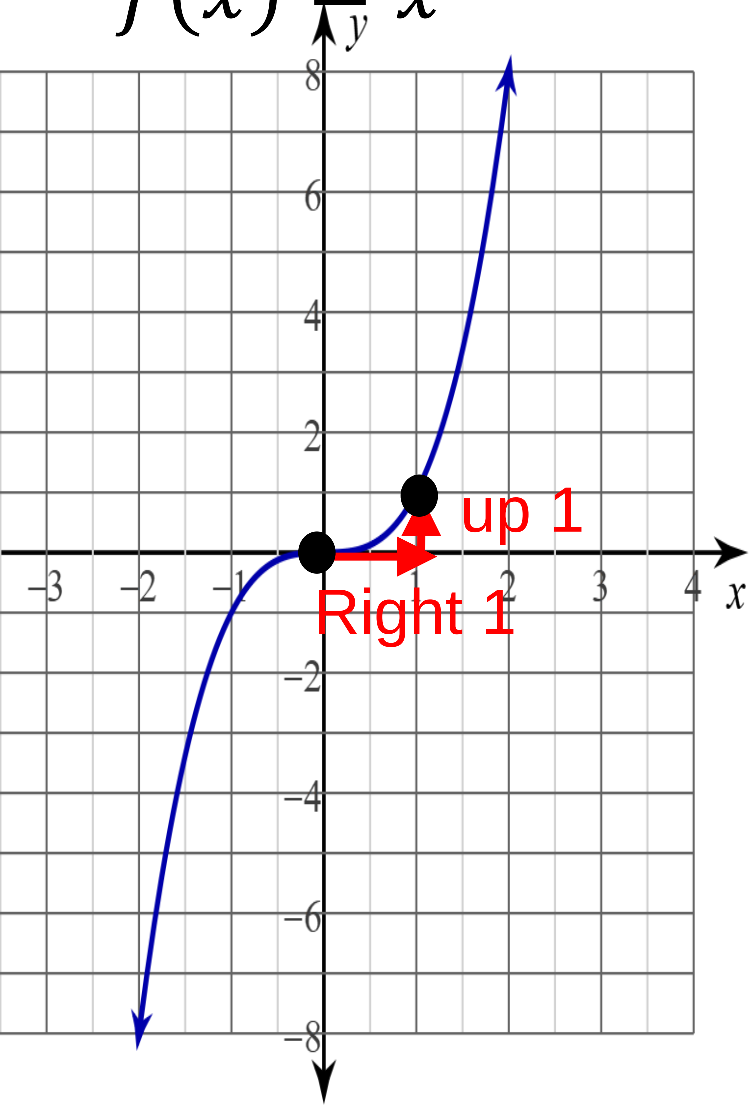
$g(x) = 2x^3$ VSF =2 .





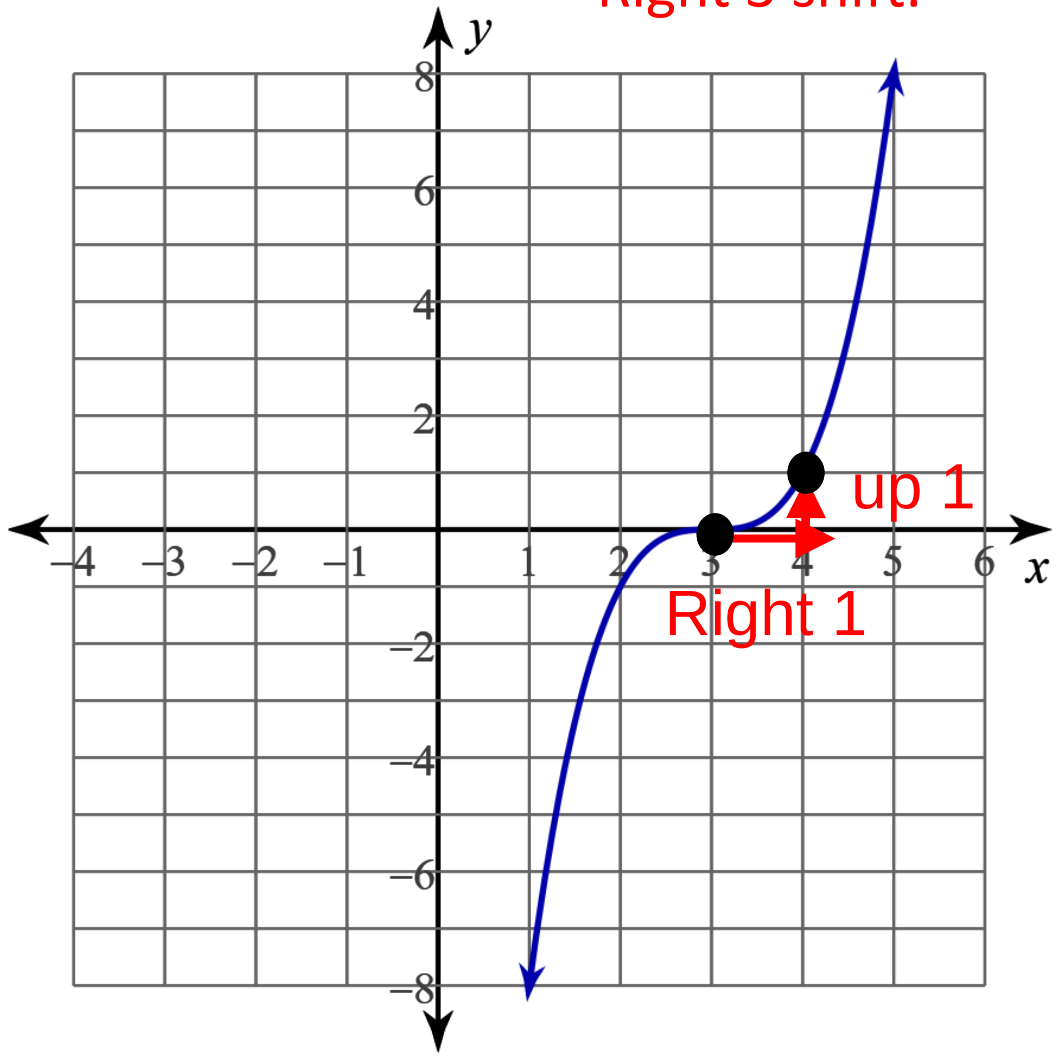
Inflection point did not move, shape is vertically stretched

$f(x) = x^3$



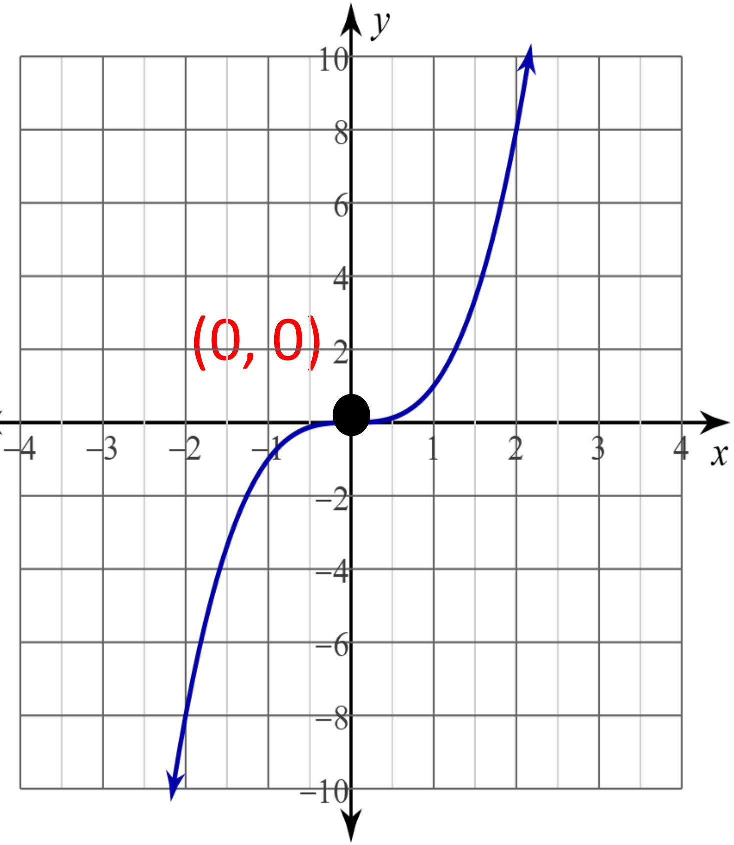
$g(x) = (x-3)^3$

Right 3 shift.



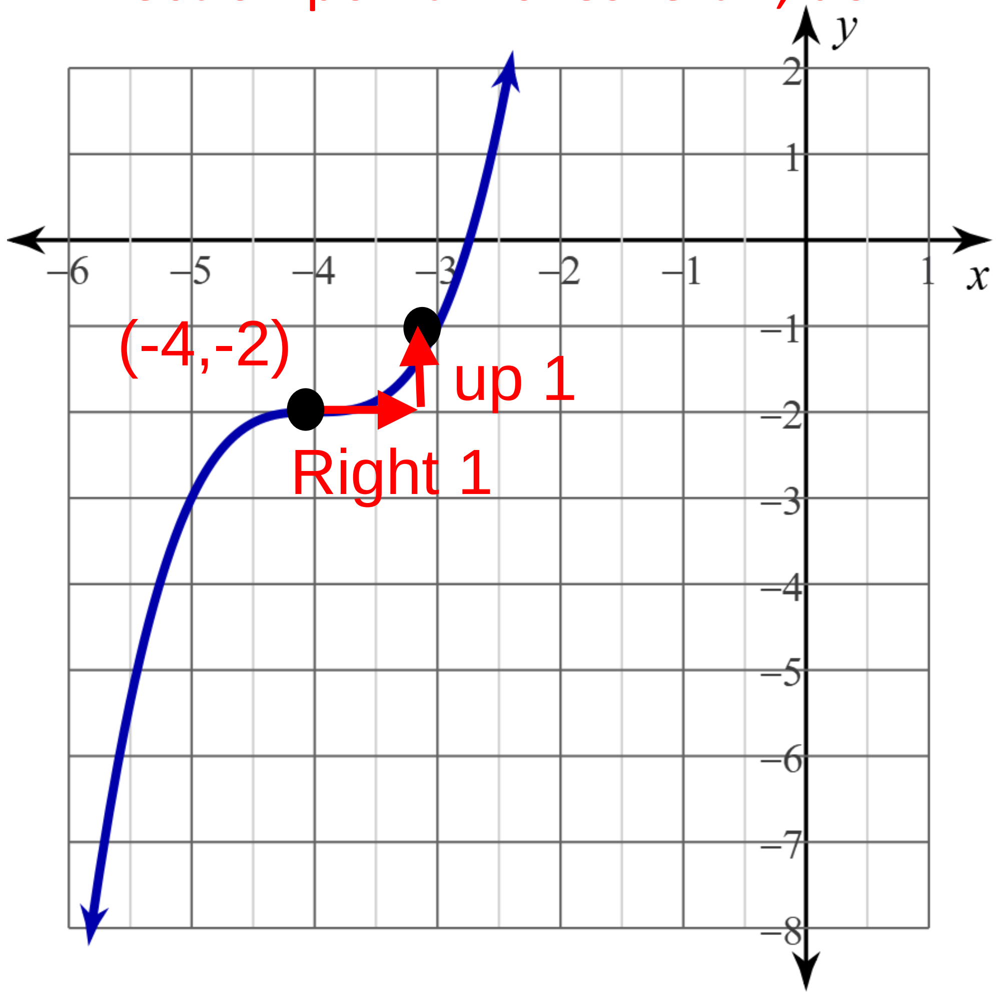
Where is the inflection point?

$f(x) = x^3$

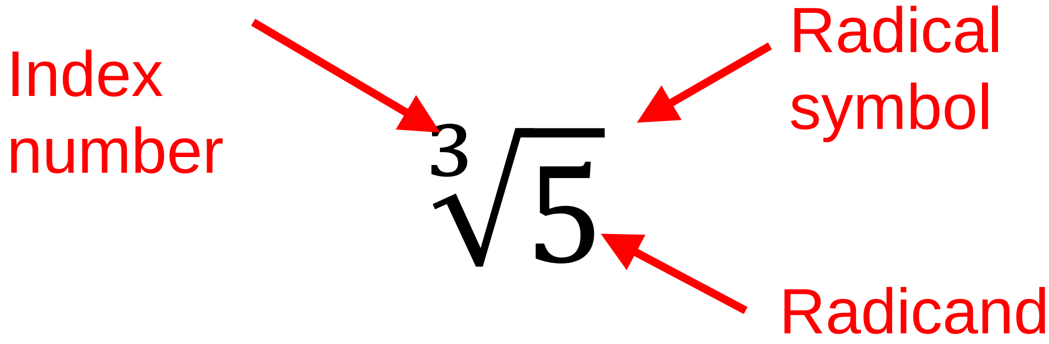


$j(x) = (x + 4)^3 - 2$

Inflection point moves left 4, down 2



Cubed Root (or 3rd root)



$$\sqrt[3]{5}$$

$x = \sqrt[3]{5}$ Some number equals the cubed root of 5.

Use the property of equality to "cube" the left and right side of the equal sign results in an equivalent equation.

$$(x)^3 = \left(\sqrt[3]{5}\right)^3$$

$$x^3 = 5$$

$\sqrt[3]{5}$ means "what number cubed equals 5"

Cubed Root function: $f(x)=\sqrt[3]{x}$

Fill in the output values of the table, then graph the points.

x	y
-8	-2
-1	-1
0	0
1	1
8	2

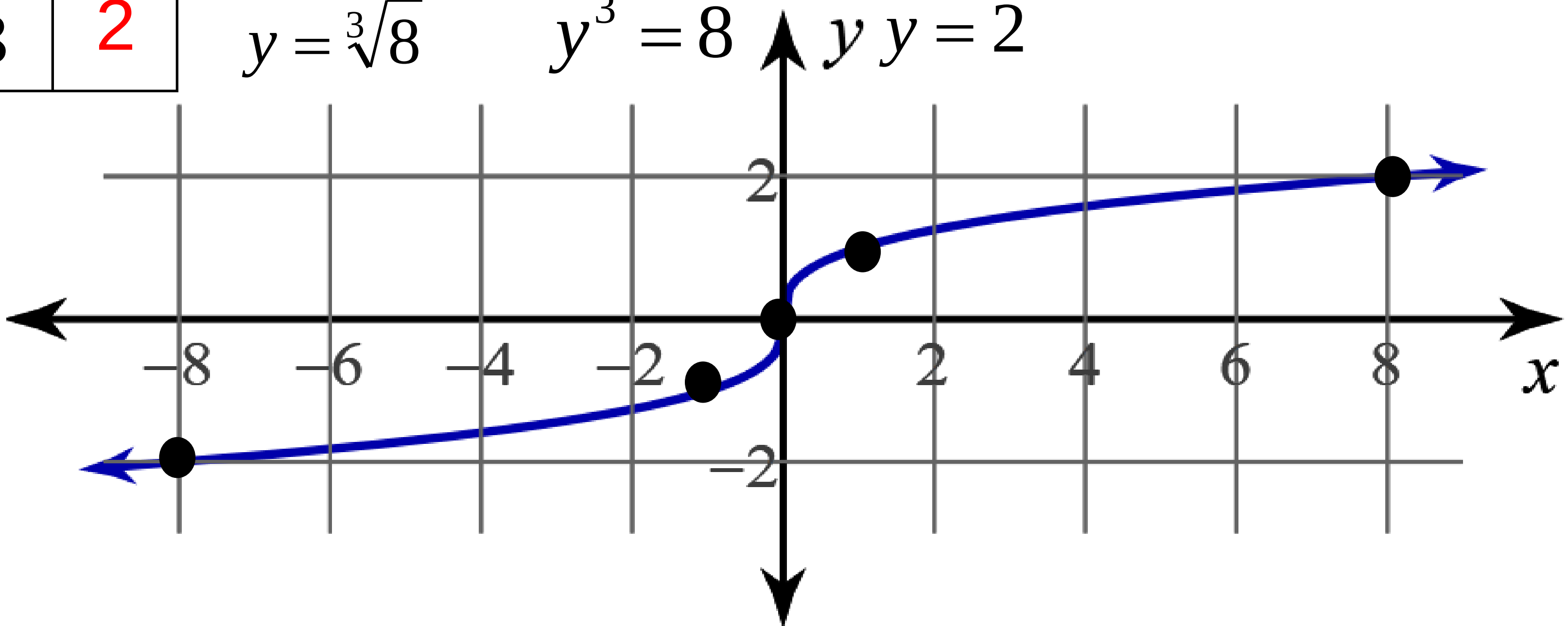
$y=\sqrt[3]{-8}$ $\quad y^3=-8$ $\quad y=-2$

$y=\sqrt[3]{-1}$ $\quad y^3=-1$ $\quad y=-1$

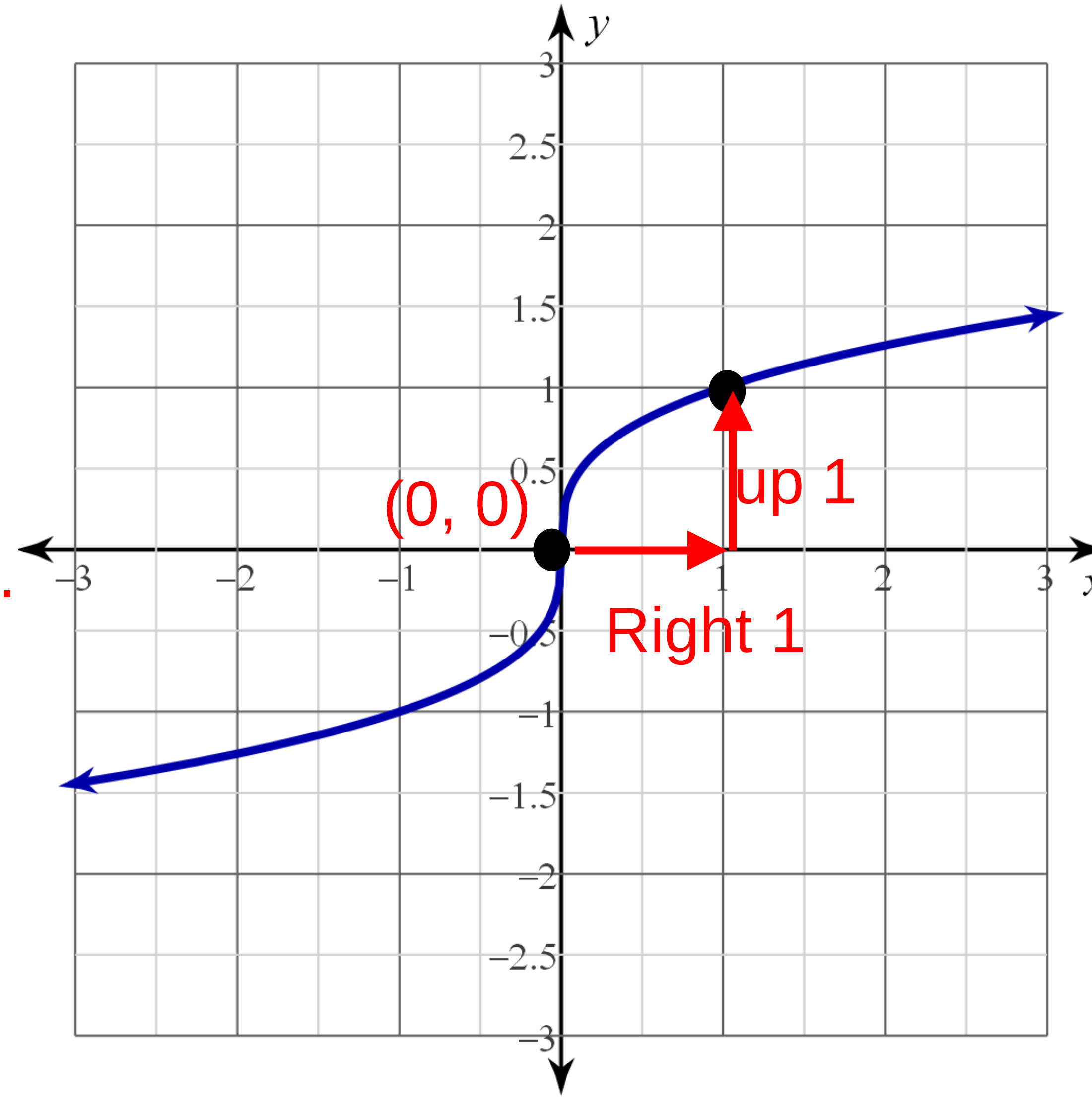
$y=\sqrt[3]{0}$ $\quad y^3=0$ $\quad y=0$

$y=\sqrt[3]{1}$ $\quad y^3=1$ $\quad y=1$

$y=\sqrt[3]{8}$ $\quad y^3=8$ $\quad y=2$



Where is the inflection point? $f(x) = \sqrt[3]{x}$



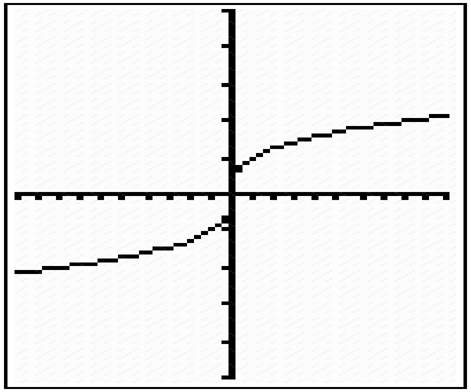
<u>Not vertically stretched</u>:
"right 1, up 1"
From the inflection point

domain? All real numbers.

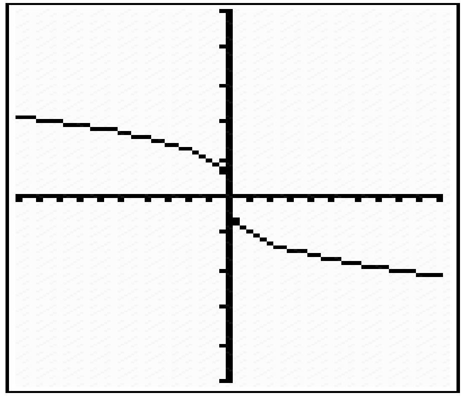
range? All real numbers.

What is the transformation of the parent function?

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

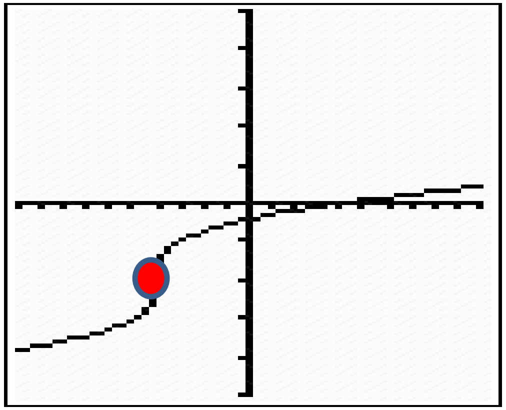


$k(x) = -\sqrt[3]{x}$



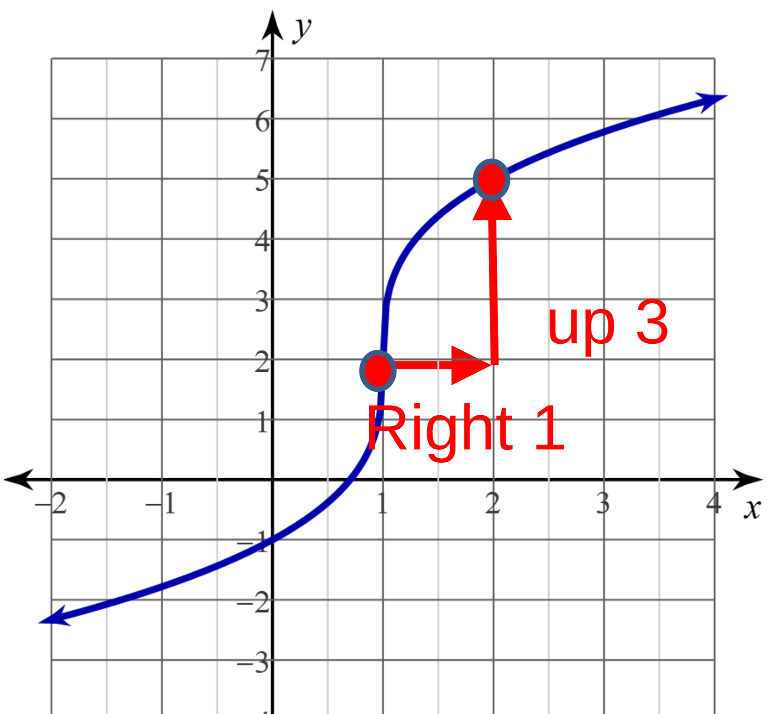
Reflected(x-axis)

$g(x) = -2 + \sqrt[3]{x+4}$



Left 4, down 2

Inflection point: (-4, -2)

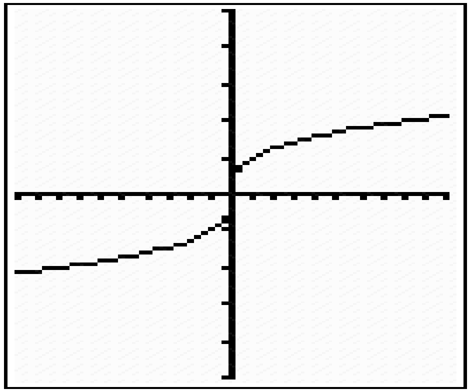


$j(x) = 3\sqrt[3]{x-1} + 2$

VSF=3, right 1, up 2

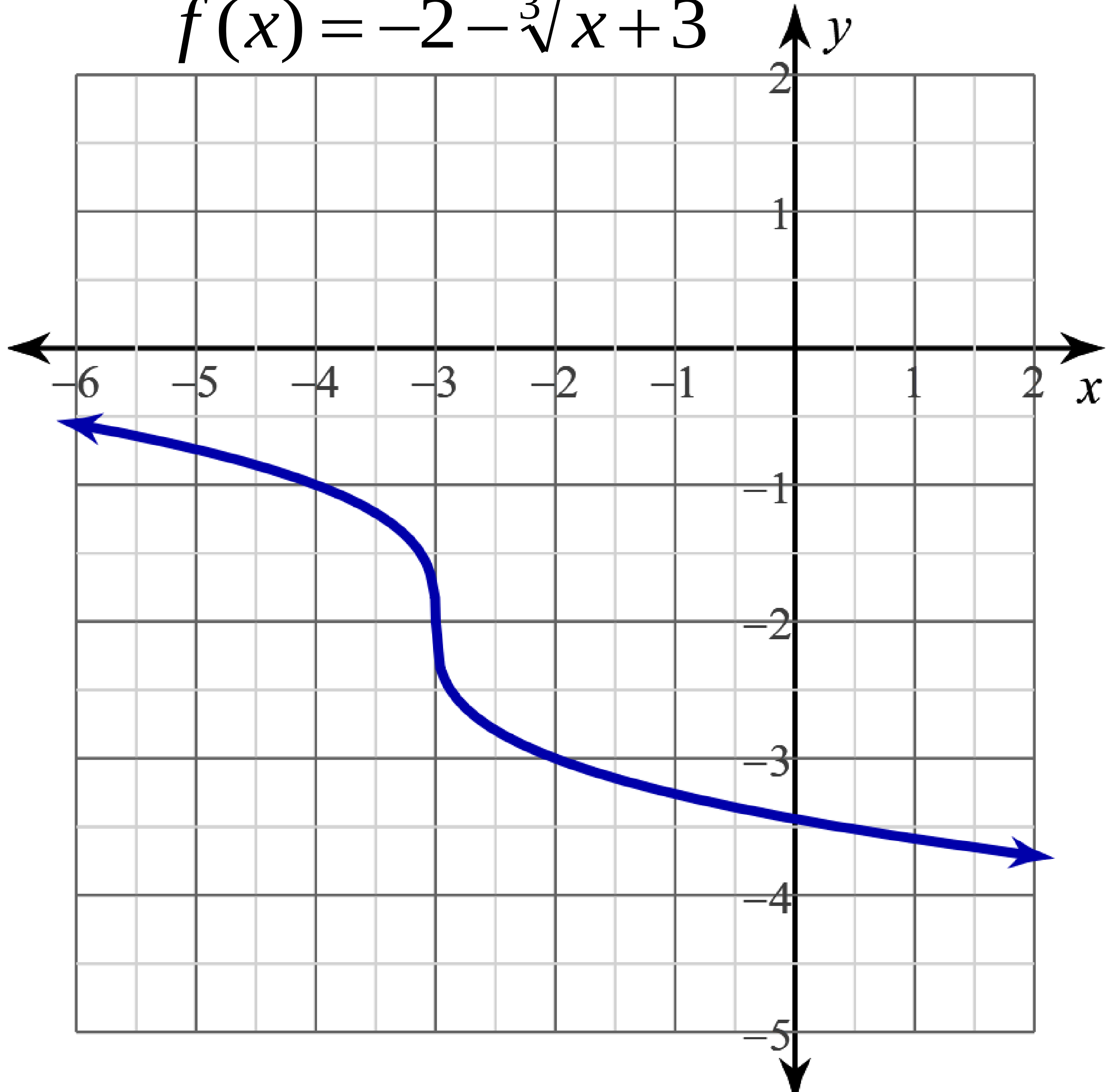
Inflection point: (1, 2)

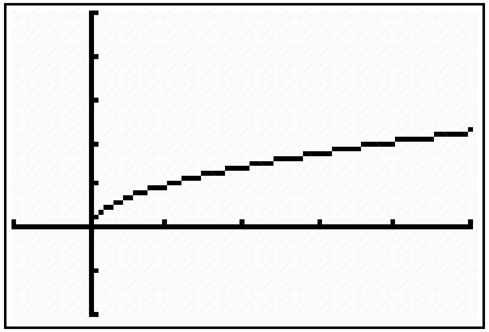
$f(x) = \sqrt[3]{x}$



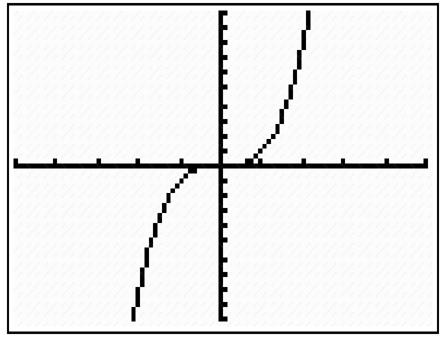
Graph the (without a calculator).

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

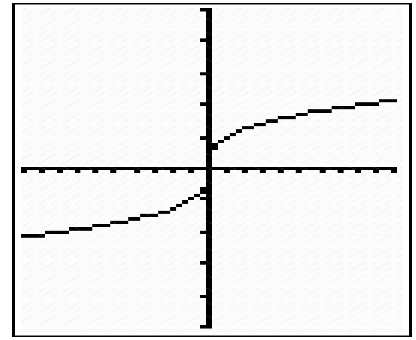




$$f(x) = \sqrt{x}$$



$$f(x) = x^3$$



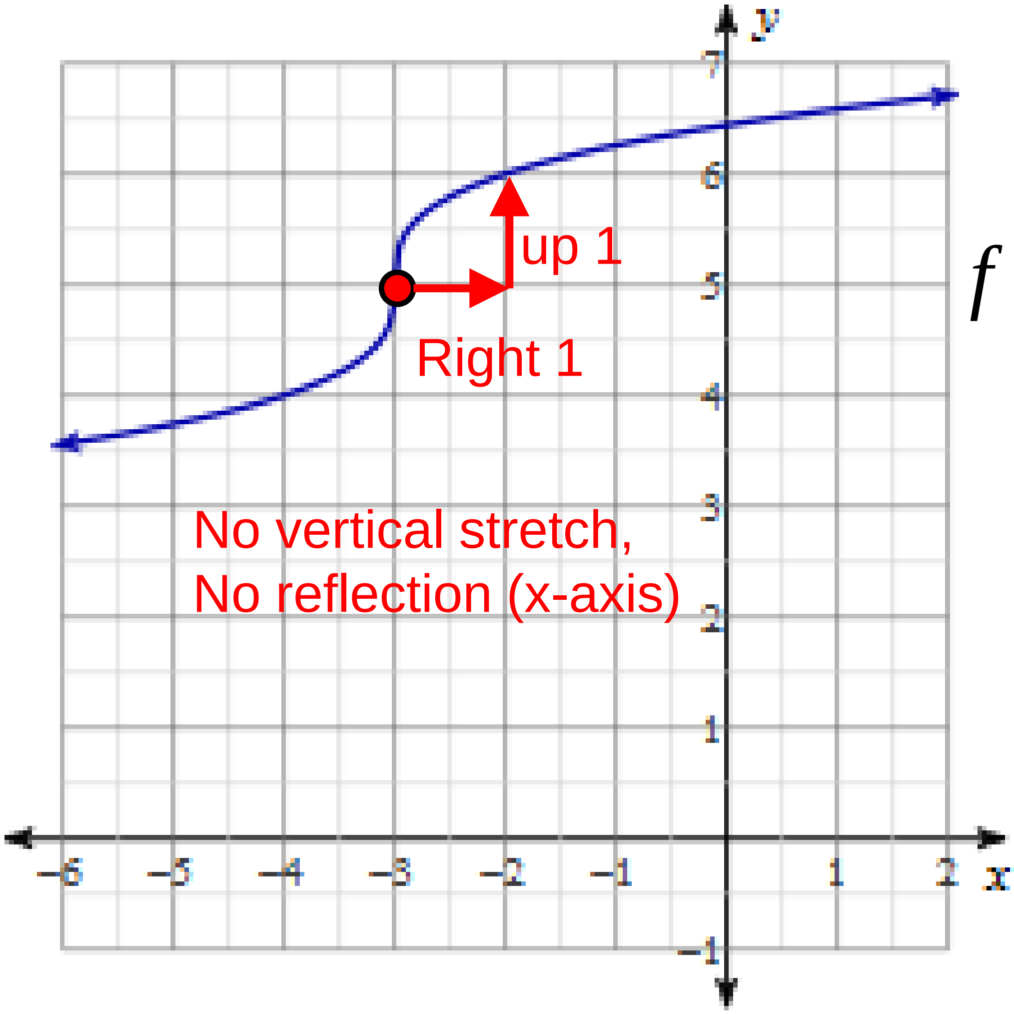
$$f(x) = \sqrt[3]{x}$$

$$y = (-1)a\sqrt{x-h} + k$$

$$y = (-1)a(x-h)^3 + k$$

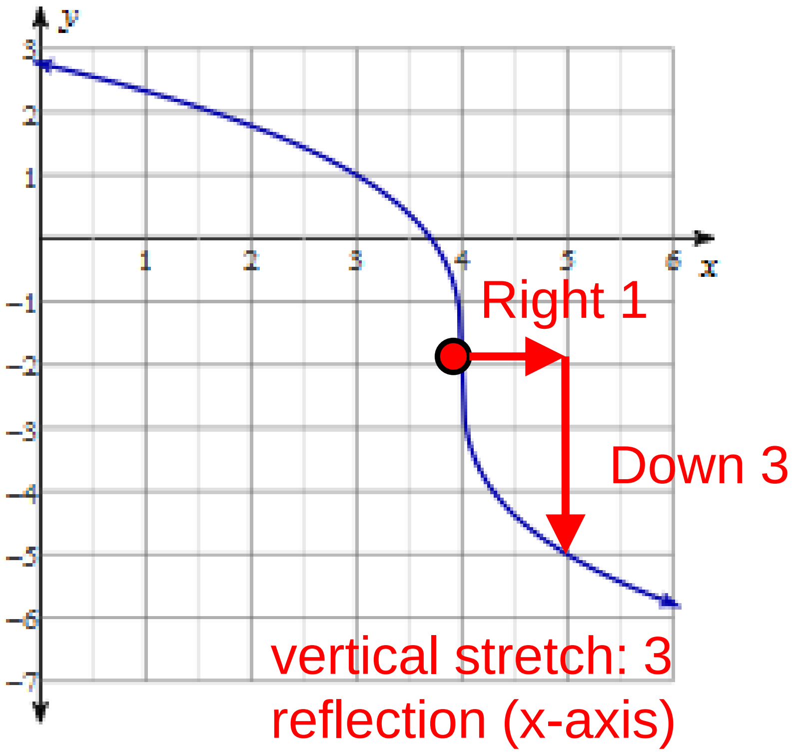
$$y = (-1)a\sqrt[3]{x-h} + k$$

What is the equation of the graph?



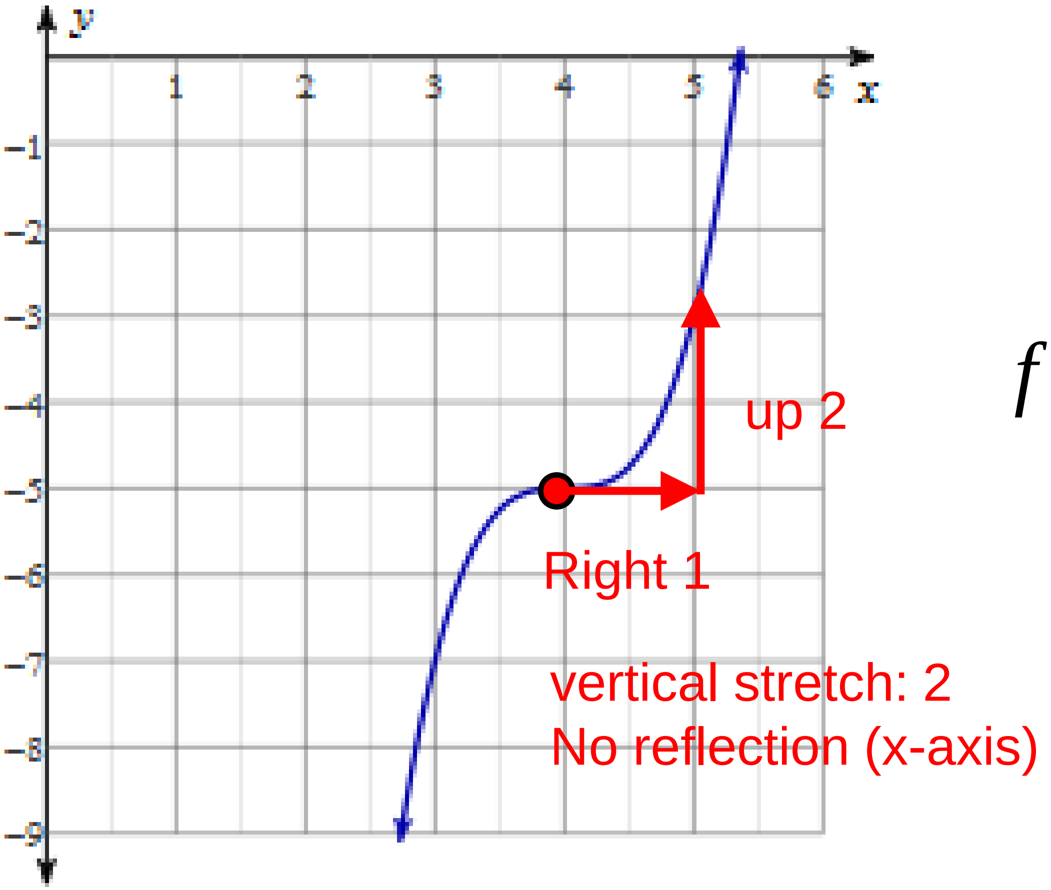
$$f(x) = 5 + \sqrt[3]{x+3}$$

What is the equation of the graph?



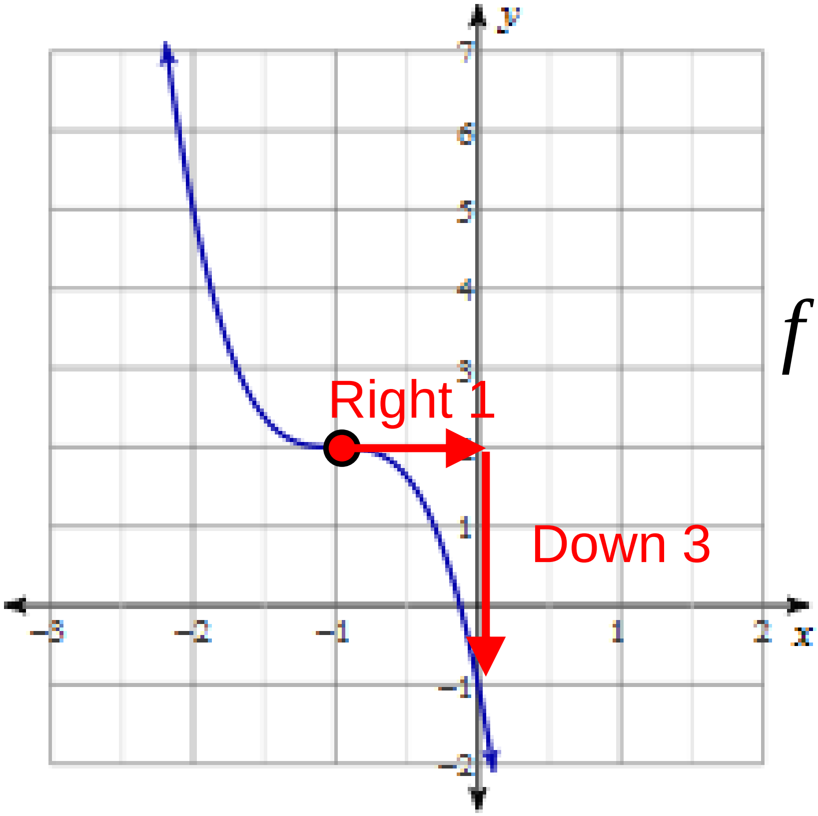
$$f(x) = -2 - 3\sqrt[3]{x-4}$$

What is the equation of the graph?



$$f(x) = 2(x-4)^3 - 5$$

What is the equation of the graph?



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

vertical stretch:3
reflection (x-axis)