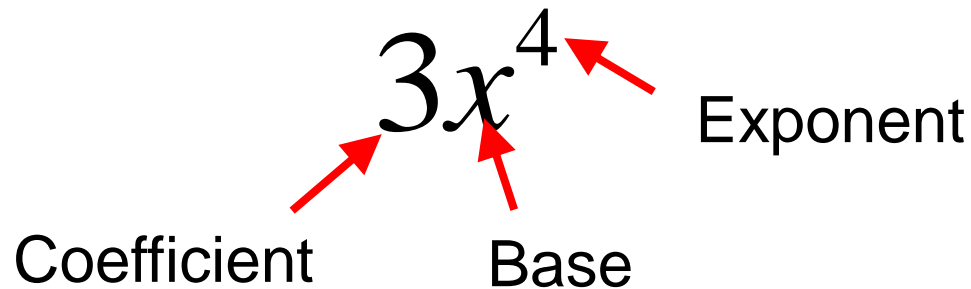


Math-3A
Lesson 1-5

Cube, and Cubed Root
Functions.

What is a power?

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



The diagram shows the expression $3x^4$. Three red arrows point from labels to parts of the expression: one from 'Coefficient' to the number 3, one from 'Base' to the letter x, and one from 'Exponent' to the number 4.

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

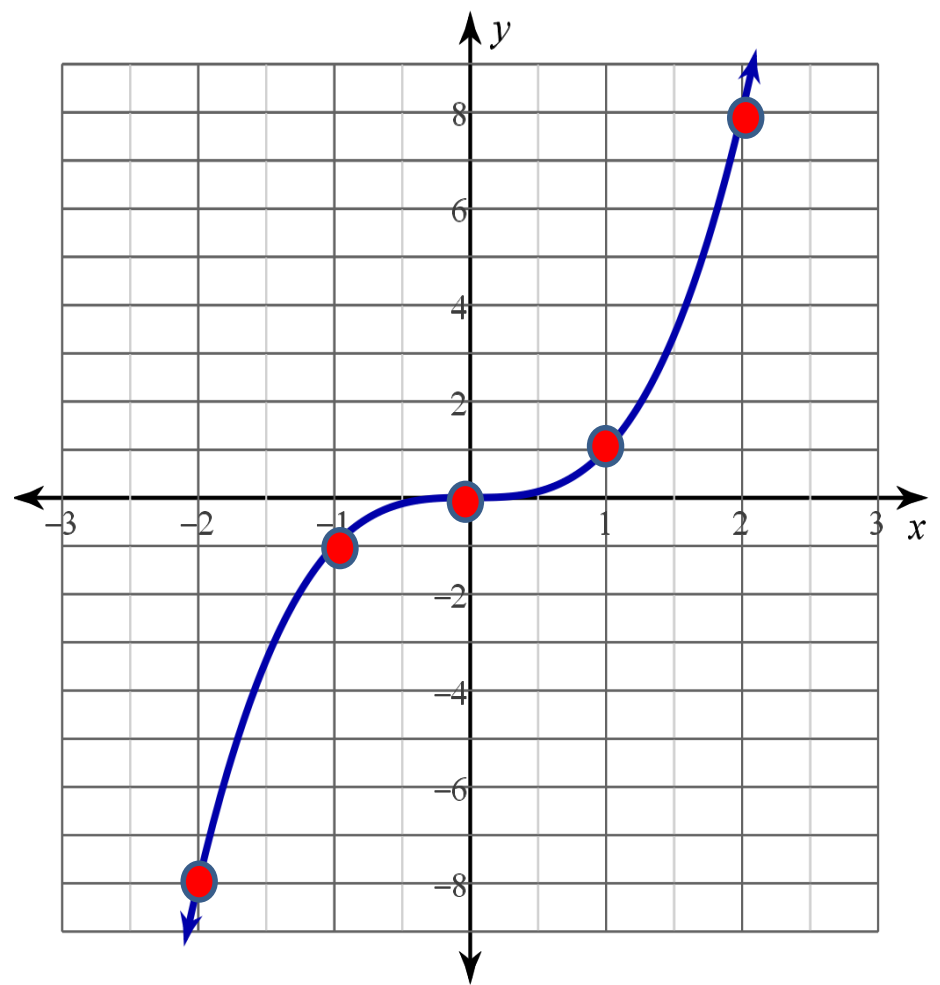
$$y = (-2)^3$$

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

$$y = (0)^3$$

$$y = (1)^3$$

$$y = (2)^3$$



Domain of the graph?

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

Range of the graph?

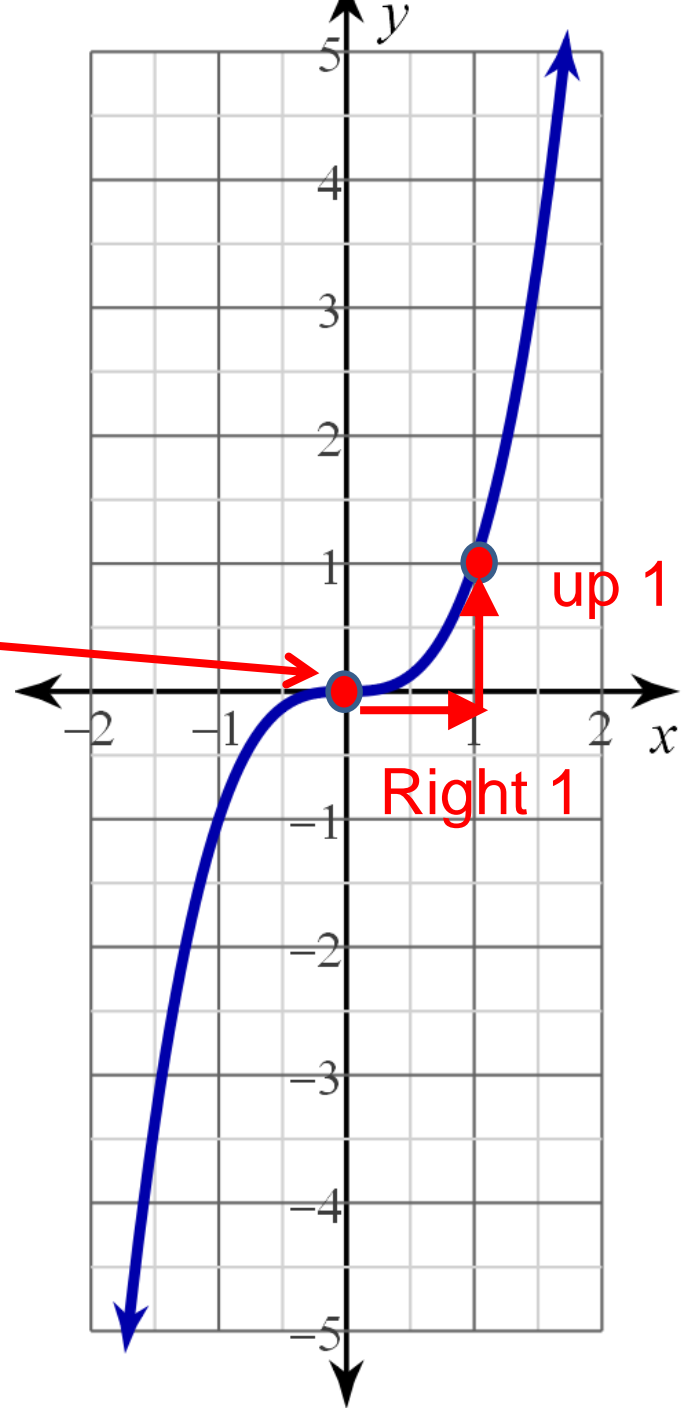
$$y = (-\infty, \infty)$$

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

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)

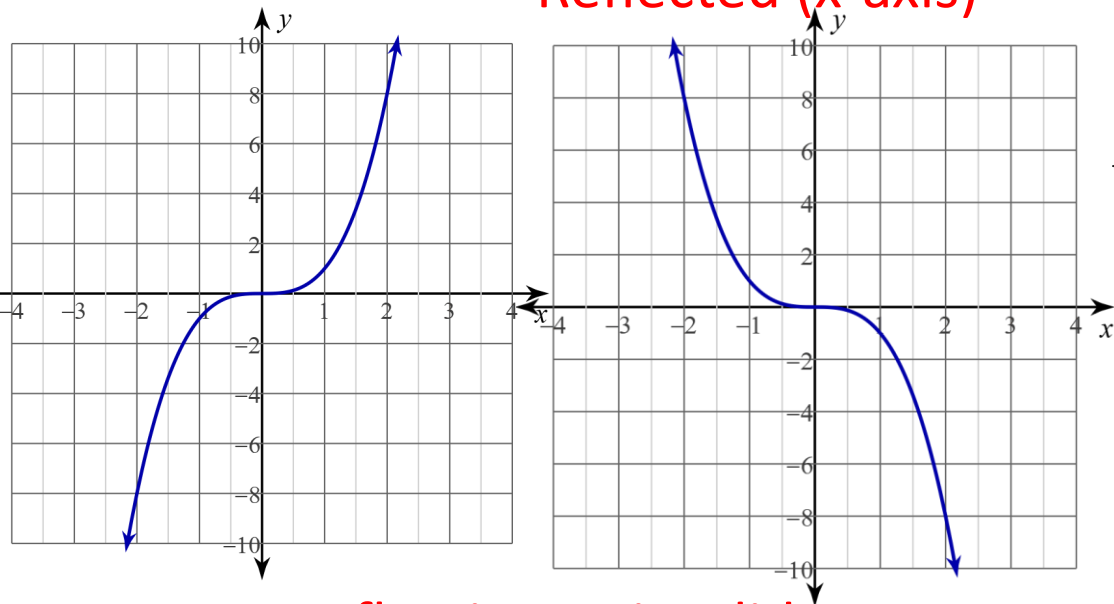
Reflection across the x-axis and vertical stretching
affects the shape of the graph.

Describe the transformations:

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

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

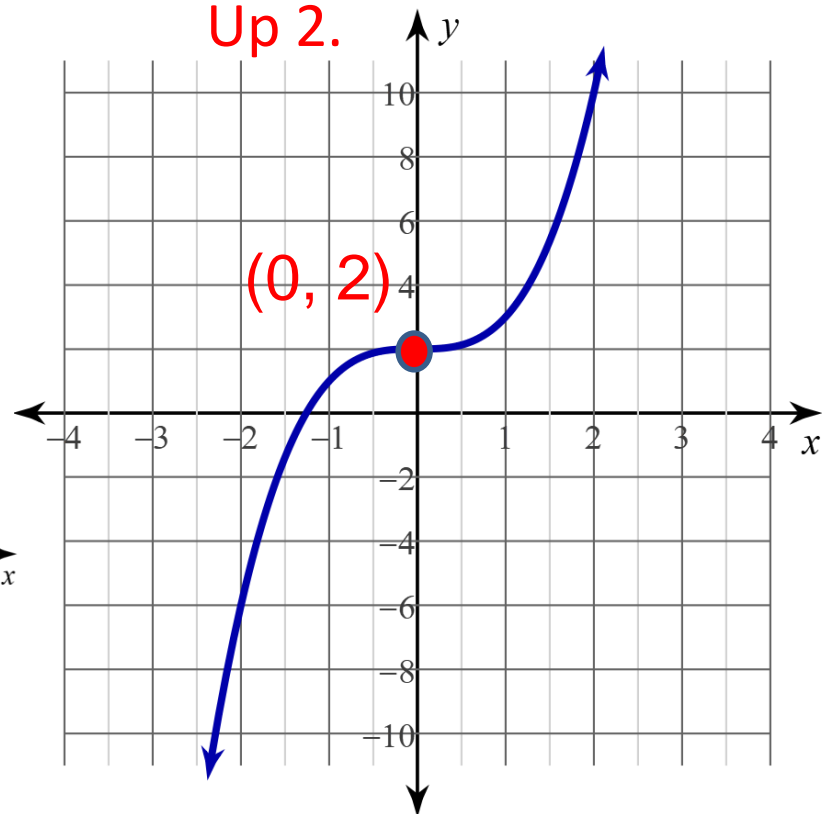
Reflected (x-axis)



Inflection point did not move,
but the shape changed.

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

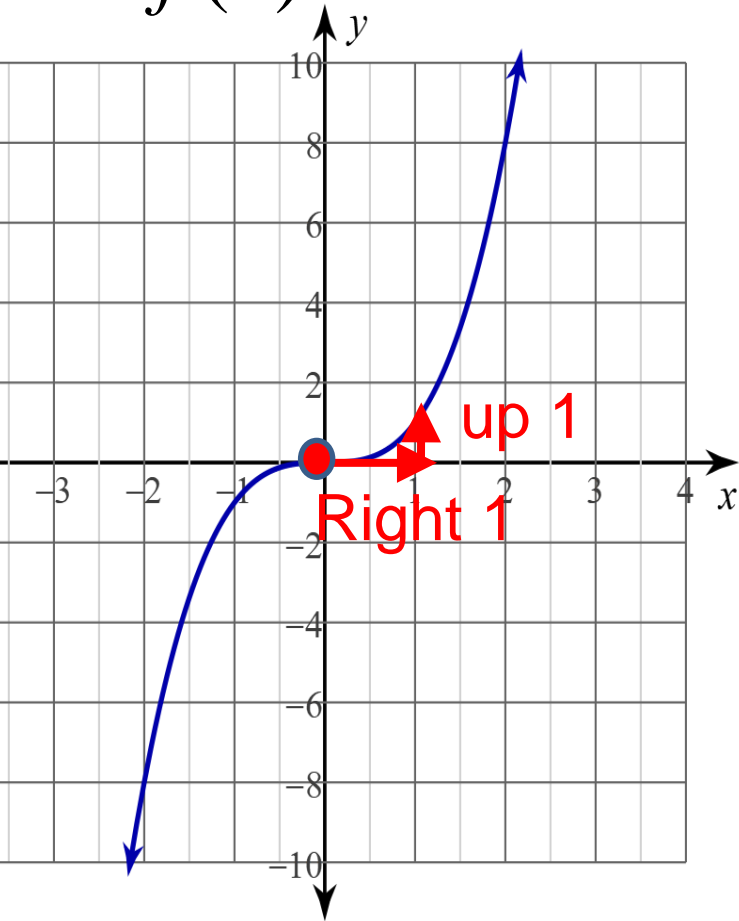
Up 2.



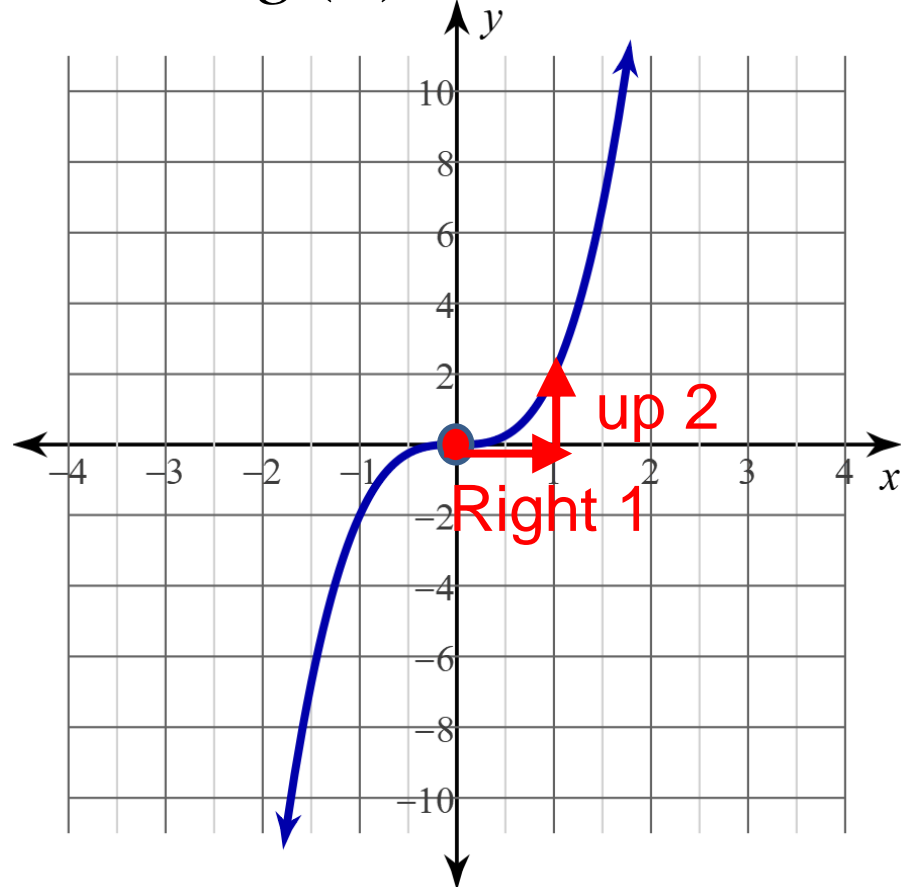
Inflection point moved,
shape did not change.

Describe the transformations of the parent function given by:

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



$$g(x) = 2x^3 \quad \text{VSF} = 2.$$

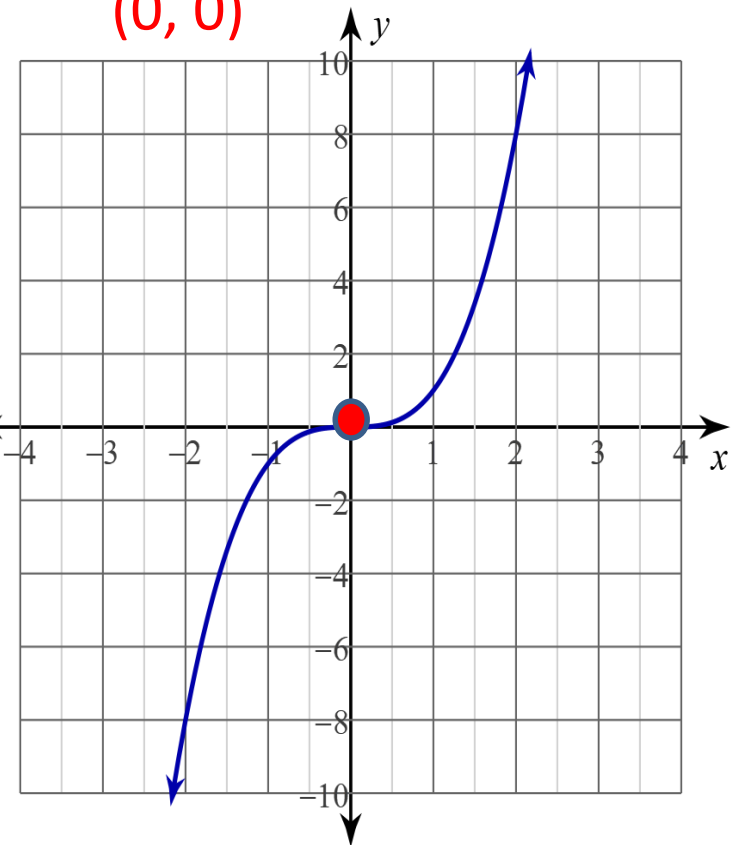


Inflection point did not move,
shape is vertically stretched

Where is the inflection point?

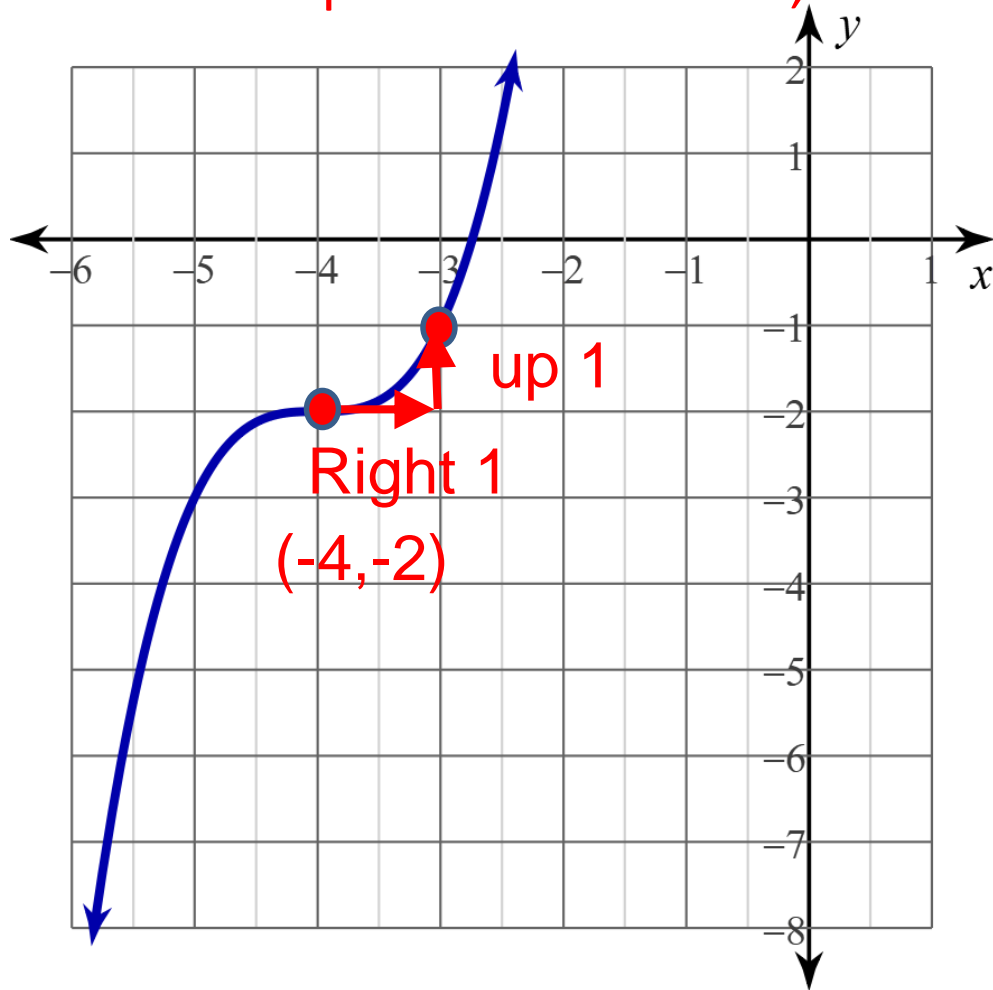
$$f(x) = x^3$$

$(0, 0)$



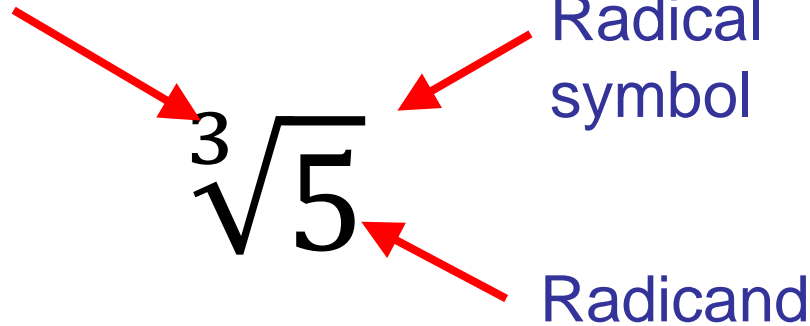
$$j(x) = (x + 4)^3 - 2$$

Inflection point moves left 4, down 2



Cubed Root (or 3rd root)

Index
number



Some number equals the cubed root of 5.

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

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

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

$$x^3 = 5$$

$\sqrt[3]{5}$ 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

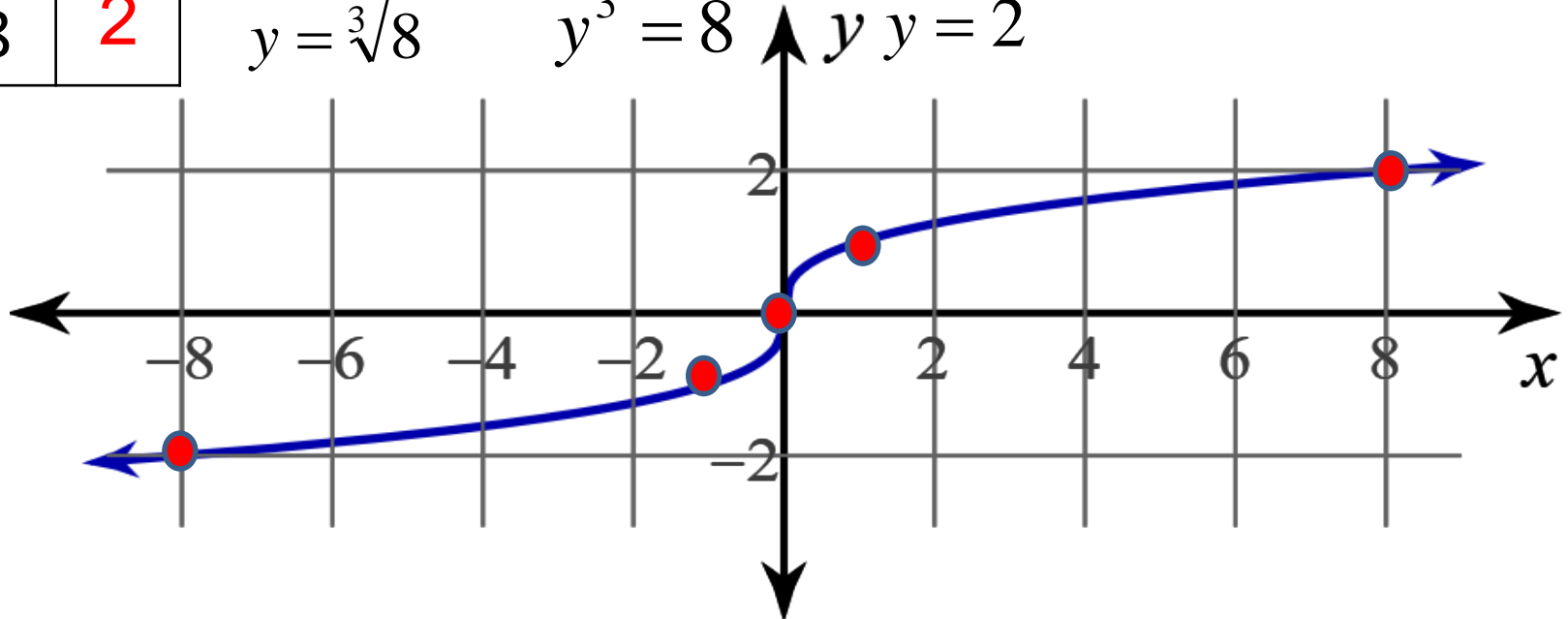
$$y = \sqrt[3]{-8} \quad y^3 = -8 \quad y = -2$$

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

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

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

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



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

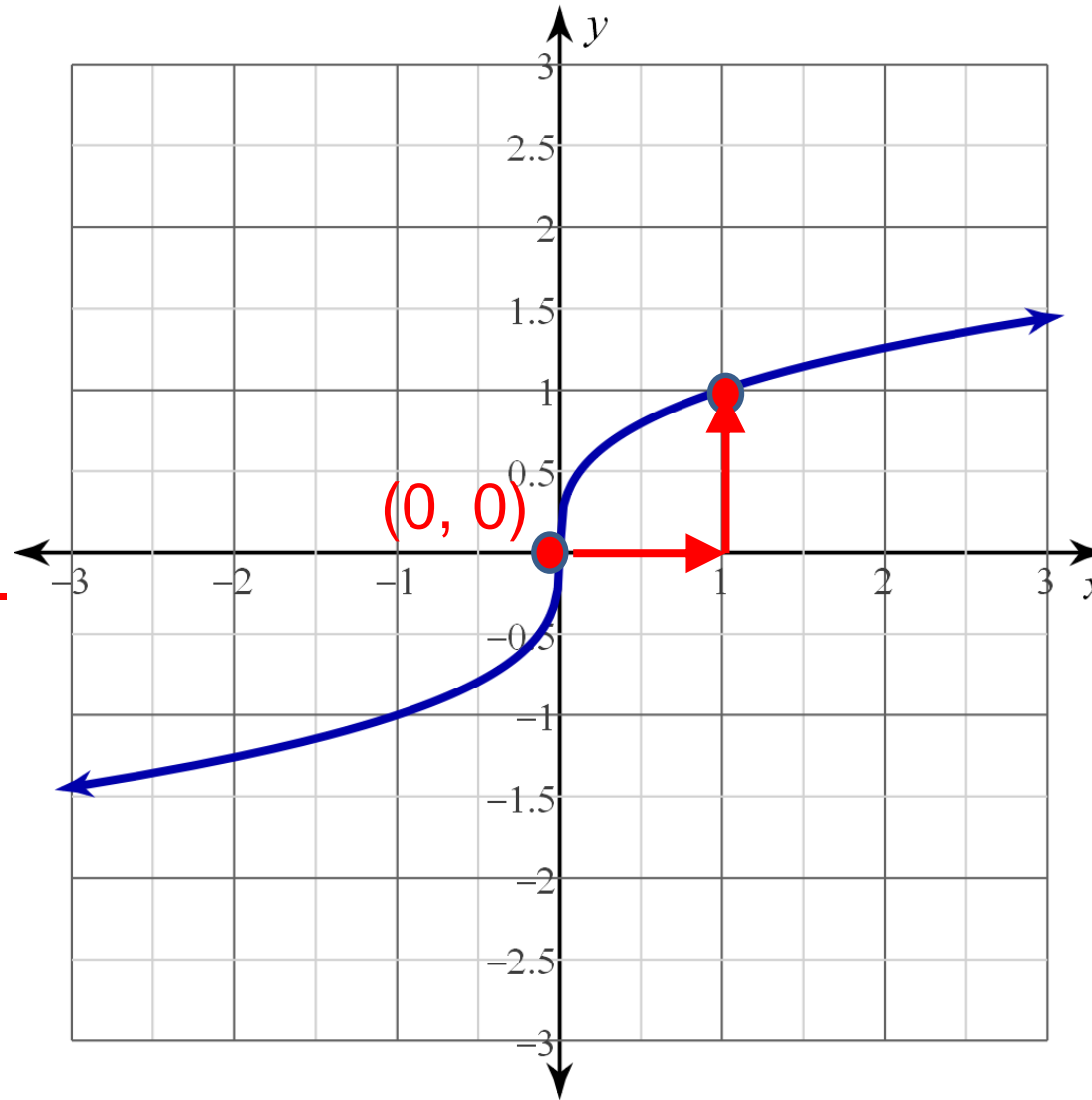
Not vertically stretched:

“right 1, up 1”

From the inflection point

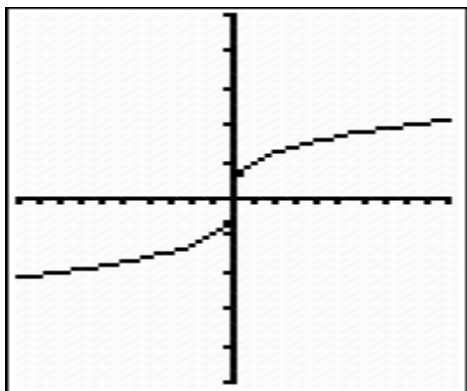
domain? **All real numbers.**

range? **All real numbers.**

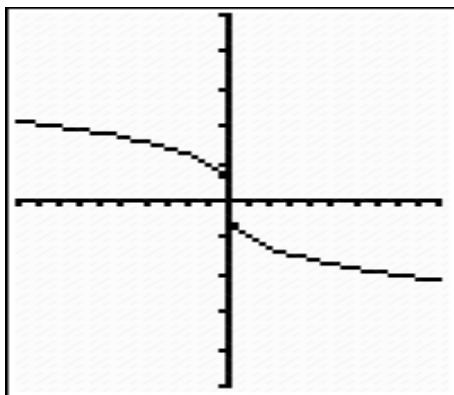


What is the transformation of the parent function?

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

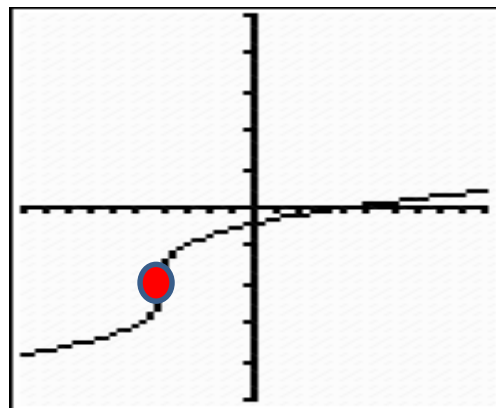


$$k(x) = -\sqrt[3]{x}$$



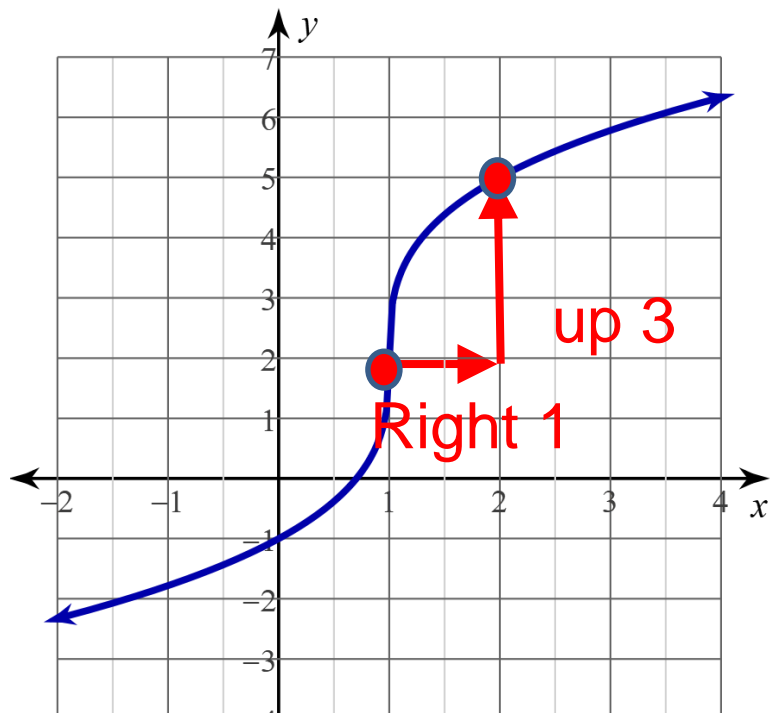
Reflected(x-axis)

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



Left 4, down 2

Inflection point: (-4, -2)

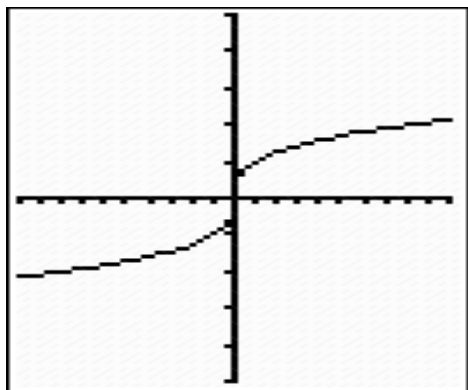


$$j(x) = 3\sqrt[3]{x - 1} + 2$$

VSF=3, right 1, up 2

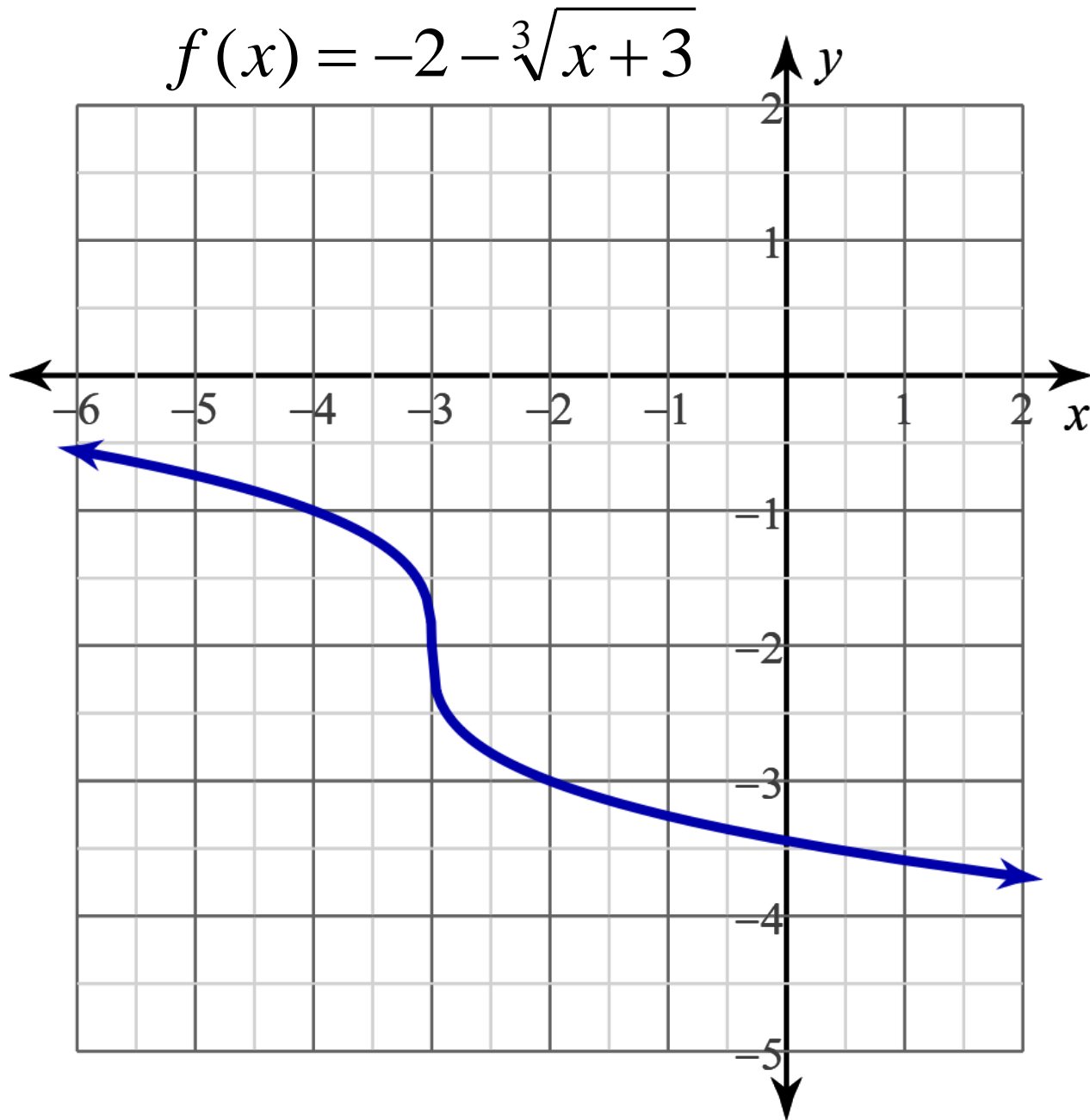
Inflection point: (1, 2)

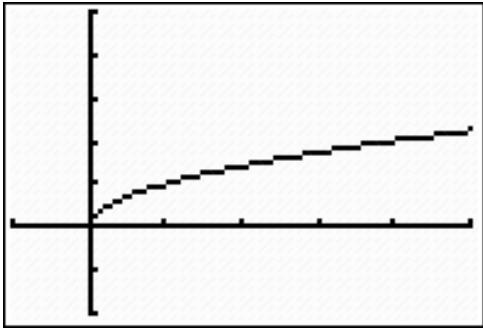
$$f(x) = \sqrt[3]{x}$$



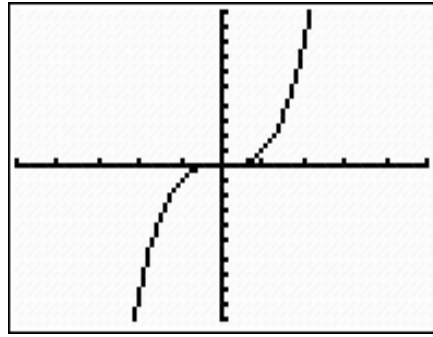
Graph the (without a calculator).

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

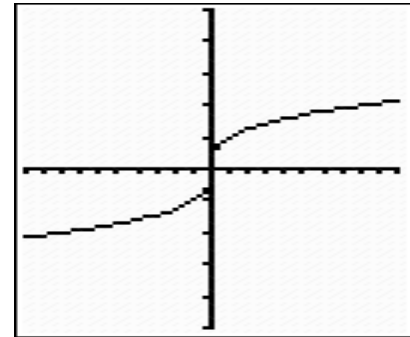




$$f(x) = \sqrt{x}$$



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



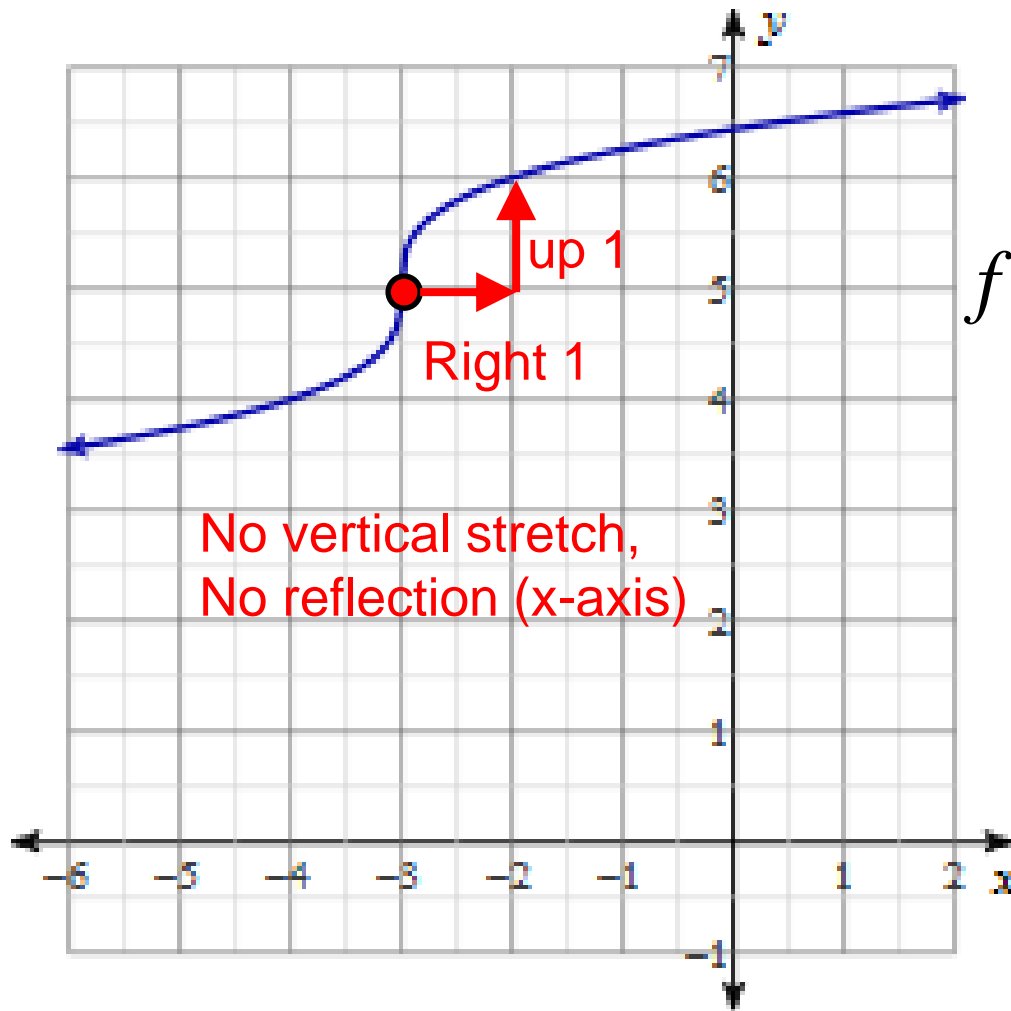
$$f(x) = \sqrt[3]{x}$$

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

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

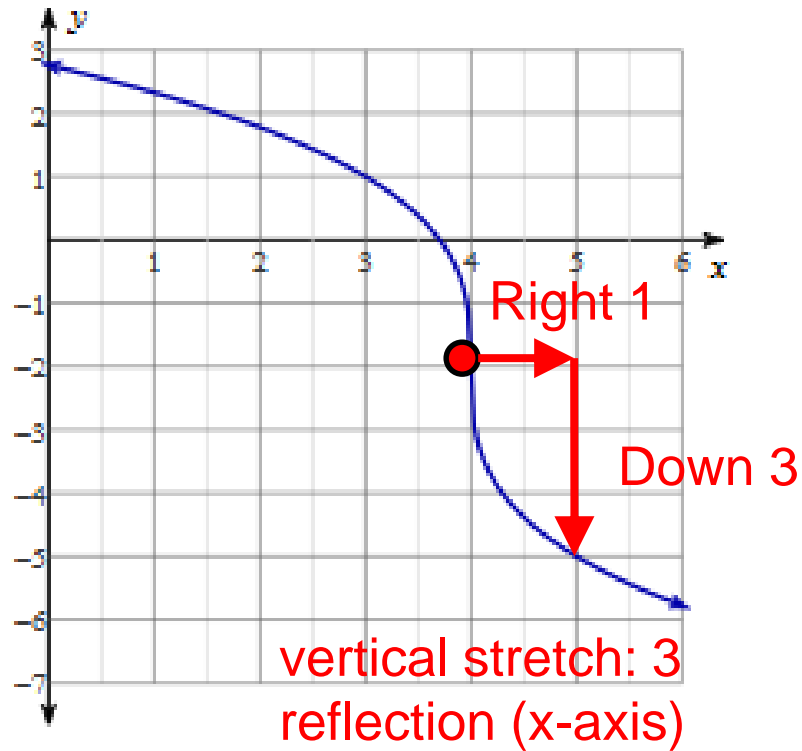
$$y = (-1)a\sqrt[3]{x-h} + k$$

What is the equation of the graph?



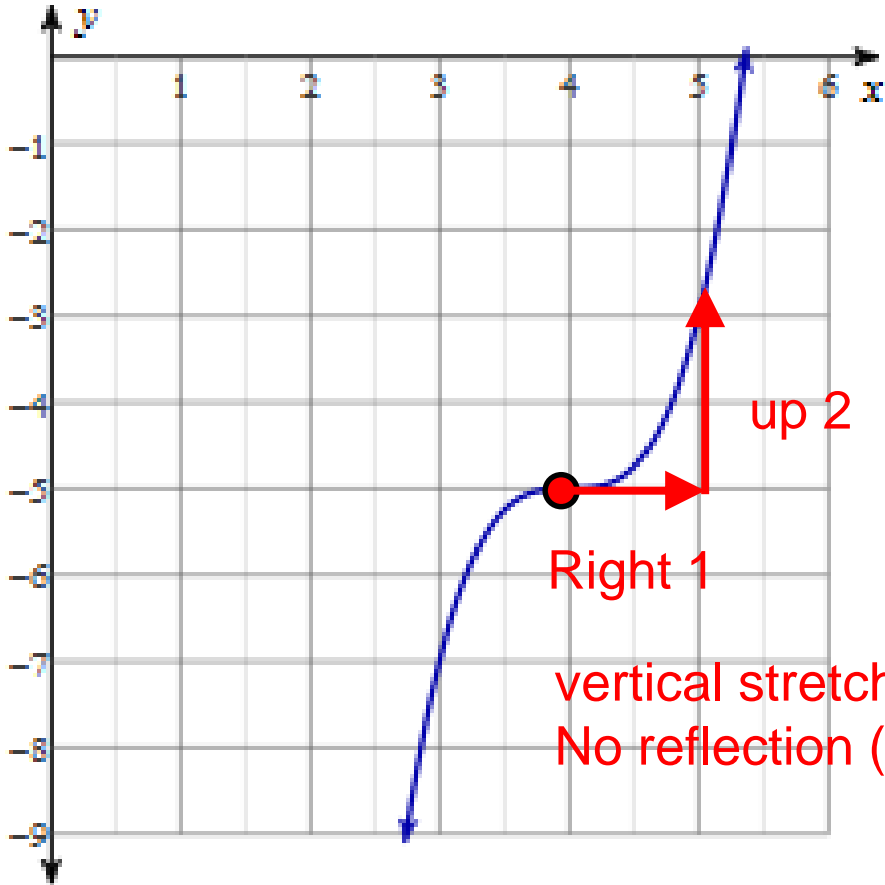
$$f(x) = 5 + \sqrt[3]{x + 3}$$

What is the equation of the graph?



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

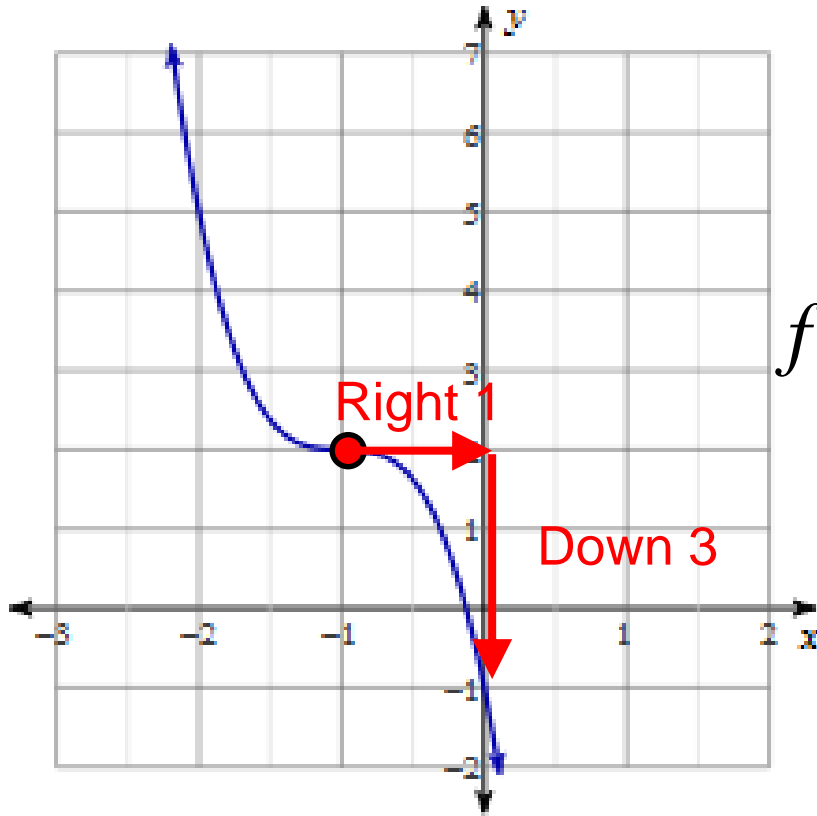
What is the equation of the graph?



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

vertical stretch: 2
No reflection (x-axis)

What is the equation of the graph?



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

vertical stretch:3
reflection (x-axis)