

# Properties of Square Root Functions

The square root function is the inverse of the quadratic.  $y = x^2 \rightarrow y = \sqrt{x}$

Given:  $f(x) = 2\sqrt{x + 3} - 1$  and  $g(x) = -\frac{1}{3}\sqrt{2x + 6} + 3$

Evaluate  $f(6)$

$$f(6) = 2\sqrt{6 + 3} - 1$$

$$f(6) = 2\sqrt{9} - 1$$

$$f(6) = 2(3) - 1$$

$$f(6) = 6 - 1 = 5$$

Evaluate  $g(15)$

$$g(15) = -\frac{1}{3}\sqrt{2(15) + 6} + 3$$

$$g(15) = -\frac{1}{3}\sqrt{36} + 3$$

$$g(15) = -\frac{1}{3}(6) + 3$$

$$g(15) = -2 + 3 = 1$$

The square root of something can be written with an exponent of  $\frac{1}{2}$ . Re-write first, then solve.

$$\text{Given: } h(x) = 4(10 - 2x)^{1/2} + 2$$

Evaluate  $h(3)$

$$h(x) = 4\sqrt{10 - 2x} + 2$$

$$h(3) = 4\sqrt{10 - 2(3)} + 2$$

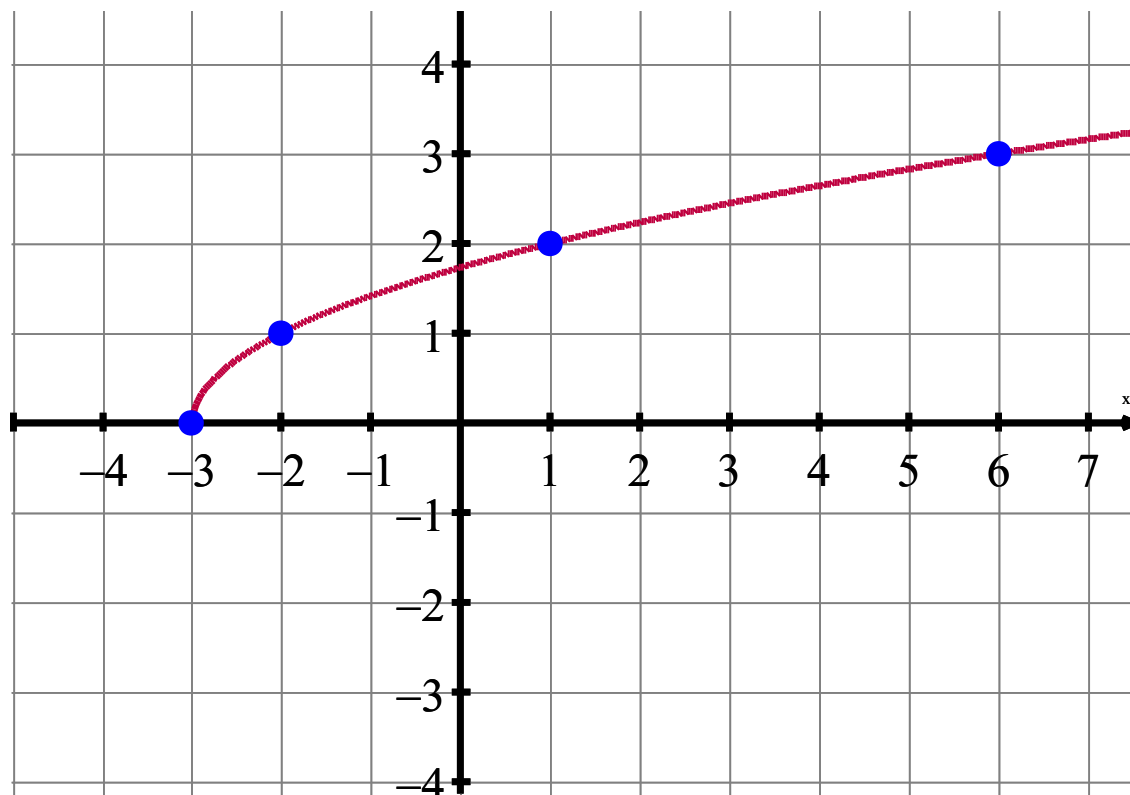
$$h(3) = 4\sqrt{10 - 6} + 2$$

$$h(3) = 4\sqrt{4} + 2$$

$$h(3) = 4(2) + 2$$

$$h(3) = 8 + 2 = 10$$

Graph the function  $y = \sqrt{x + 3}$



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

Vertex:  $(-3, 0)$

y-intercept:  $(0, \sqrt{3})$

x-intercept:  $(-3, 0)$

Decreasing: Never

Increasing:  $(-3, \infty)$

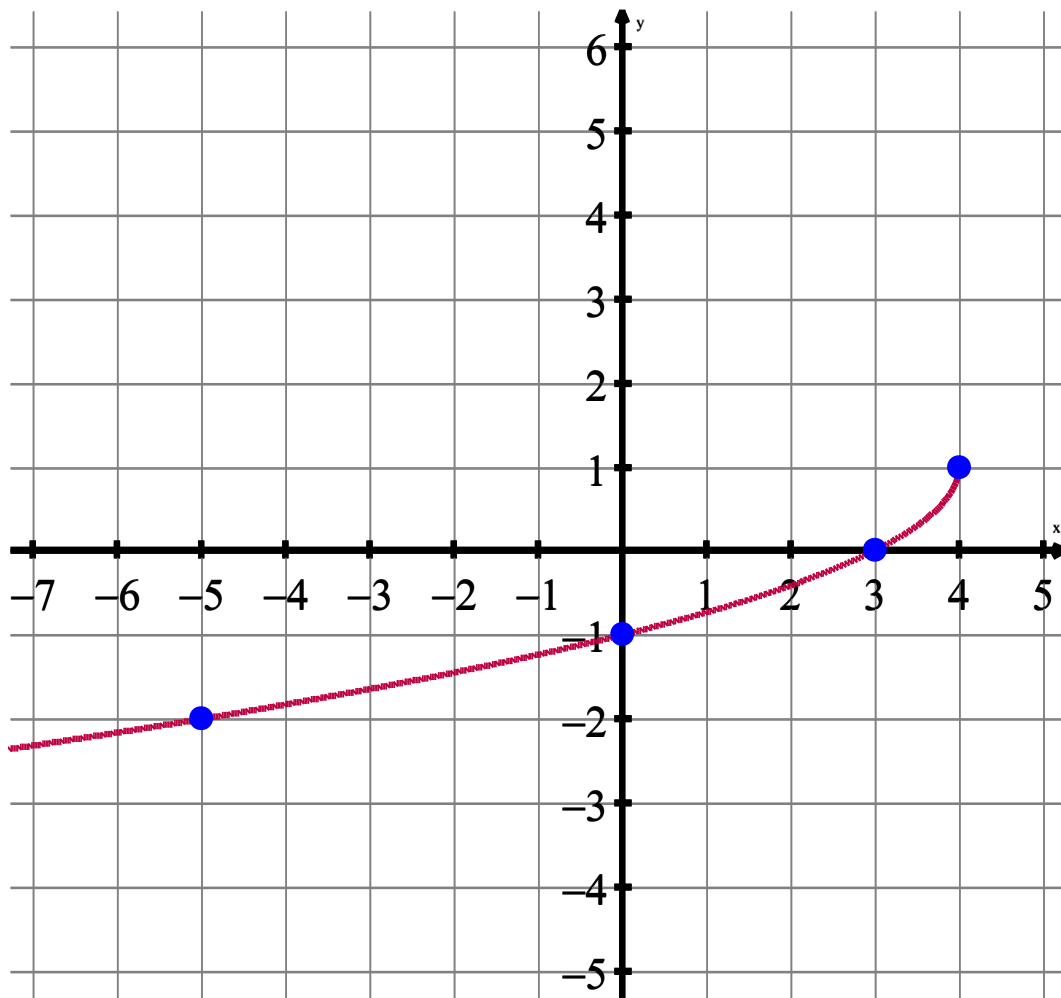
Domain:  $[-3, \infty)$

Range:  $[0, \infty)$

End behavior:

As  $x \rightarrow \infty$ ,  $f(x) \rightarrow \infty$

Graph  $y = -\sqrt{4 - x} + 1$



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

Vertex:  $(4, 1)$

y-intercept:  $(0, -1)$

x-intercept:  $(3, 0)$

Decreasing: Never

Increasing:  $(-\infty, 4)$

Domain:  $(-\infty, 4]$

Range:  $(-\infty, 1]$

End behavior:

As  $x \rightarrow -\infty$ ,  $f(x) \rightarrow -\infty$

Find the vertex of:

$$f(x) = -3\sqrt{3x + 9} - 2$$

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

Vertex: (-3, -2)

$$g(x) = 2\sqrt{16 - 2x} + 4$$

$$g(x) = 2\sqrt{-2x + 16} + 4$$

$$g(x) = 2\sqrt{-2(x - 8)} + 4$$

Vertex: (8, 4)