



2.2 Square Root of a Function



Focus On ...

- sketching the graph of $y = \sqrt{f(x)}$ given the graph of $y = f(x)$
- explaining strategies for graphing $y = \sqrt{f(x)}$ given the graph of $y = f(x)$
- comparing the domains and ranges of the functions $y = f(x)$ and $y = \sqrt{f(x)}$, and explaining any differences



Square Root Function

The function $y = \sqrt{f(x)}$ is the square root of the function and is **only defined** for $f(x) \geq 0$

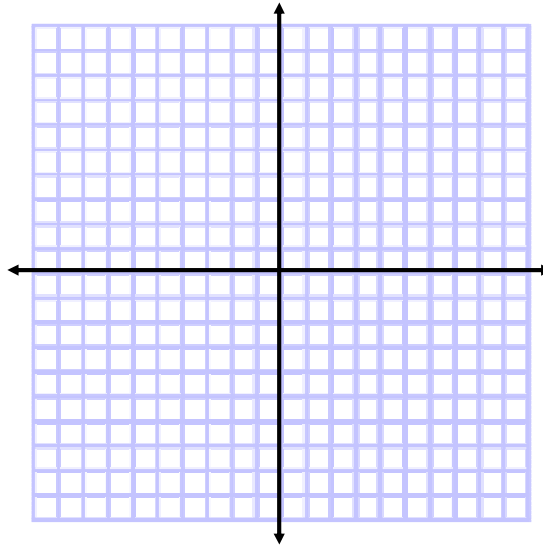
The function $y = \sqrt{2x+1}$ represents the **square root of the function** $y = 2x+1$

Example 1

Compare Graphs of a Linear Function and the Square Root of the Function

- a) Given $f(x) = 3 - 2x$, graph the functions $y = f(x)$ and $y = \sqrt{f(x)}$.
- b) Compare the two functions.

x	$y = 3 - 2x$	$y = \sqrt{3 - 2x}$
-2		
-1		
0		
1		
1.5		



Relative Locations of $y = f(x)$ and $y = \sqrt{f(x)}$

The domain of $y = \sqrt{f(x)}$ consists only of the values in the domain of $f(x)$ for which $f(x) \geq 0$.

The range of $y = \sqrt{f(x)}$ consists of the square roots of the values in the range of $y = f(x)$ for which $\sqrt{f(x)}$ is defined.

The graph of $y = \sqrt{f(x)}$ exists only where $f(x) \geq 0$. You can predict the location of $y = \sqrt{f(x)}$ relative to $y = f(x)$ using the values of $f(x)$.

Value of $f(x)$	$f(x) < 0$	$f(x) = 0$	$0 < f(x) < 1$	$f(x) = 1$	$f(x) > 1$
Relative Location of Graph of $y = \sqrt{f(x)}$	The graph of $y = \sqrt{f(x)}$ is undefined.	The graphs of $y = \sqrt{f(x)}$ and $y = f(x)$ intersect on the x-axis.	The graph of $y = \sqrt{f(x)}$ is above the graph of $y = f(x)$.	The graph of $y = \sqrt{f(x)}$ intersects the graph of $y = f(x)$.	The graph of $y = \sqrt{f(x)}$ is below the graph of $y = f(x)$.

Example 2**Compare the Domains and Ranges of $y = f(x)$ and $y = \sqrt{f(x)}$**

Identify and compare the domains and ranges of the functions in each pair.

a) $y = 2 - 0.5x^2$ and $y = \sqrt{2 - 0.5x^2}$

graph a)

b) $y = x^2 + 5$ and $y = \sqrt{x^2 + 5}$

Method 1: Analyse Graphically

graph b)

Method 2: Analyse Key Points

Use the locations of any intercepts and the maximum value or minimum value to determine the domain and range of each function.

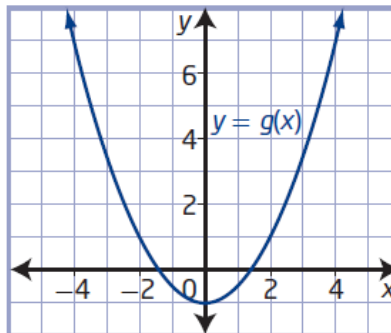
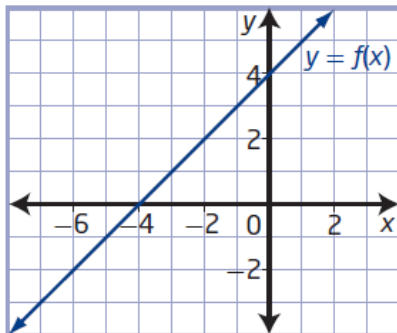
Function	$y = 2 - 0.5x^2$	$y = \sqrt{2 - 0.5x^2}$
x-Intercepts	-2 and 2	-2 and 2
y-Intercept	2	$\sqrt{2}$
Maximum Value	2	$\sqrt{2}$
Minimum Value	none	0

How can you justify this information algebraically?

Example 3

Graph the Square Root of a Function From the Graph of the Function

Using the graphs of $y = f(x)$ and $y = g(x)$, sketch the graphs of $y = \sqrt{f(x)}$ and $y = \sqrt{g(x)}$.



Key Ideas

- You can use values of $f(x)$ to predict values of $\sqrt{f(x)}$ and to sketch the graph of $y = \sqrt{f(x)}$.
- The key values to consider are $f(x) = 0$ and $f(x) = 1$.
- The domain of $y = \sqrt{f(x)}$ consists of all values in the domain of $f(x)$ for which $f(x) \geq 0$.
- The range of $y = \sqrt{f(x)}$ consists of the square roots of all values in the range of $f(x)$ for which $f(x)$ is defined.
- The y -coordinates of the points on the graph of $y = \sqrt{f(x)}$ are the square roots of the y -coordinates of the corresponding points on the original function $y = f(x)$.

What do you know about the graph of $y = \sqrt{f(x)}$ at $f(x) = 0$ and $f(x) = 1$? How do the graphs of $y = f(x)$ and $y = \sqrt{f(x)}$ compare on either side of these locations?

30.11	2	3	4
<p>Outcome 2a: I can demonstrate understanding of radical functions.</p>	<p>I can demonstrate the process of:</p> <ul style="list-style-type: none"> sketch the graph of $y = \sqrt{(x)}$ using a table of values identify the role of a, b, h, k given an equation 	<p>I can use transformations to graph $y - k = a\sqrt{b(x - h)}$</p> <p>I can explain the role of a, b, h, and k given an equation.</p> <p>Sketch the graph of $y = \sqrt{f(x)}$ given the graph of $y = f(x)$</p> <p>I can compare the domains and ranges of $y = \sqrt{f(x)}$ and $y = f(x)$</p> <p>Graphically solve Radical Equations with technology</p>	<p>I can determine a radical function from its graph</p> <p>Solve situational questions</p> <p>Answer theory questions</p>

Assignment

1 - 4, 5ab, 6ab, 7 ad, 8 , 9,
11 - 13, 16

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