Graphing Square Root Functions

Make a table for each function. **Ignore any points with decimals.**

$f(x) = x^2$

x	f(x)
0	0
1	1
2	4
3	9
4	16
5	25
6	36
7	49
8	64
9	81

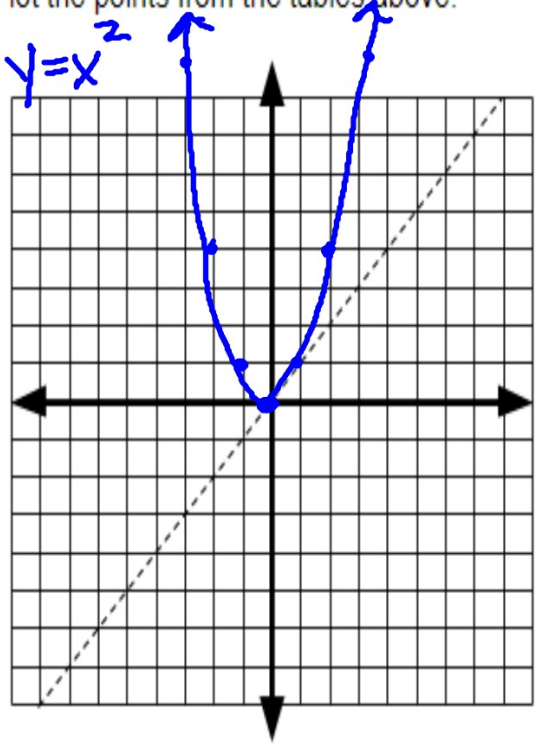
$f(x) = \sqrt{x}$

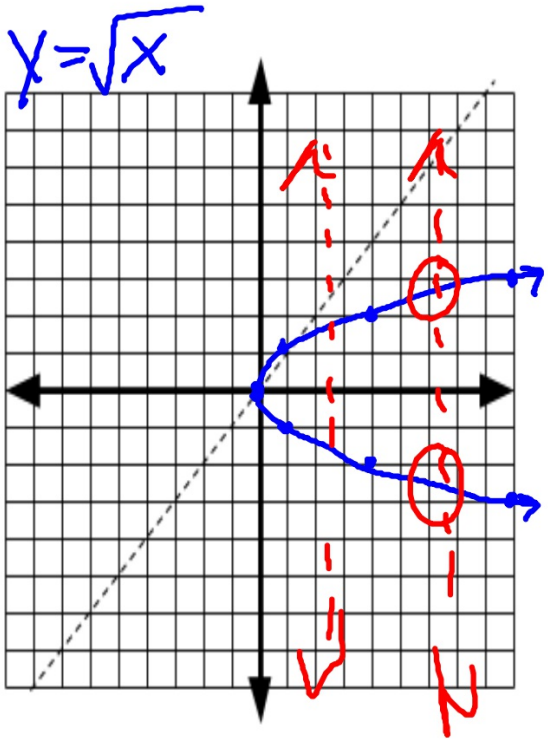
x	f(x)
0	0
1	1
2	1.414
3	1.732
4	2
5	2.235
6	2.445
7	2.644
8	2.828
9	3

What do you notice about the other points? The x & y are switched

These functions are inverses of each other. By definition, this means the x-values and the y-values are switched

Plot the points from the tables above.





As a result, the graphs have the same numbers in their points but the X and the Y coordinates have been switched.

This causes the graphs to have the same shape but to be flipped over the line Y=X.

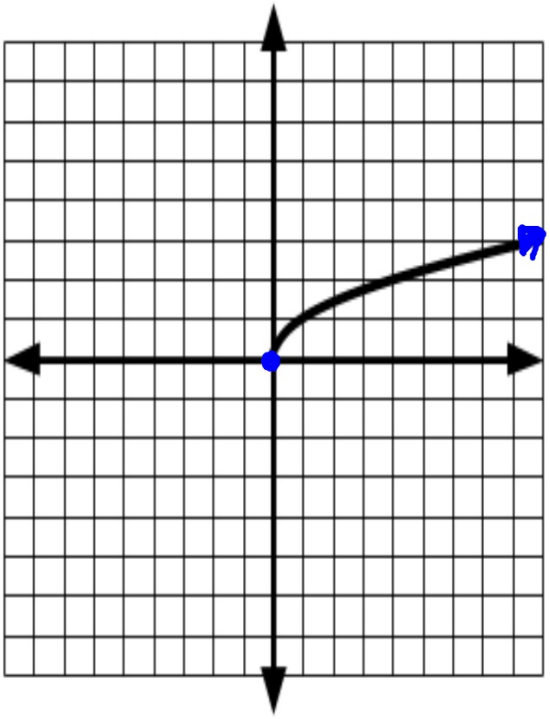
The Square Root Function

Did you notice the problem with the square root graph above????

Not a function :(

We have to define the Square Root Function as (positive only). This means that we will only use the top side of the graph.

The result: $f(x) = \sqrt{x}$



Characteristics of the graph

Vertex (0,0)

End Behavior

Domain $(0, \infty)$ (x-values)

Range $(0, \infty)$ (y-values)

Symmetry None

Pattern

Transforming the Graphs

Now that we know the shapes we can use what we know about transformations to put that shape on the coordinate plane. Let's remind ourselves where to look for each of these types of transformations!

Translate

left: inside $\sqrt{\ }$ $x + \#$

right: inside $\sqrt{\ }$ $x - \#$

up: outside $\sqrt{\ }$ $+$

down: outside $\sqrt{\ }$ $-$

Reflect

over y-axis $\sqrt{-x}$

over x-axis $-\sqrt{\ }$

Dilate

Stretch

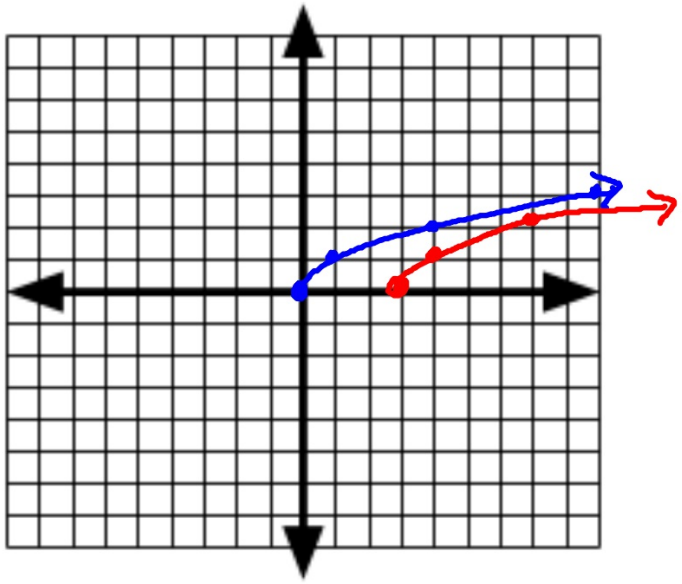
whole # multiplied

Compression

fraction multiplied

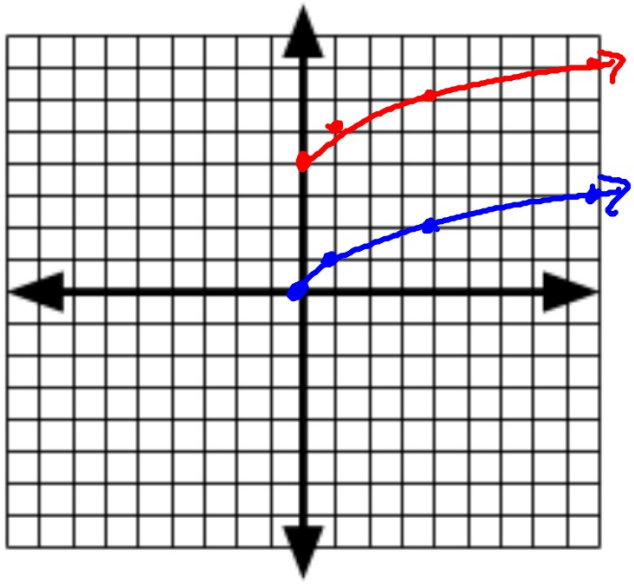
1) $f(x) = \sqrt{x-3}$

translate right 3



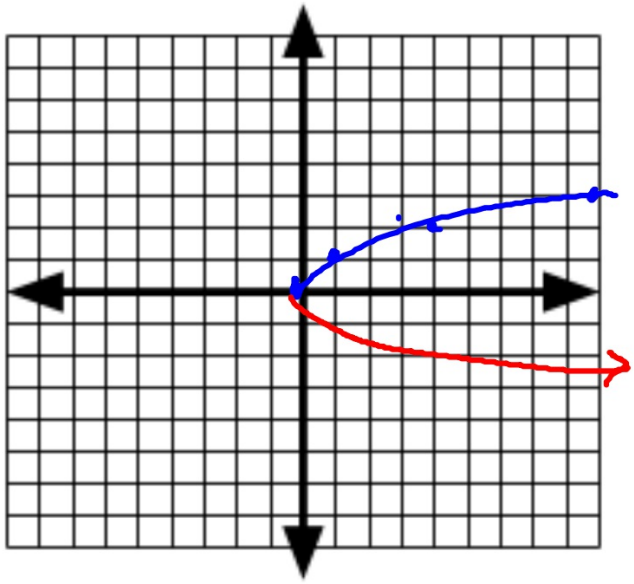
2) $f(x) = \sqrt{x} + 4$

translate up 4



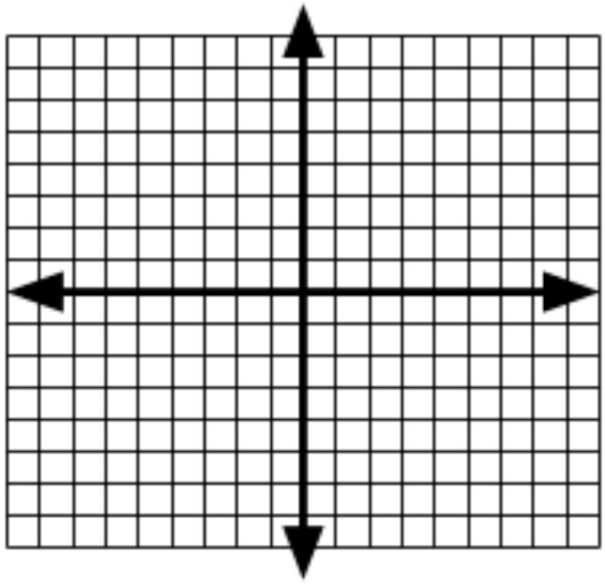
3) $f(x) = -\sqrt{x}$

reflect over x-axis



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

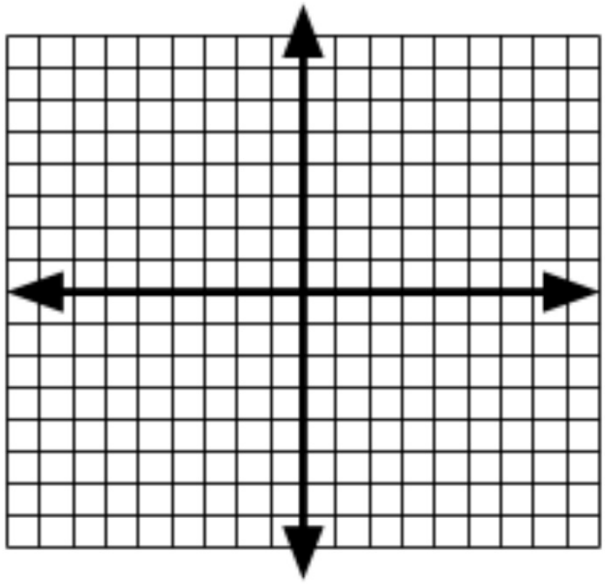
Reflect over y-axis



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

Stretch by 2

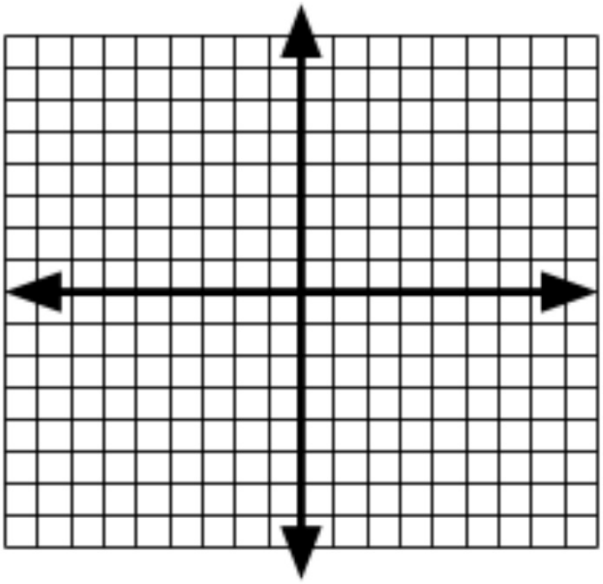
Left 3



6) $f(x) = \frac{1}{2}\sqrt{x}$

Compression

$\frac{1}{2}$



Sometimes the functions are not in graphing form. We may have to use some of our algebra skills to transform the equations into something we can use.

Ex: $f(x) = \sqrt{4x - 12}$ This is not in graphing form.

$\sqrt{4x-12}$ $\sqrt{4}\sqrt{x-3}$ Stretch by 2

$\sqrt{4(x-3)}$ $\boxed{y=2\sqrt{x-3}}$ Right 3

Ex: $f(x) = \sqrt{9x + 36} - 5$ This is not in graphing form.

$\sqrt{9x+36} - 5$ $\sqrt{9}\sqrt{(x+4)} - 5$

$\sqrt{9(x+4)} - 5$ $\boxed{3\sqrt{x+4} - 5}$

Stretch 3, left 4, down 5