Graphing Square Root Functions

Make a table for each function.

$F(x) = x^2$

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

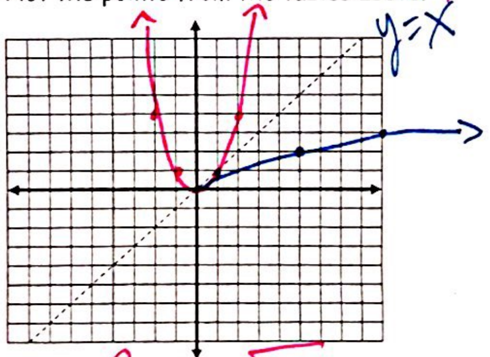
$f(x) = \sqrt{x}$

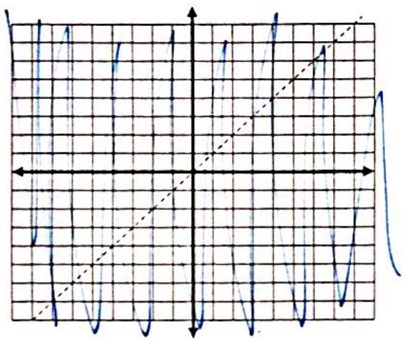
x	f(x)
0	0
1	1
2	1.41
3	1.73
4	2
5	2.24
6	2.45
7	2.65
8	2.83
9	3

Ignore the points with decimals. What do you notice about the other points? they switch places from one to the other.

These functions are inverses of each other. By definition, this means the Domain (x) and the Range (y) switch.

Plot the points from the tables above.





x^2
D: $(-\infty,\infty)$
R: $[0,\infty)$

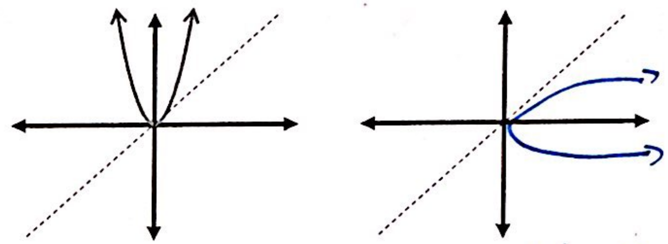
$\sqrt{x}$
D: $[0,\infty)$
R: $[0,\infty)$

As a result, the graphs have the same numbers in their points but the X and the y coordinates have Switched places.

This causes the graphs to have the Same shape but to be reflected over the line y=X.

The Square Root Function

Reflect the function $f(x) = x^2$ over the line $y = x$.

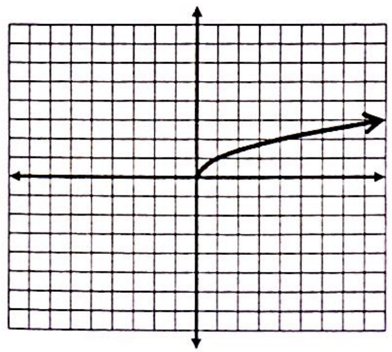


Problems? Not a function

We have to define the Square Root Function as $\sqrt{x^2} = |x|$.

This means that we will only use the top/positive side of the graph.

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



Characteristics of the graph

Vertex (0,0)

End Behavior Right increases Left Side Stops

Domain $[0,\infty)$

Range $[0,\infty)$

Symmetry None

Pattern X

$\sqrt{x}$

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.

Remember:

Translate (Slide)

Right 2: $\sqrt{x-2}$

left 2: $\sqrt{x+2}$

up 3: $\sqrt{x}+3$

Down 3: $\sqrt{x}-3$

Reflect

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

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

Dilate

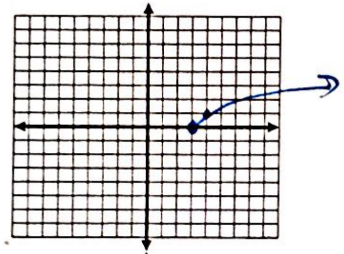
$2\sqrt{x}$: vert. stretch

$\frac{1}{2}\sqrt{x}$: vert. compress

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

$\sqrt{4-3}$

x	y
4	1

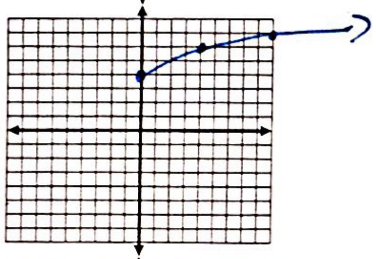


2) $f(x) = \sqrt{x} + 4$

$\sqrt{4} + 4$

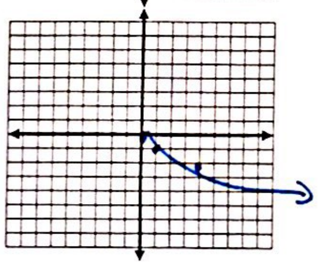
$\sqrt{9} + 4$

x	y
4	6
9	7

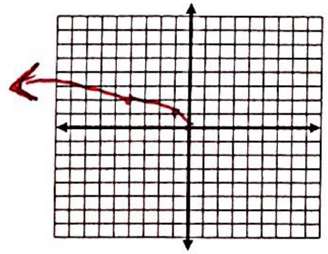


3) $f(x) = -\sqrt{x}$

x	y
0	0
1	-1
4	

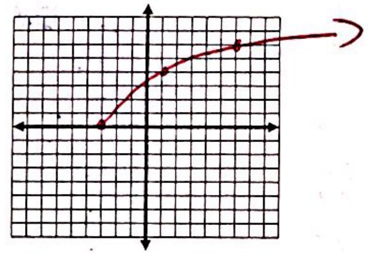


4) $f(x) = \sqrt{-x}$



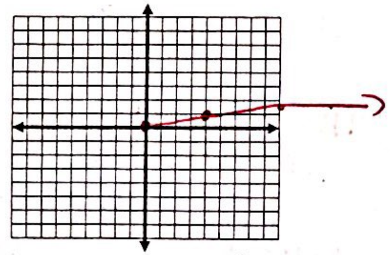
5) $f(x) = 2\sqrt{x+3}$

x	y
1	4
6	6



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

x	y
4	1
9	1.5



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.

$\sqrt{4(x-3)}$

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

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

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

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

$= \sqrt{-(x-2)}$