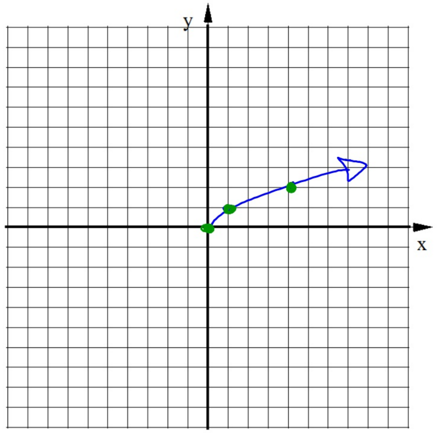
Graph the following using graph paper and at least three points.

$y = \sqrt{x}$

x	y
0	0
1	1
4	2

plotting using integer values only requires you to input the first three perfect squares.



How are the values in the tables for these two related?

$y = x^2$

x	y
0	0
1	1
2	4
3	9

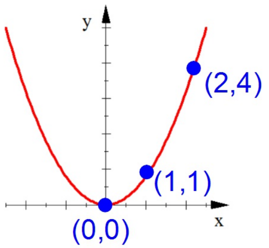
$y = \sqrt{x}$

x	y
0	0
1	1
4	2
9	3

The x's and y's are switched!

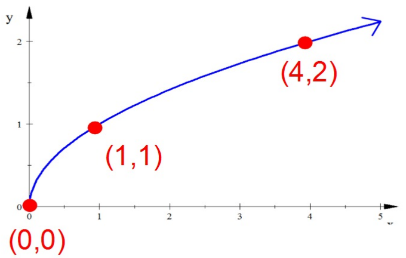
The parent quadratic:

$y = x^2$



The parent sq root:

$y = \sqrt{x}$

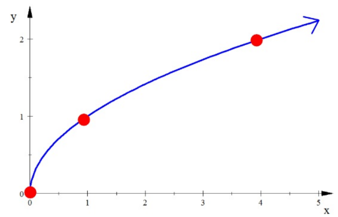


The coordinates of the points on the parent square root function are just the coordinates from the parent quadratic with x and y switched. This is because the two functions are inverses.

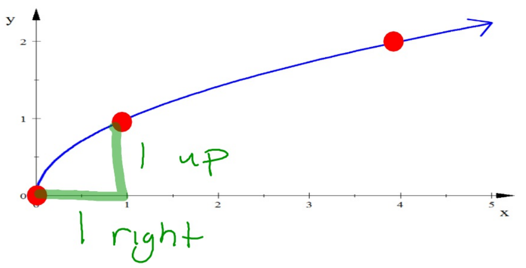
The graph of the Parent Square Root Function: $y = \sqrt{x}$

The graph of a square root doesn't have a Vertex

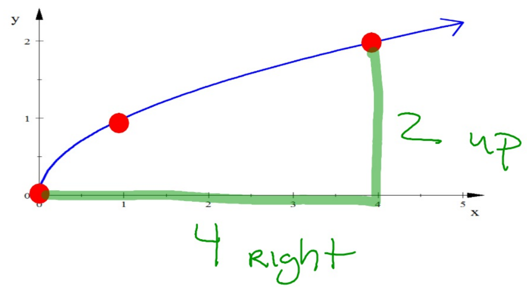
Starting Point is: (0,0)



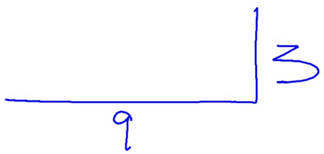
First "Good Point"



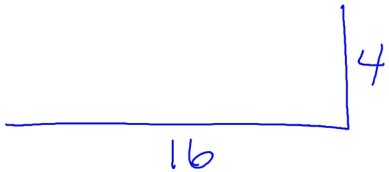
Second "Good Point"



Third "good point"



Fourth "good point"



The graph of $y = \sqrt{x}$ is only half of a sideways parabola because

- $\sqrt{x}$ means the Principal (positive) Square Root which would be the top half of the sideways parabola.
- An entire sideways parabola would NOT be a function and the graphing calculator can only graph functions.

Describe what transformations each equation models:

$$y = 2(x-5)^2 + 7$$

2   2 times taller (vertical stretch factor of 2)

-5   moved 5 units right

+7   moved 7 units up

$$y = -\frac{1}{2}|x+6| - 8$$

-1/2   half as tall (vertical shrink factor)
Upside down (x-axis reflection)

+6   moved 6 units left

-8   moved 8 units down

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

h: Horizontal Translation

k: Vertical Translation

a: a>1 Vertical Stretch

0<a<1 Vertical Shrink

a <0: x-axis reflection (upside down)

The new starting point
or
The new origin

(h,k)

Graph each using three points. Include an arrow to indicate which direction the graph continues.

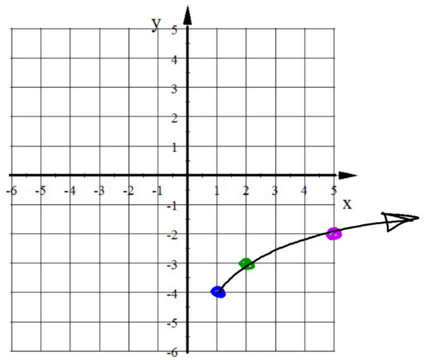
$$y = \sqrt{x-1} - 4$$

1 Right 4 down
STARTS AT (1,-4)

a=1 ⇒ same height as parent function

1ST PT
1
1

2nd PT
2
4



Graph each using three points. Include an arrow to indicate which direction the graph continues.

$y = 2\sqrt{x+3} + 1$

3 left 1 up

STARTS AT (-3,1)

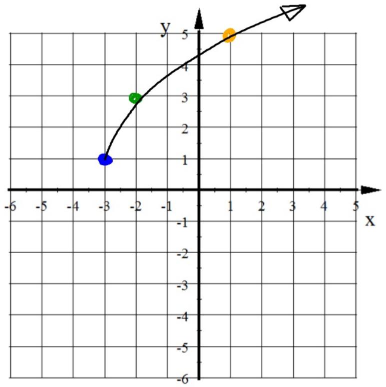
2 Times taller

1ST PT

1 | 1x2 → 1 | 2

2nd pT

4 | 2x2 → 4 | 4



Graph each using three points. Include an arrow to indicate which direction the graph continues.

$y = -4\sqrt{x+2} + 3$

2 left 3 up

STARTS AT (-2,3)

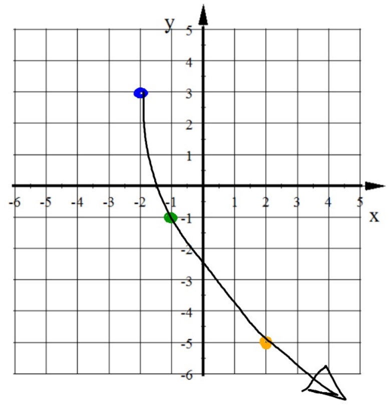
4x Taller & upside down

1ST PT

1 | 1x-4 → 1 | -4

2nd PT

4 | 2x-4 → 4 | -8



When we graphed parabolas we

- shifted them left, right, up and down
- made them taller and shorter
- made them upside down (x-axis reflection)

What didn't we do?

make them backwards (y-axis reflection)

Why not?

Since a parabola is already symmetric about a vertical line a y-axis reflection won't change it.

Since $y = \sqrt{x}$ isn't symmetric about the y-axis you can make it backwards.

If an upside down square root (x-axis reflection) is:

$$y = -\sqrt{x}$$

A backward square root function (y-axis reflection) is:

$$y = \sqrt{-x}$$

Write the equation of the parent square root function after the following transformations:

- move 4 units up
- move 11 units left
- 3 times taller
- x-axis reflection

$y = -3\sqrt{x+11} + 4$

Write the equation of the parent square root function after the following transformations:

- move 9 units down
- half as tall
- y-axis reflection

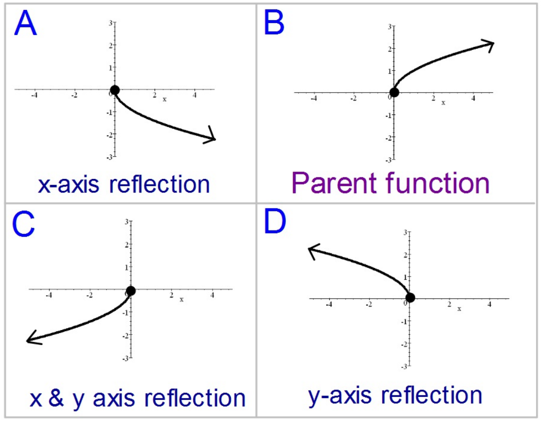
$y = \frac{1}{2}\sqrt{-x} - 9$

Write the equation of the parent square root function after a y-axis reflection and moving it 7 units right.

When you have both a Horizontal Translation and a y-axis reflection you must use PARENTHESES to separate the two transformations

$y = \sqrt{-(x-7)}$

The shapes of the square root function:



Match the graphs with the equations

1. $y = -\sqrt{-x}$ C
2. $y = \sqrt{x}$ B
3. $y = -\sqrt{x}$ A
4. $y = \sqrt{-x}$ D

Graph this square root function

$y = 2\sqrt{-(x-5)} - 2$

5 RT 2 down

STARTS AT (5, 2)

2x Taller

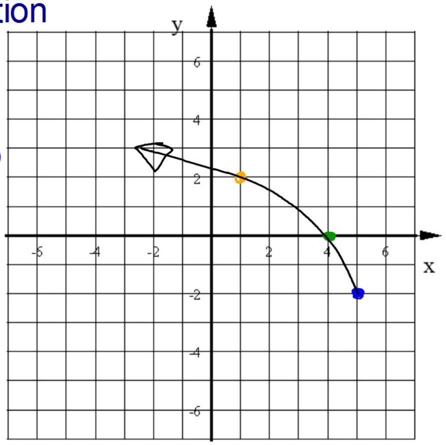
Backwards

1ST point

1 | 1 × 2 → 2 | 1 BACKWARDS

2nd point

4 | 2 × 2 → 4 | 4 Backwards



Graph this square root function

$y = -4\sqrt{-(x+2)} + 6$

2 left 6 up

STARTS AT (−2, 6)

4x Taller & upside down

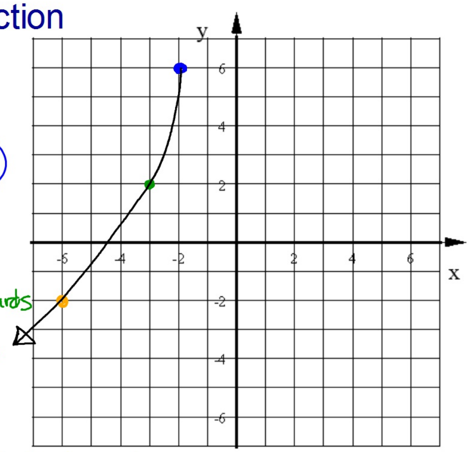
Backwards

1ST PT

1 | 1x −4 → −4 | 1 Backwards

2nd PT

4 | 2x −4 → −8 | 4 Backwards



Write the equation of this function

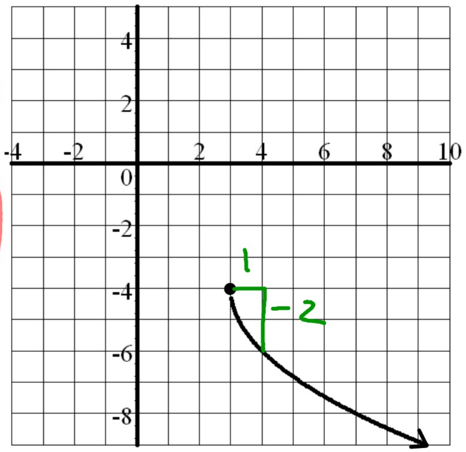
STARTS AT (3, −4)
h k

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

1 | 1 became 1 | −2

upside down and 2x taller

a = −2



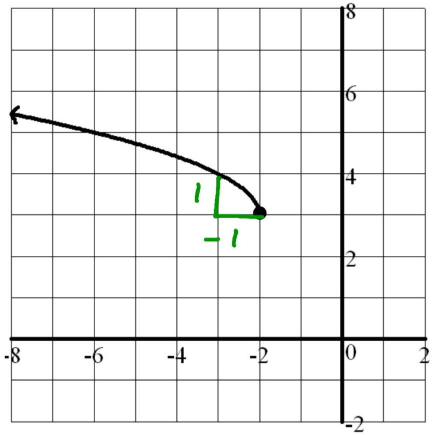
Write the equation function

STARTS AT (−2, 3)
h k

1 | 1 became 1 | −1

- Backwards
- No Vertical Stretch or Shrink

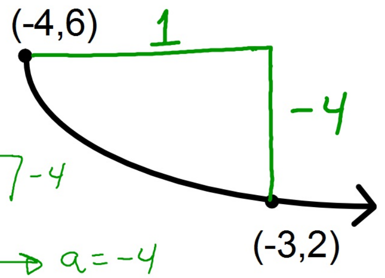
a = 1



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

Write the equation of this function

STARTS AT
$(-4, 6)$
$h \; k$



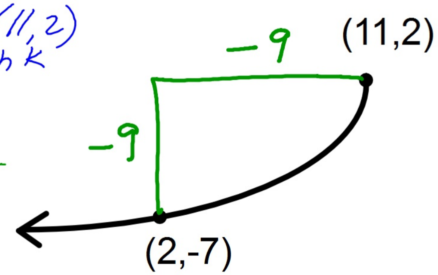
1 1 became 1 -4

upside down &
4x taller → $a = -4$

$$\boxed{y = -4\sqrt{x+4} + 6}$$

Write the equation of this function

STARTS AT $(11, 2)$
$h \; k$



9 3 became -9 -9

- backwards
- upside down
- 3x taller

$a = -3$

$$\boxed{y = -3\sqrt{-(x-11)} + 2}$$

Find the Domain and Range of each.

1. $y = 2\sqrt{x+1} - 3$

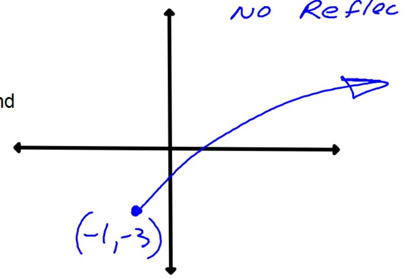
Domain:
$[-1, \infty)$

Range:
$[-3, \infty)$

Finding Domain and Range graphically

STARTS AT $(-1, -3)$
NO Reflections

Graphs goes up and to the right from (-1,-3)



Finding Domain and Range algebraically.

1. $y = 2\sqrt{x+1} - 3$

For domain: the radicand can't be negative.
Therefore set radicand ≥ 0 and solve for x.

$$x + 1 \geq 0$$
$$-1 \quad -1$$
$$x \geq -1$$

Domain: $(-1, \infty]$

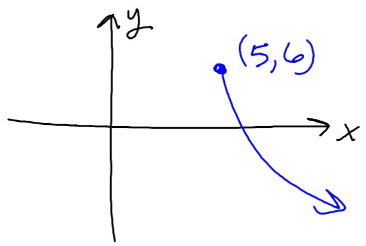
Range:
$[-3, \infty)$

X	Y
-1	-3
0	-1
3	1

Since range is also called the output you can input values for x according to the domain and notice what comes out. Output starts with -3 and increases afterward

2. $y = -4\sqrt{x-5} + 6$

STARTS AT $(5,6)$
upside down

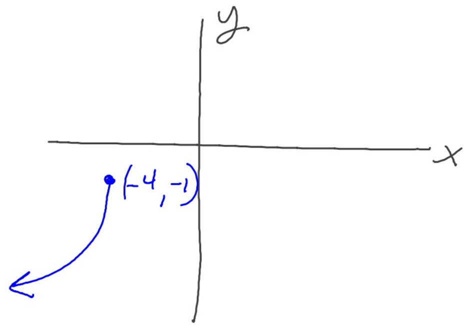


Domain:
$[5, \infty)$

Range:
$(-\infty, 6]$

3. $y = -\sqrt{-(x+4)} - 1$

STARTS AT $(-4,-1)$
upside down & backwards



Domain:
$(-\infty, -4]$

Range:
$(-\infty, -1]$

You can now do Hwk #41

Practice Sheet Sec 7-8

Due Monday, January 7, 2019

This is the end of Chapter 7!!