Graphing Radical Functions

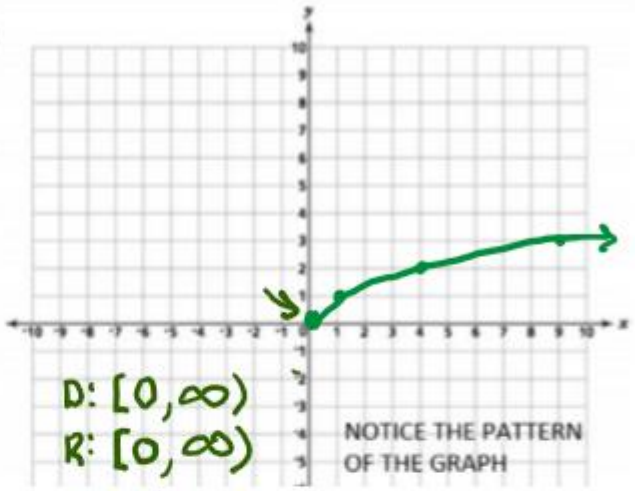
Graphing Square Roots

Parent Graph

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

x	$y=\sqrt{x}$
0	0
1	1
4	2
9	3

NOTE x VALUES ARE PERFECT SQUARES



D: $[0, \infty)$

R: $[0, \infty)$

NOTICE THE PATTERN OF THE GRAPH

Transformations of Parent Functions

$f(x) = a\sqrt{x-h} + k$

- a stretches or shrinks function (Hint multiply "a" by the y-coordinate.)
  - vertical stretch if $|a| > 1$
  - vertical shrink if $0 < |a| < 1$ ← a proper fraction
  - reflection across x-axis if $a < 0$ and then does one of the above.

- h does a horizontal (left, right) shift (Hint: h is the opposite sign of what is shown)
  - $y = \sqrt{x-4}$ $h = 4$ +h shifts that # to the right
  - $y = \sqrt{x+3}$ $h = 3$ -h shifts that # to the left

- k does a vertical (up, down) shift (Hint: k is the same sign of what is shown)
  - $y = \sqrt{x} + 2$ $k = 2$ +k shifts that # up.
  - $y = \sqrt{x} - 3$ -k shifts that # down

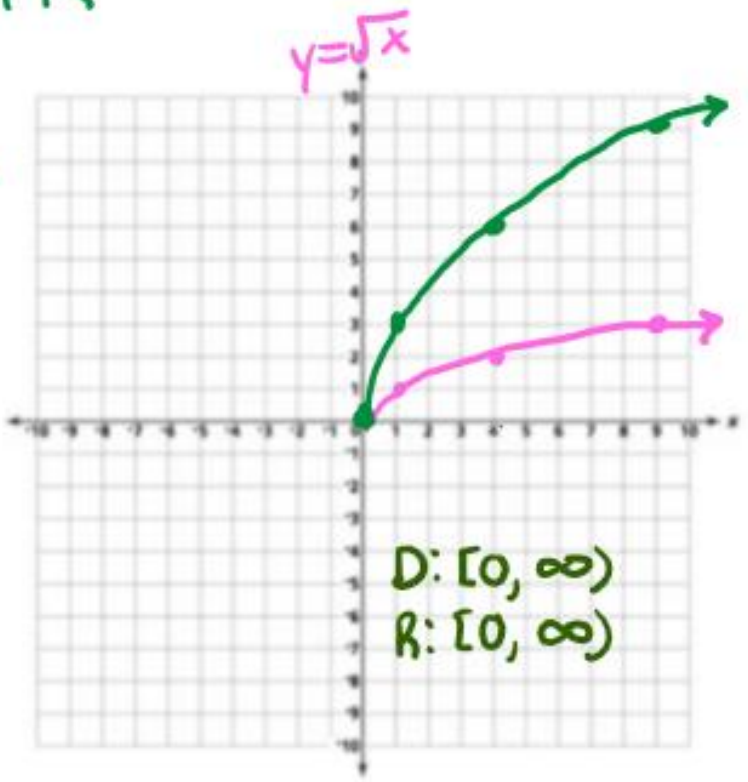
$y = a\sqrt{x-h} + k$

EX. 1 $y = 3\sqrt{x}$

$a = 3$ multiply y by 3

x	$y = 3\sqrt{x}$
0	$3\sqrt{0} = 0$
1	$3\sqrt{1} = 3$
4	$3\sqrt{4} = 6$
9	$3\sqrt{9} = 9$

always use these for $\sqrt{}$



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

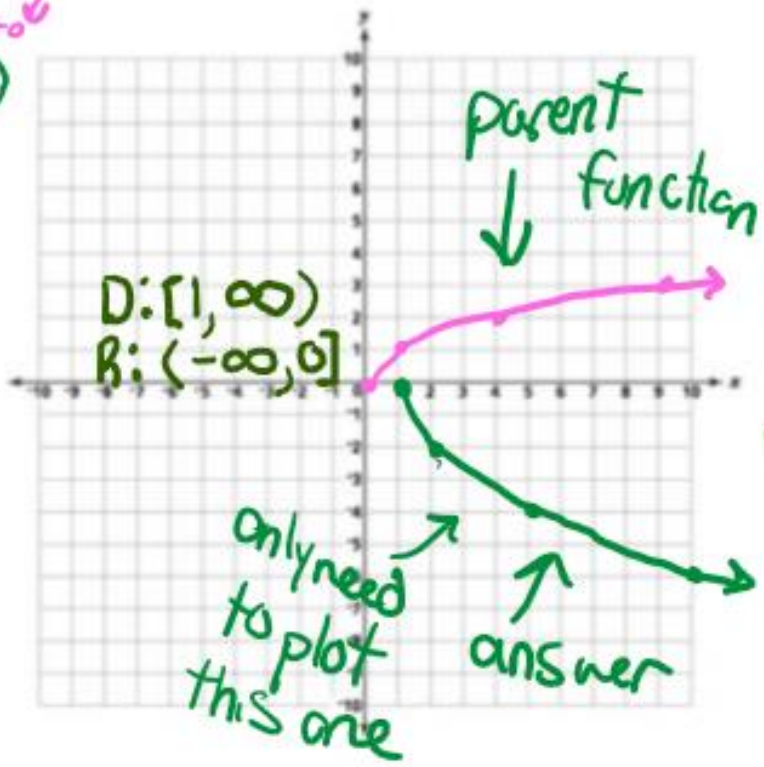
vertical

EX. 3 $y = -2\sqrt{x-1}$ +0

$a = -2$ $h = 1$ $k = 0$

x	$y = \sqrt{x}$
0	0
1	1
4	2
9	3

x+1	-2y
1	0
2	-2
5	-4
10	-6



★ Change sign on h ★

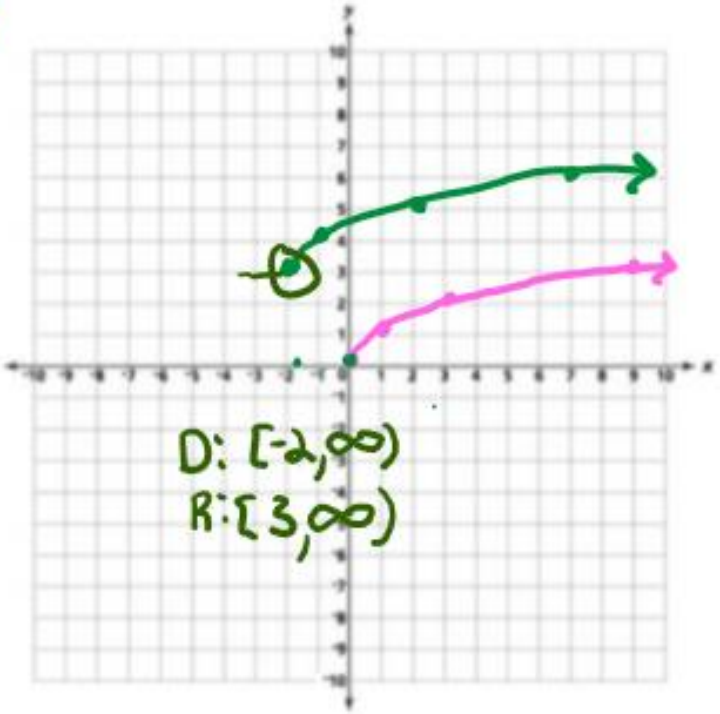
EX. 2 $y = \sqrt{x+2}+3$

$a=1$ $h=-2$ (left 2) $k=3$ (up 3)

x	$y=\sqrt{x}$
0	0
1	1
4	2
9	3

Use these x-values

x−2	y+3
−2	3
−1	4
2	5
7	6



D: $[-2,\infty)$
R: $[3,\infty)$

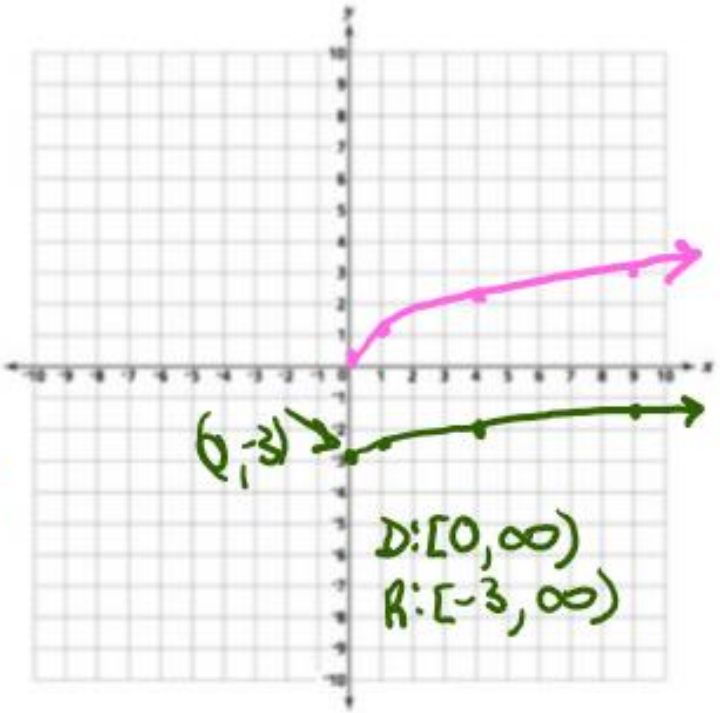
EX. 4 $y = \frac{1}{2}\sqrt{x} - 3$

x	$y=\sqrt{x}$
0	0
1	1
4	2
9	3

always multiply the 'y'

$a=\frac{1}{2}$ $h=0$ $k=-3$

x	$\frac{1}{2}y-3$
0	−3
1	−2.5
4	−2
9	−1.5



D: $[0,\infty)$
R: $[-3,\infty)$