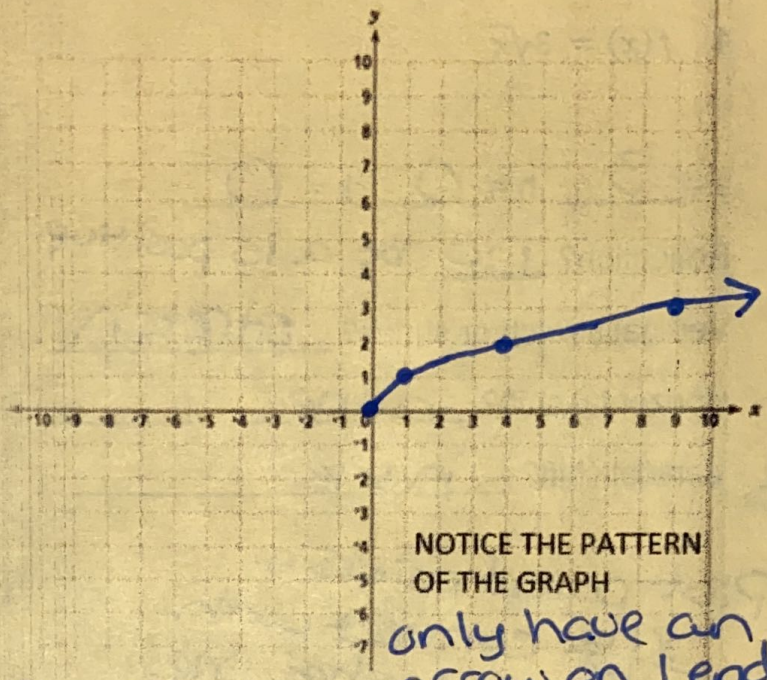
Graphing Square Roots

Parent Graph

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

x	y
0	0
1	1
4	2
9	3

NOTE x VALUES ARE PERFECT SQUARES



NOTICE THE PATTERN OF THE GRAPH

only have an arrow on 1 end.

Transformations of Parent Functions

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

y

- a stretches or shrinks function (Hint: multiply "a" by the y-coordinate.)
  - stretch vertically if |a|> 1 ignore negative
  - shrink vertically if 0 <|a|< 1 ignore neg.
  - reflect across x-axis if a< 1 (negative) and then does one of the above.

- h does a horizontal (left, right) shift (Hint: h is the opposite sign of what is shown)
  - +h shifts that # to the right
  - -h shifts that # to the left.

- k does a vertical (up, down) shift (Hint: k is the same sign of what is shown)
  - +k shifts that # up.
  - -k shifts that # down

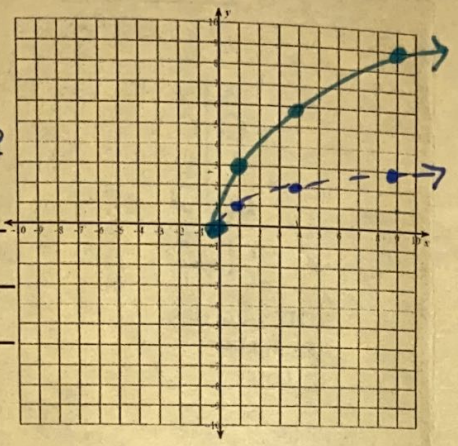
* order of transformation

x → H : left or right

y → A : stretch/shrink/reflect

K : up or down

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



a = 3 h = 0 k = 0

Reflection? no bc a is positive

Vertical stretch or shrink? stretch

h Horizontal shift? none

K Vertical shift? none

Plot parent points + connect with a dashed line.

x	y
0	0
1	1
4	2
9	3

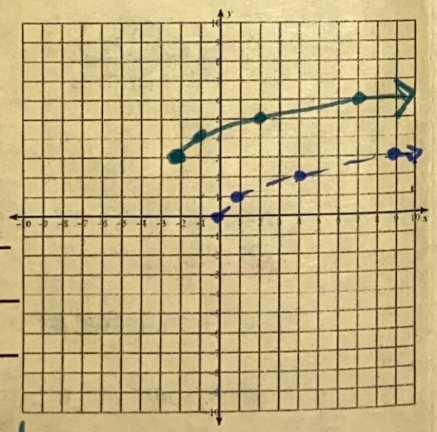
multiply y-coordinates by 3

x	3y
0	0
1	3
4	6
9	9

plot new pts.

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

opposite



a = 1 h = -2 k = 3

Reflection? no

Vertical stretch or shrink? no

Horizontal shift? left 2

Vertical shift? up 3

count left 2 + up 3 from each parent point or make a new t-chart

Parent

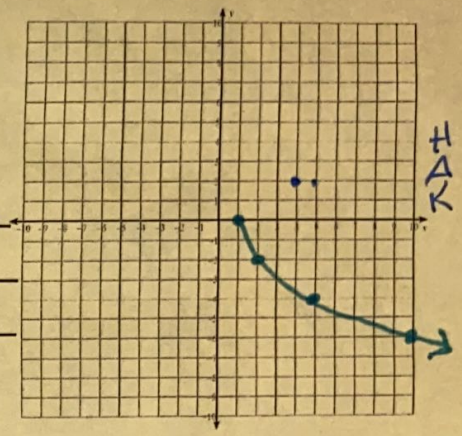
x	y
0	0
1	1
4	2
9	3

x±h ay±K

x-2	1y+3
-2	3
-1	4
2	5
7	6

Then plot new pts.

3. $f(x) = -2\sqrt{x-1}$



H A K

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

Reflection? yes

Vertical stretch or shrink? stretch

Horizontal shift? right 1

Vertical shift? none

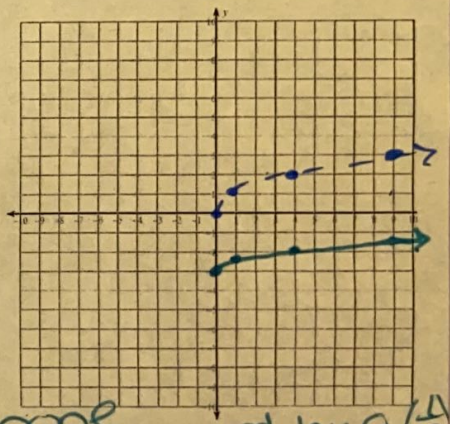
x	y
0	0
1	1
4	2
9	3

x±h ay±K

x+1	-2y	
1	0	-2·0
2	-2	-2·1
5	-4	-2·2
10	-6	-2·3

plot points

4. $f(x) = \frac{1}{2}\sqrt{x} - 3$



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

Reflection? no

Vertical stretch or shrink? shrink

Horizontal shift? none

Vertical shift? down 3

x	y
0	0
1	1
4	2
9	3

x+0	$\frac{1}{2}$y-3
0	-3
1	-2½
4	-2
9	-1½

H - none
A - mult. y-coord. by a ($\frac{1}{2}$)
K - shift down 3