

SECTION 3.4/3.5

OTHER GRAPHING (family of functions)

GENERAL TRANSFORMATIONS

PIECEWISE FUNCTIONS

$$y = x^2 \quad \uparrow \uparrow$$

$$x = y^2 \quad \curvearrowright$$

$$y = |x| \quad \uparrow \uparrow$$

$$x = |y| \quad \curvearrowleft$$

$$y = x^3 \quad \uparrow \uparrow$$

$$x = y^3 \quad \leftarrow \rightarrow$$

$$y = \sqrt{x} \quad \rightarrow$$

* WORKING ON THESE FIRST

$$y = a(x-h)^2 + k \quad (\text{general formula})$$

$$y = -2|x+3| + 2$$

$$y = a|x-h| + k$$

you can set it equal to zero & solve

① Identify the basic shape

② what is the (h, k) ?
 $(-3, 2)$

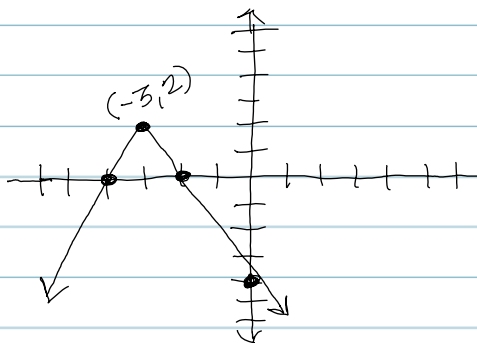
③ $a = -2$ - down
2 stretch
(narrow)

x	y
-4	0
-3	2
-2	0

add one above & below

$$\left. \begin{array}{l} -2(-4+3) + 2 \\ -2(-3+3) + 2 \\ -2(-2+3) + 2 \end{array} \right\} \begin{array}{l} -2(-1) + 2 \\ -2(0) + 2 \\ -2(1) + 2 \end{array}$$

Graph:



added \rightarrow

x	y
0	-4

D: $(-\infty, \infty)$ or \mathbb{R}

R: $(-\infty, 2]$

$y = -(x-1)^3 + 3$

$y = a(x-h)^3 + k$

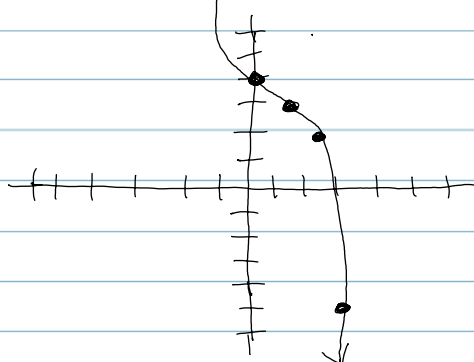
① Basic shape:

② $a = -1$ - downward
| neutral

③ $(h, k) = (1, 3)$

④ graph

x	y
0	4
1	3
2	2
3	-5
-1	1



⑤ D: $(-\infty, \infty)$

⑥ R: $(-\infty, \infty)$

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

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

○ 2 stretched (wide)
○ 1
○ 1/2 ring will move left if lifted up
compressed (narrow)

① Basic shape:

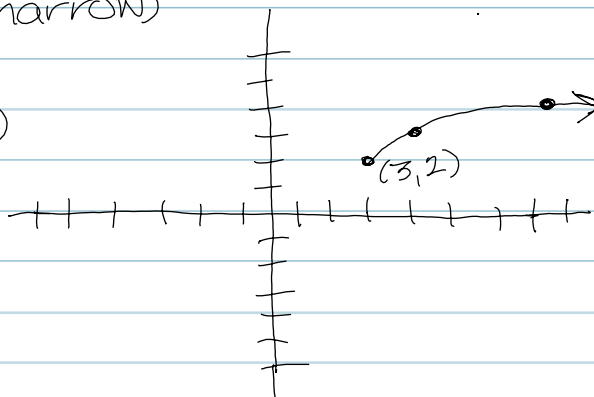
② $(h, k) = (3, 2)$

③ $a = 1 \rightarrow$ + up
| neutral

④ graph

⑤ D: $[3, \infty)$

⑥ R: $[2, \infty)$



x	y
2	sqrt(-1) not real
3	2
4	3
5	
6	
7	4

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

① Basic shape:

② $(h, k) = (1, 2)$

$$1-x=0$$

$$1=x$$

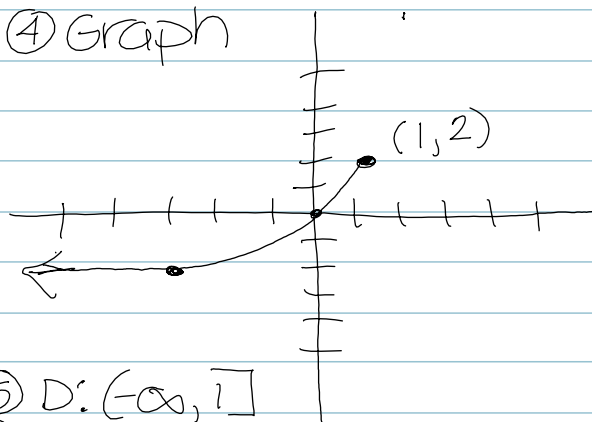
③ $a = -2$ → -down

2 stretched (wide)

* -x (left)
+x (right)

④ Graph

x	y
-3	-2
-2	
-1	
0	0
1	2
2	NOT REAL



⑤ $D: (-\infty, 1]$

⑥ $R: (-\infty, 2]$

↑ lowest y
↑ highest y

$$y = \sqrt{5-x} + 3$$

①

② $(h, k) = (5, 3)$

③ $a = 1$ + up
1 neutral
-x go left

For domain

(5, 3)

⑤ $D: (-\infty, 5]$

⑥ $R: [3, \infty)$

FYI: DRILL WORKSHEETS ON WEBSITE