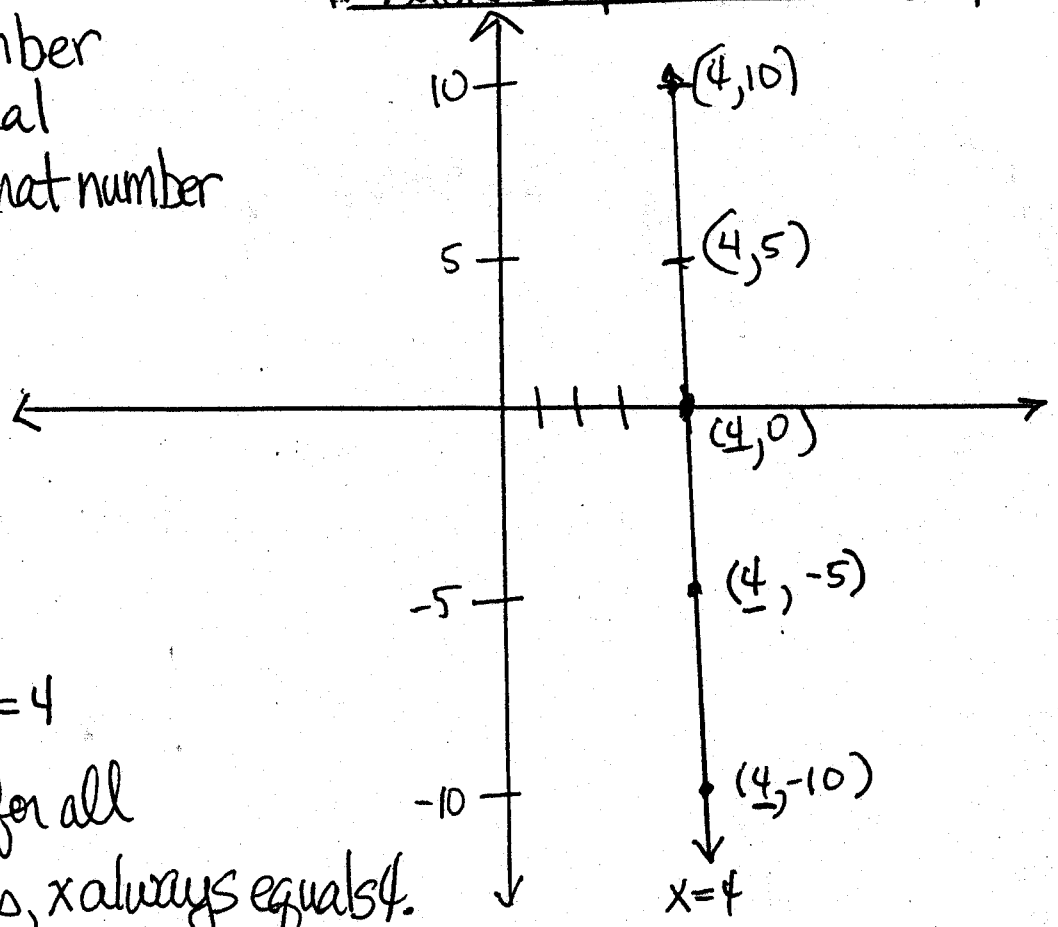
* Basic Graphs to memorize *

- x = a number is a vertical line @ that number

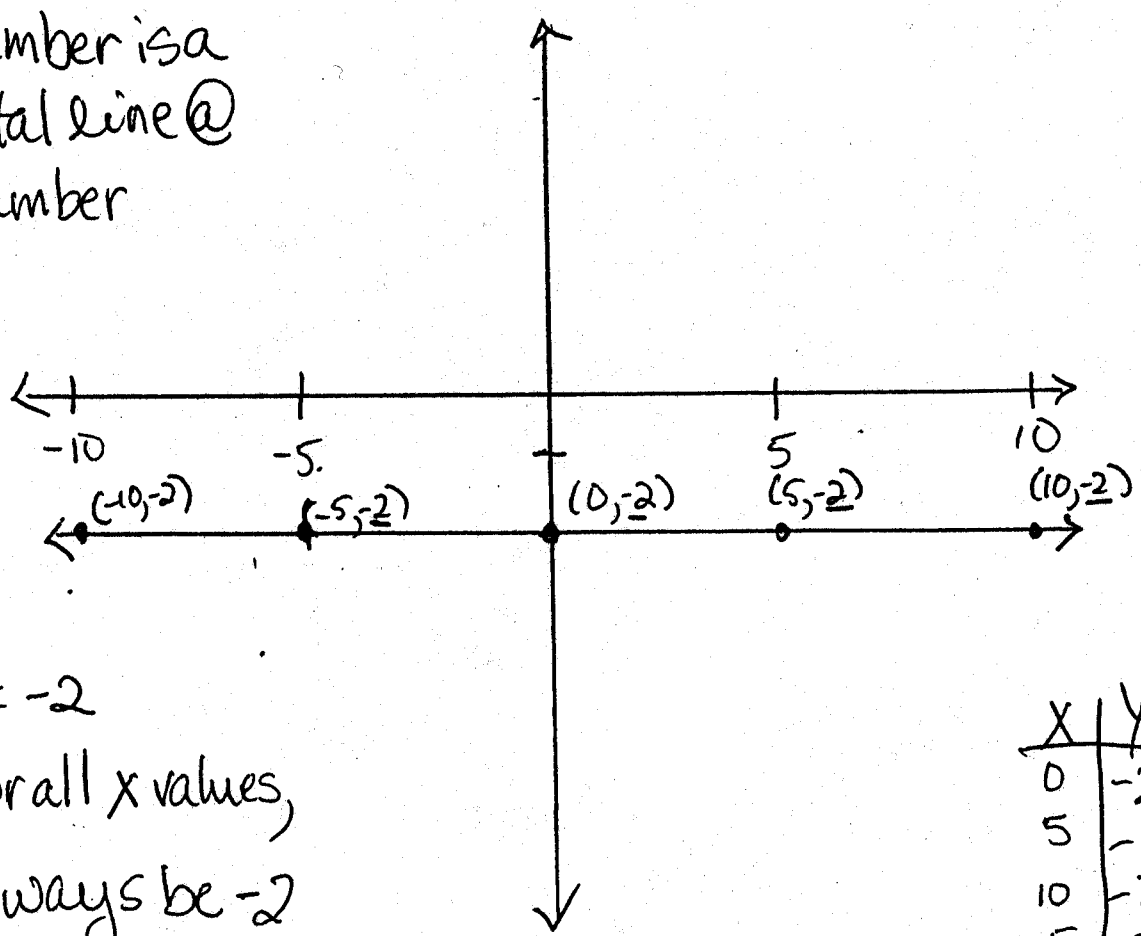


x	y
4	0
4	5
4	-5
4	10
4	-10

ex: x = 4 means for all y values, x always equals 4.

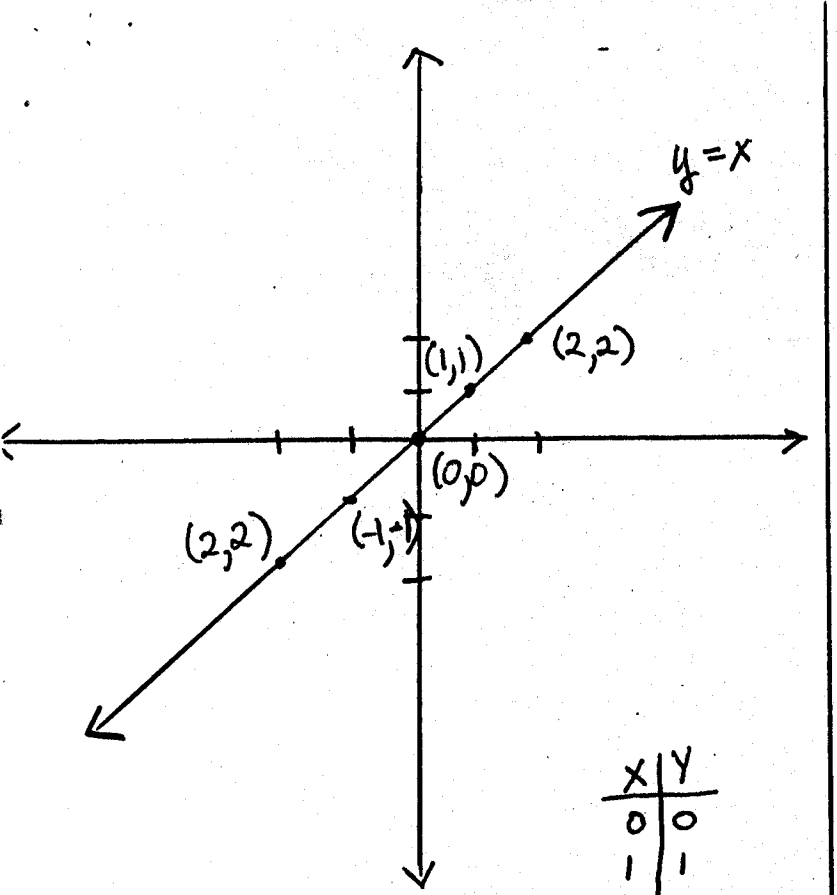
---

y = a number is a horizontal line @ that number



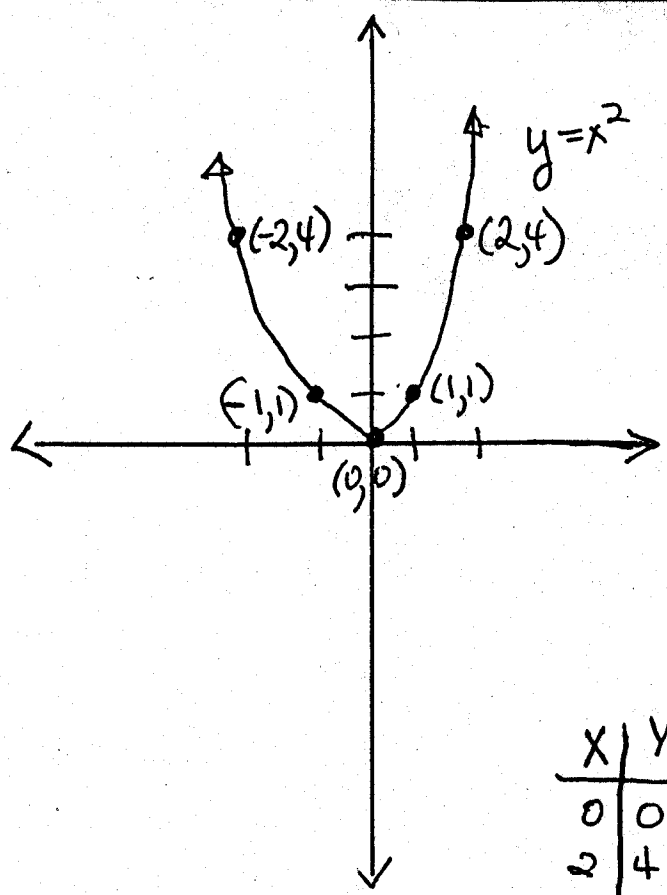
ex: y = -2 means for all x values, y will always be -2

x	y
0	-2
5	-2
10	-2
-5	-2
-10	-2



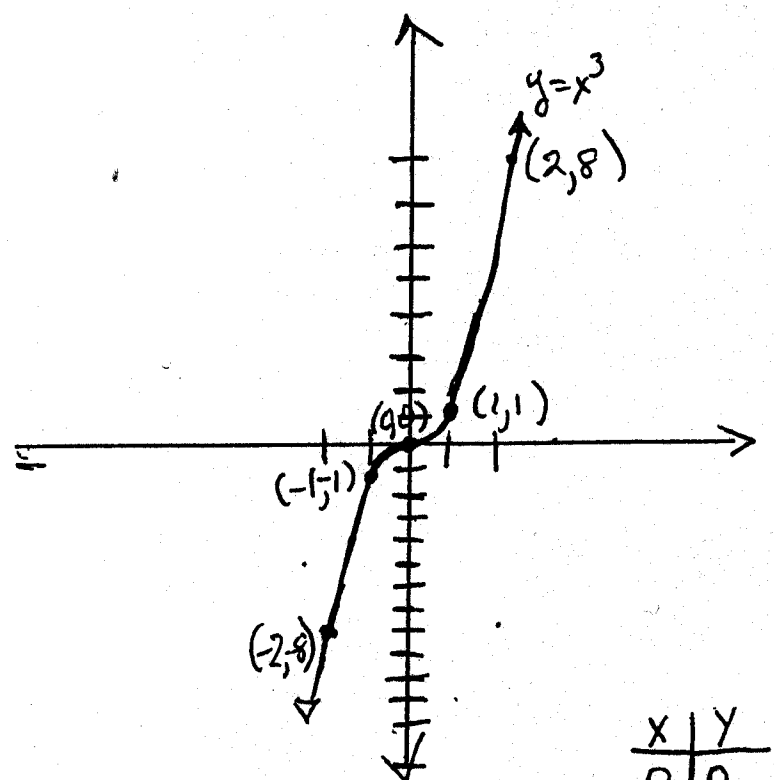
X	Y
0	0
1	1
-1	-1
-2	-2
2	2

$y = x$



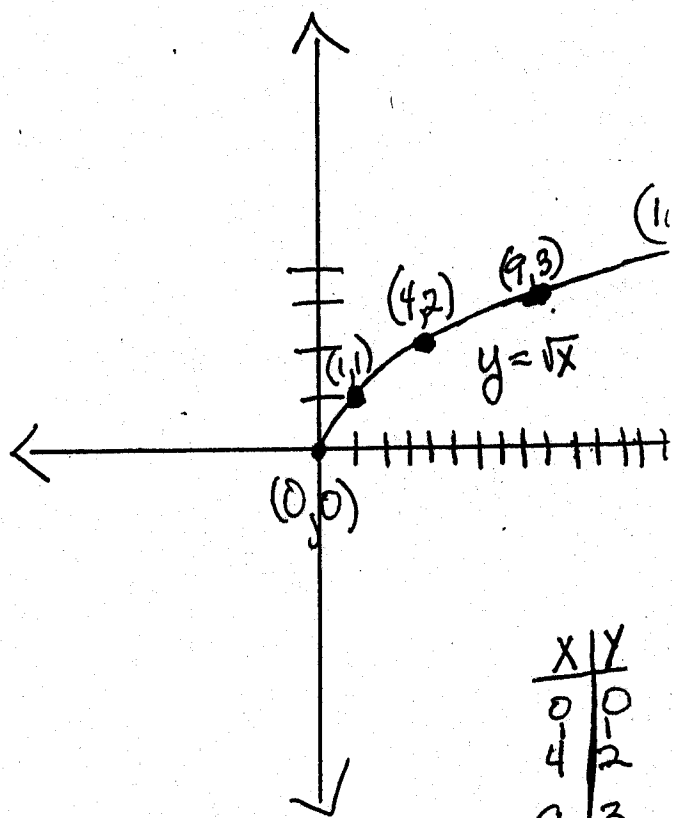
X	Y
0	0
2	4
-2	4
1	1
-1	1

$y = x^2$



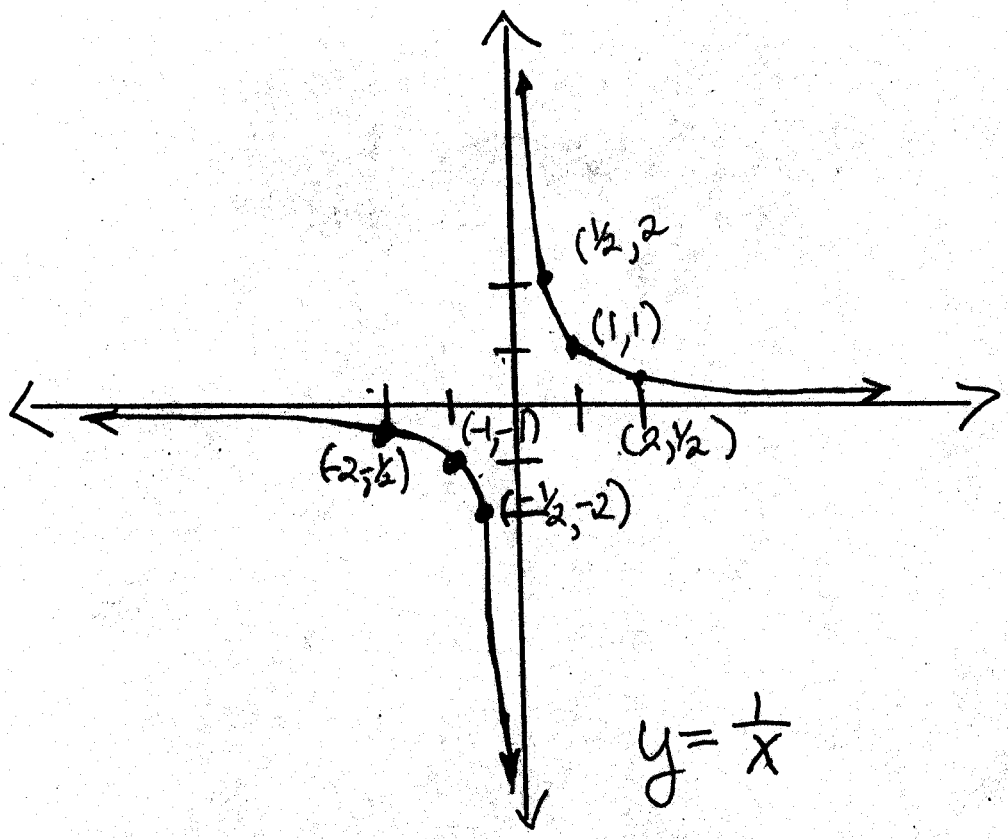
X	Y
0	0
-1	-1
-2	-8
1	1
2	8

$y = x^3$



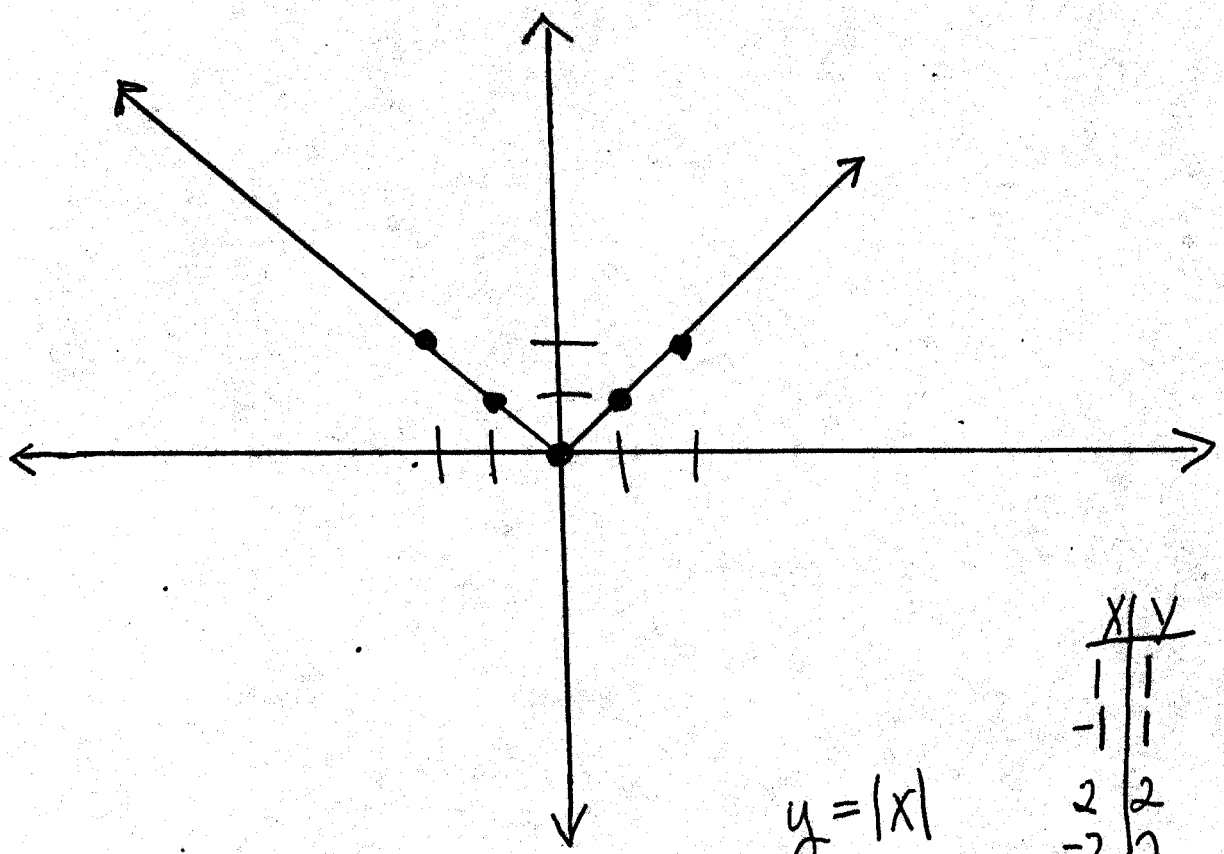
X	Y
0	0
4	2
9	3
16	4

$y = \sqrt{x}$



$y = \frac{1}{x}$

X	Y
1	1
-1	-1
2	½
-2	-½
½	2
-½	-2



$y = |x|$

X	Y
1	1
-1	1
2	2
-2	2
0	0

Transformation Rules:

* Start with the basic function (should be memorized)
* Then apply the following rules:
  I will use $y = x^2$ to illustrate the rules:

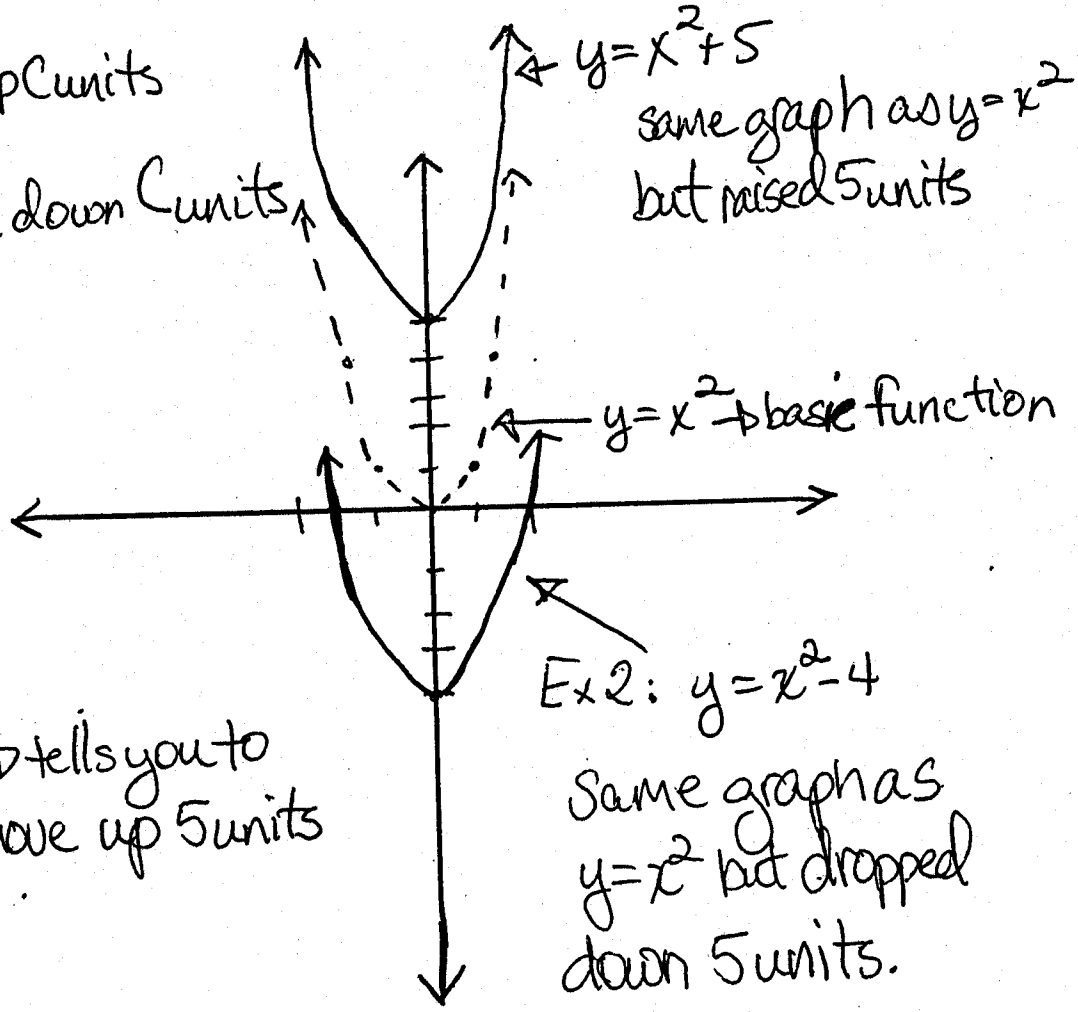
I. If there is a number added or subtracted to the entire function, then it shifts the whole graph up (if add
down (if sub

ex: $y = x^2$ ← basic function

C is any number

$y = x^2 + C$ → move up C units

$y = x^2 - C$ → move down C units



Ex1:
$y = x^2 + 5$ → tells you to move up 5 units

II. If the number is added or subtracted directly to the variable then the graph is shifted to the left or right.

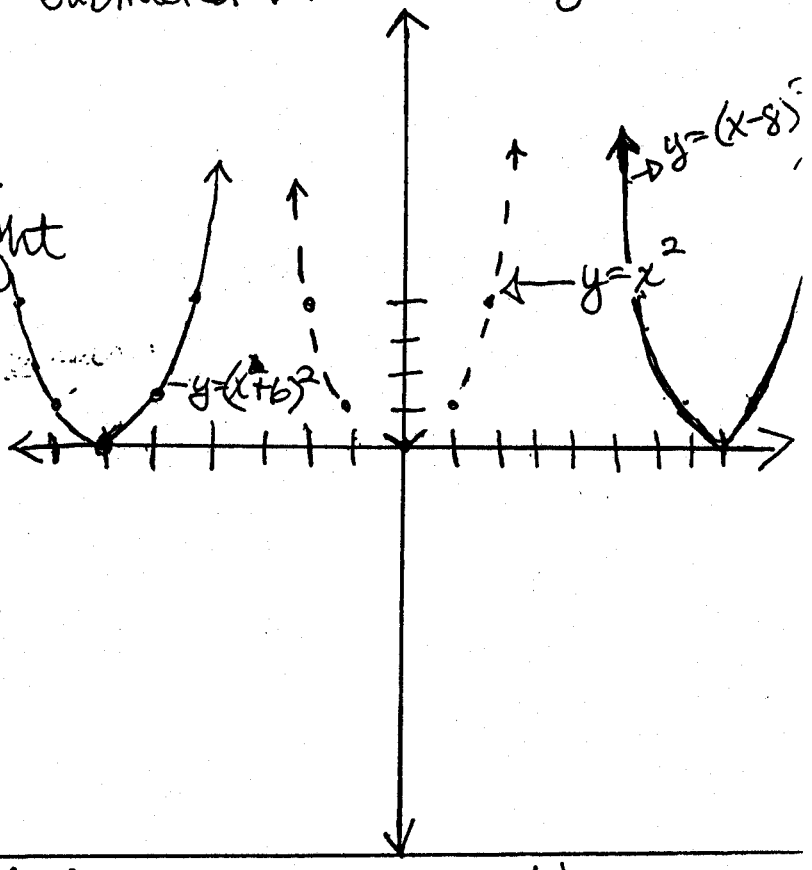
* it is opposite what you would think *

added → move to the left
subtracted → move to the right

Rule: c is a number

$y=(x+c)^2$ → c units to the left

$y=(x-c)^2$ → c units to the right

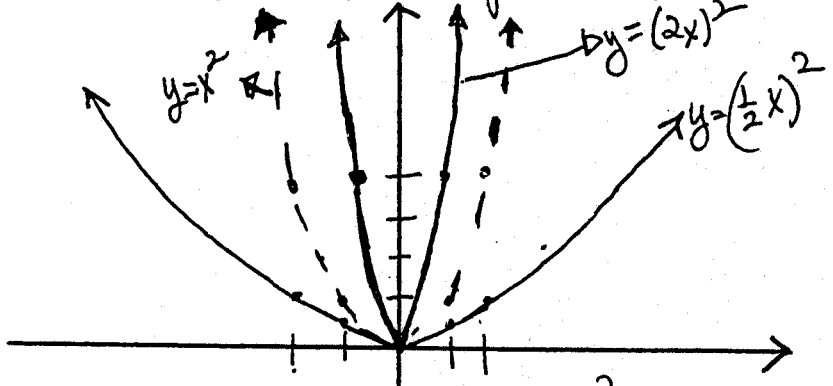


Ex1:
$y=(x+6)^2$ → tells you to move the six units to the left

Ex2:
$y=(x-8)^2$ tells you to move the graph 8 units to the right

II. If a number is multiplied directly to the variable, then the function is compressed or stretched. * again opposite what you would think

- if # is btw. 0 & 1, fraction or decimal, then it is stretc
- if # is greater than 1, then the graph is compressed.



horizontal

$y=(kx)^2$

K btwn 0 & 1 → $0<K<1$ → $y=\left(\frac{1}{2}x\right)^2$ → stretched

K larger than 1 → $K>1$ → $y=(2x)^2$ → compressed

Ex1:

IV. If the whole function is multiplied by a number, then it is also compressed or stretched. (vertically)

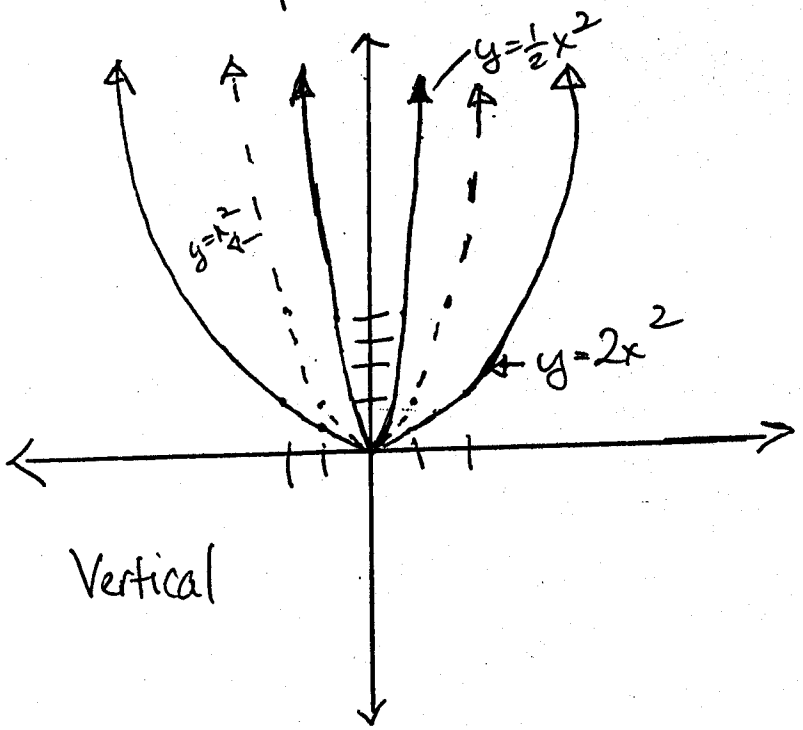
$y = K \cdot x^2$ → notice no parenthesis

$K > 1$ → if K is larger than 1 then stret

$0 < K < 1$ → if K is btwn. 0 & 1 then comp

Ex1: $y = 2x^2$ b/c 2 is >1 then stretch

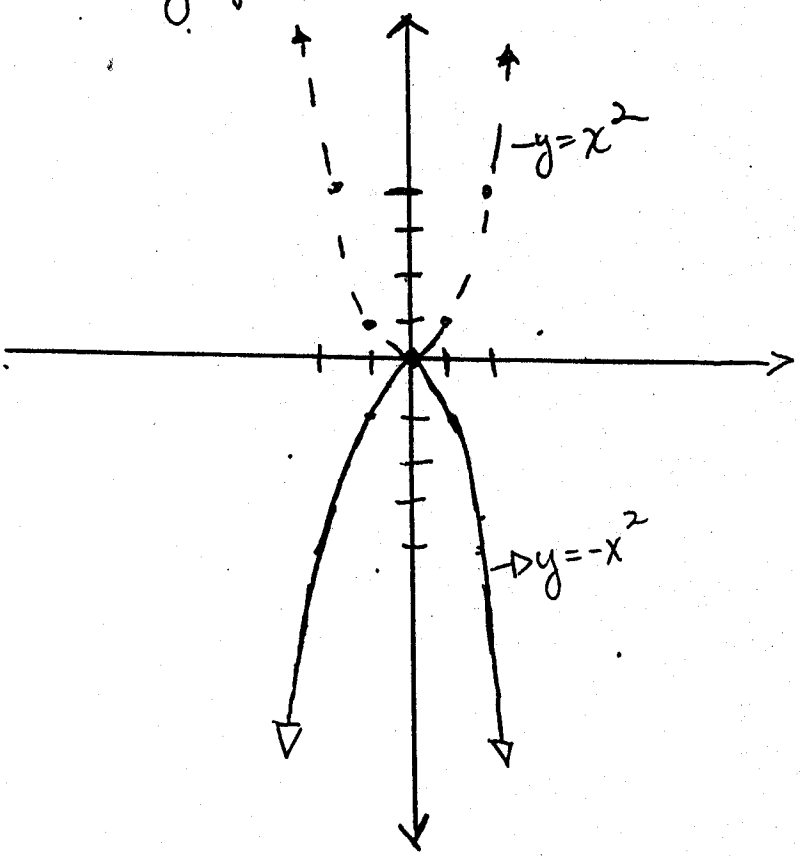
$y = \frac{1}{2}x^2$ b/c $\frac{1}{2}$ is btwn 0 & 1 then compressed



Vertical

V. Reflections: If the base function is multiplied by -1, causes a reflection about the x axis. (Flip the graph upside down)

If the base function replaces x w/ $-x$ $(f(-x))$, then the graph is reflected about the y axis.



X Reflection:

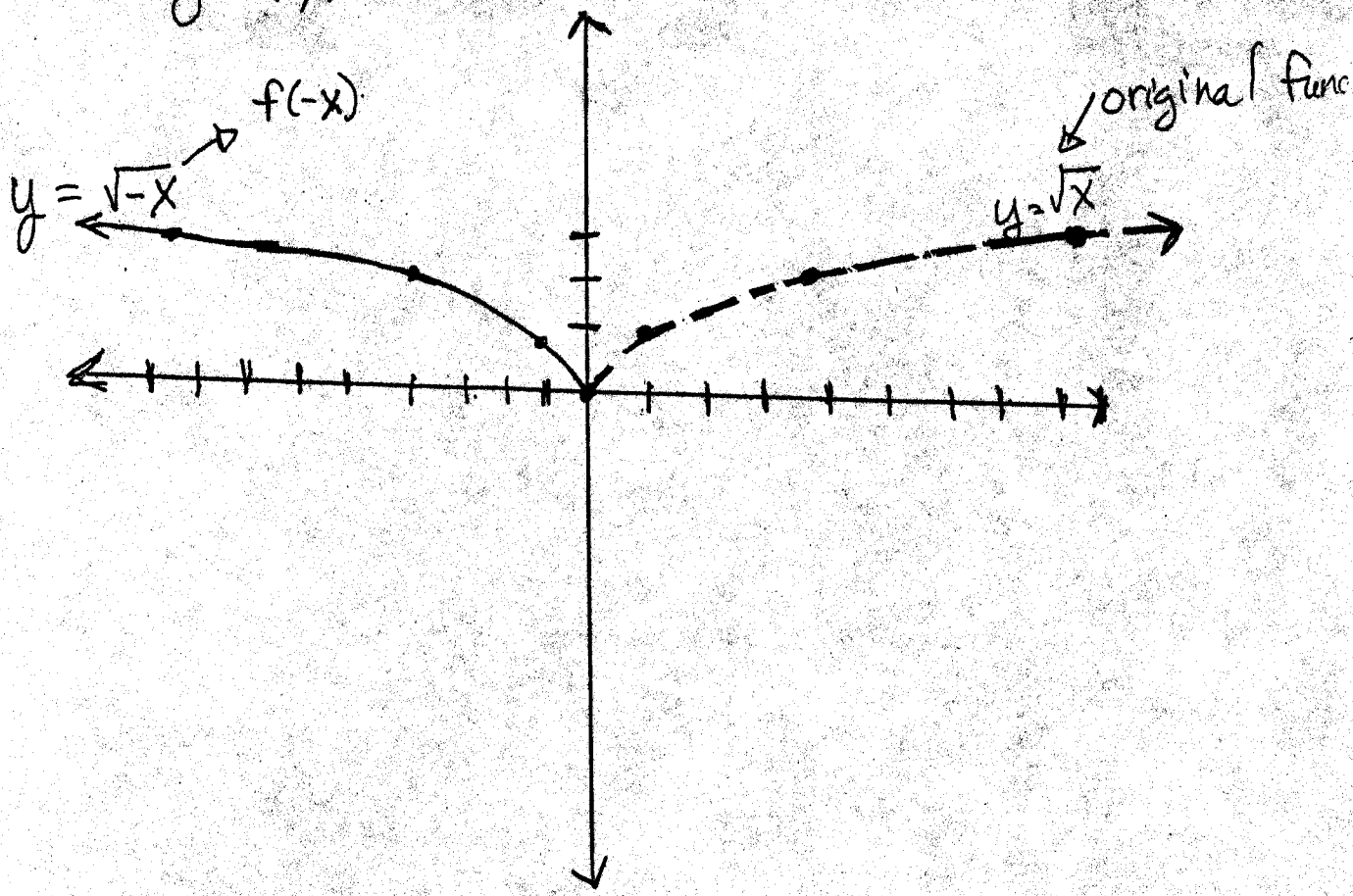
$y = -x^2$

↑ neg 1 times function

flip it upside down

y reflection: I cannot use $y = x^2$, Can anyone tell me why?

I will use $y = \sqrt{x}$



Transformation Rules:

* Start with the basic function (should be memorized)
* Then apply the following rules:

I will use $y = x^2$ to illustrate the rules:

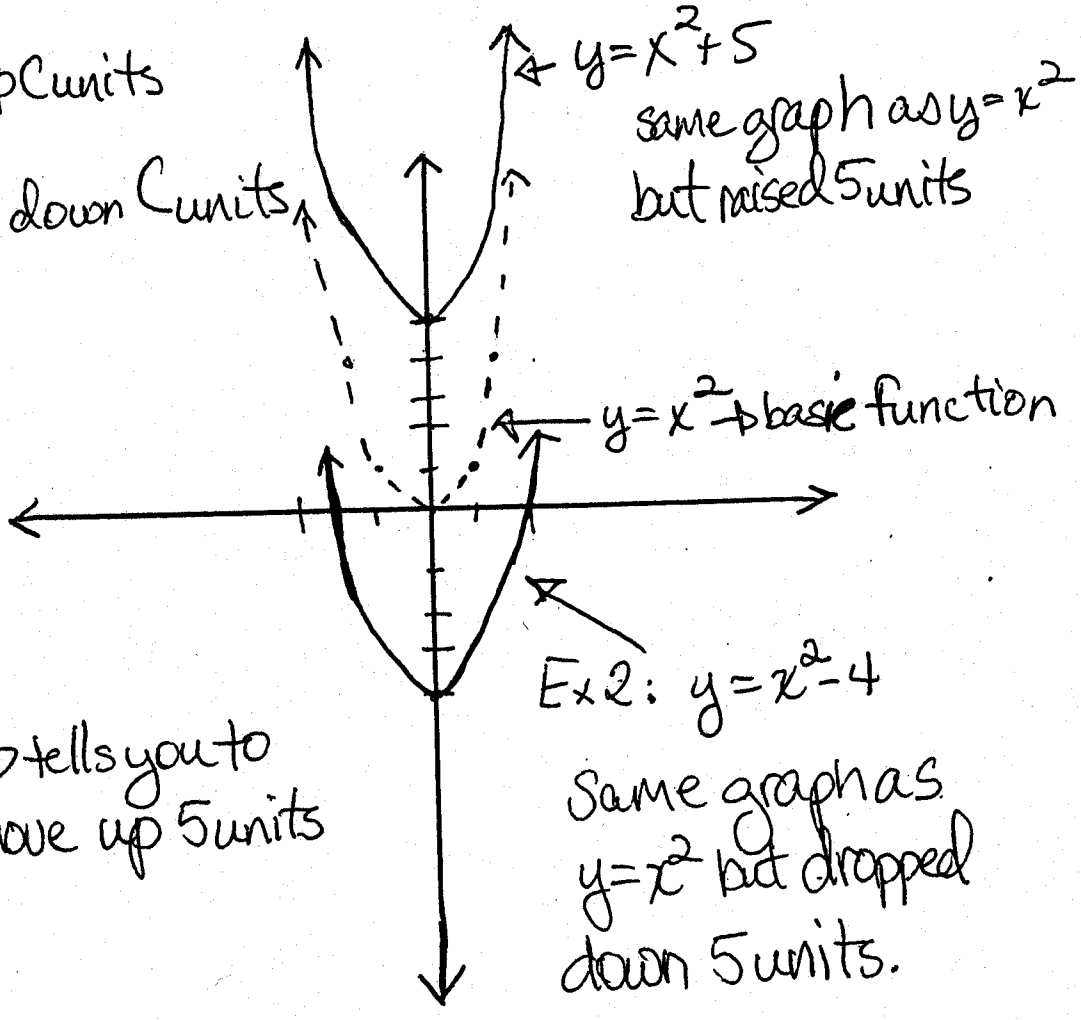
I. If there is a number added or subtracted to the entire function, then it shifts the whole graph up (if add
down (if sub

ex: $y = x^2$ ← basic function

C is any number

$y = x^2 + C$ → move up C units

$y = x^2 - C$ → move down C units



Ex1:
$y = x^2 + 5$ → tells you to move up 5 units

II. If the number is added or subtracted directly to the variable then the graph is shifted to the left or right.

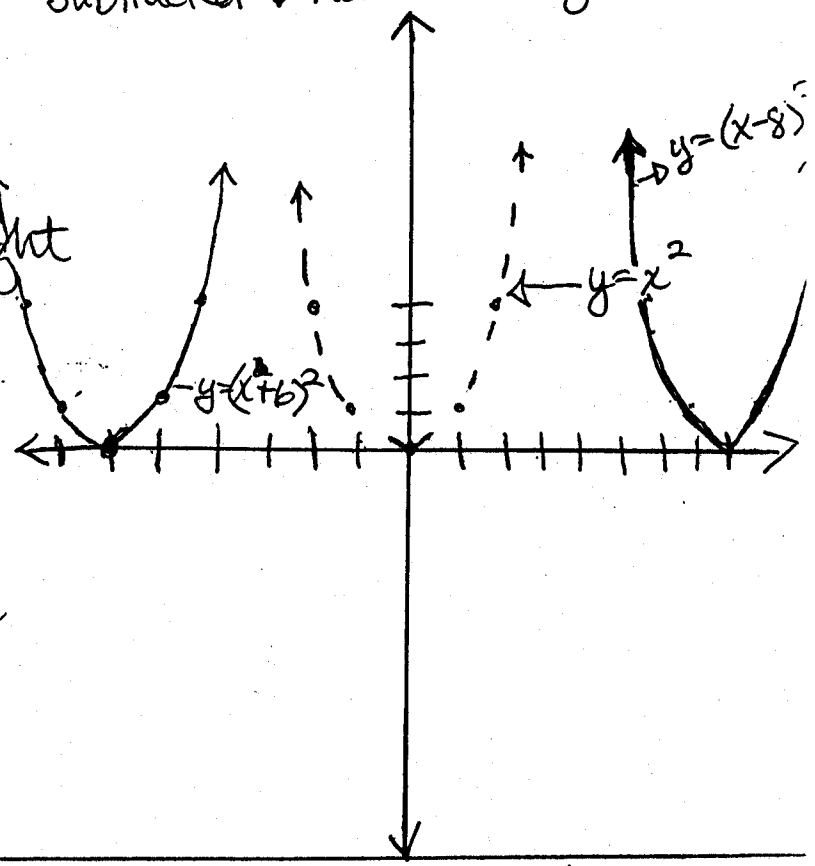
* it is opposite what you would think *

added → move to the left
subtracted → move to the right

Rule: c is a number

$y=(x+c)^2$ → c units to the left

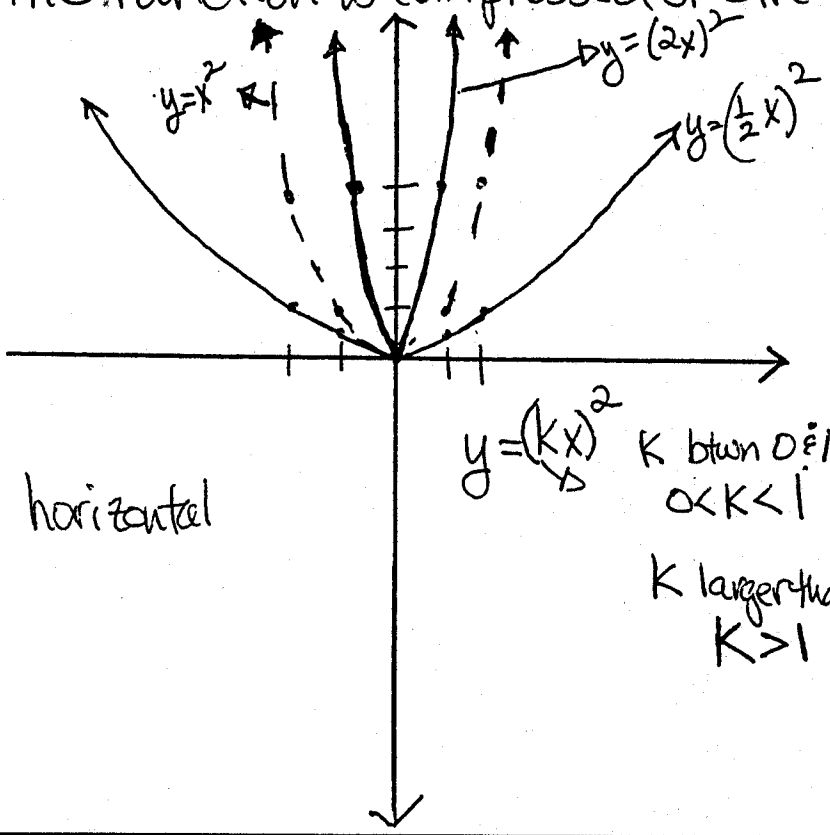
$y=(x-c)^2$ → c units to the right



Ex1:
$y=(x+6)^2$ → tells you to move the six units to the left

Ex2:
$y=(x-8)^2$ tells you to move the graph 8 units to the right

II. If a number is multiplied directly to the variable, then the function is compressed or stretched. * again opposite what you would think



- if # is btw. 0 & 1, fraction or decimal, then it is stretc
- if # is greater than 1, then the graph is compressed.

Ex1:

$y=(kx)^2$ horizontal

k btwn 0 & 1 → $y=\left(\frac{1}{2}x\right)^2$ → stretched
$0<K<1$

K larger than 1 $y=(2x)^2$ → compressed
$K>1$

V. If the whole function is multiplied by a number, then it is also compressed or stretched. (vertically)

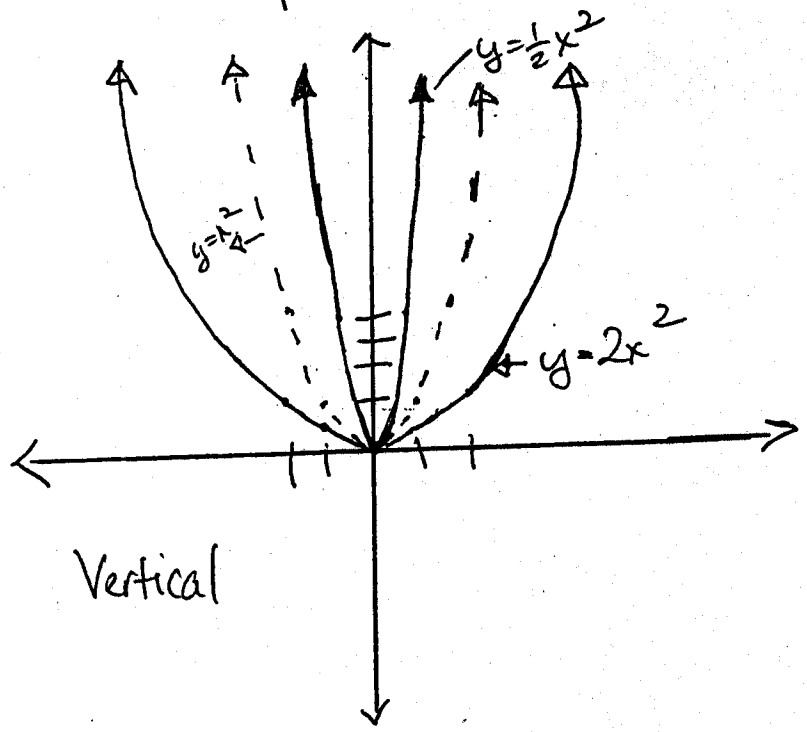
$y = K \cdot x^2$ → notice no parenthesis

$K > 1$ → if K is larger than 1 then stret

$0 < K < 1$ → if K is btwn. 0 & 1 then com

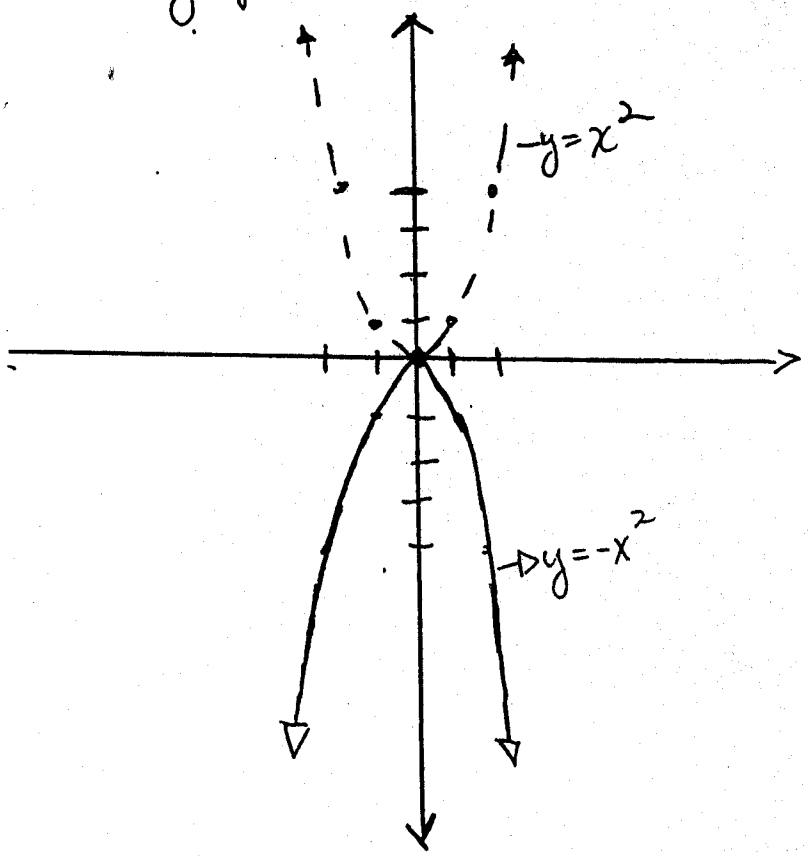
Ex1: $y = 2x^2$ b/c 2 is >1 then stretch

$y = \frac{1}{2}x^2$ b/c $\frac{1}{2}$ is btwn 0 & 1 then compressed



V. Reflections: If the base function is multiplied by -1, causes a reflection about the x axis. (flip the graph upside down)

If the base function replaces x w/ -x (f(-x)), then the graph is reflected about the y axis.



X Reflection:

$y = -x^2$

↑ neg 1 times function

flip it upside down

y reflection: I cannot use $y = x^2$, Can anyone tell me why?

I will use $y = \sqrt{x}$