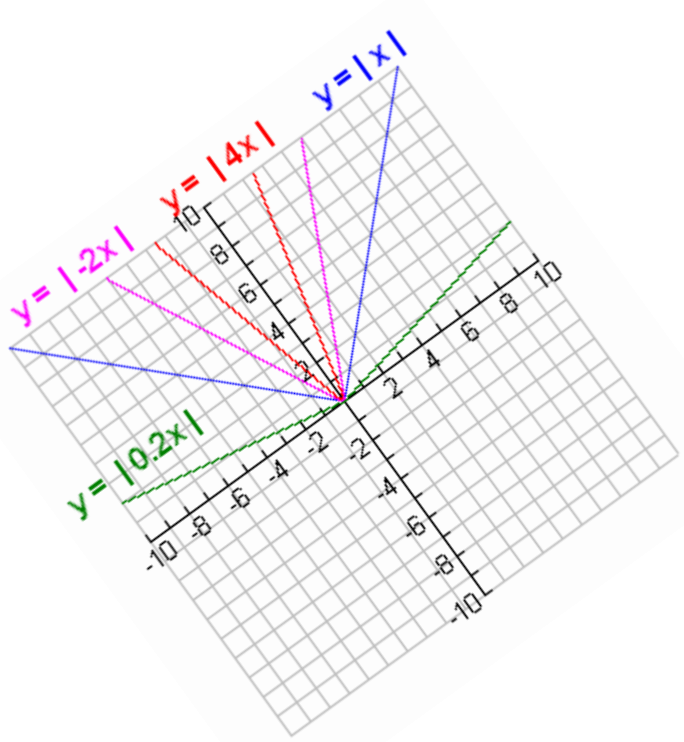
M314 Algebra II
Day 1

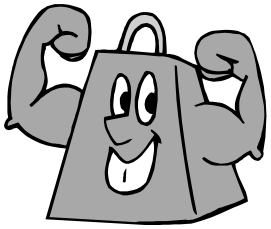
Section 9-2 and 9-3:

Absolute Value Graphs

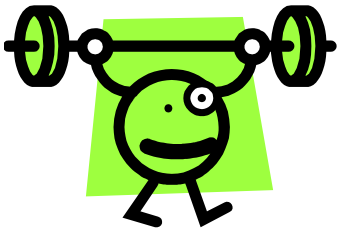


Presented by,

Mr. Kruczinski



Warm-up (#1 -4)



1) $|8|$

8

2) $|-3|$

3

3) $|-5+3|$

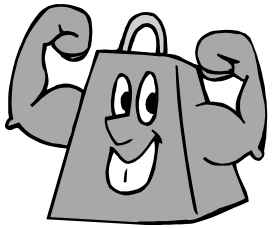
$|-2|$

2

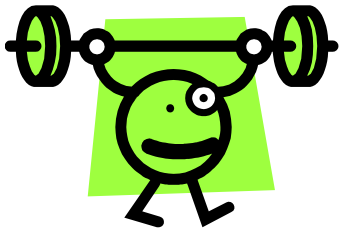
4) $|-4|-7$

$4-7$

-3



Warm-up (#3 and 4)



5) $|-10+3|+7$

$|-7|+7$

$7+7$

14

6) $3|-3|$

$3(3)$

9

7) $4|7-3|$

$4|4|$

$4(4)$

16

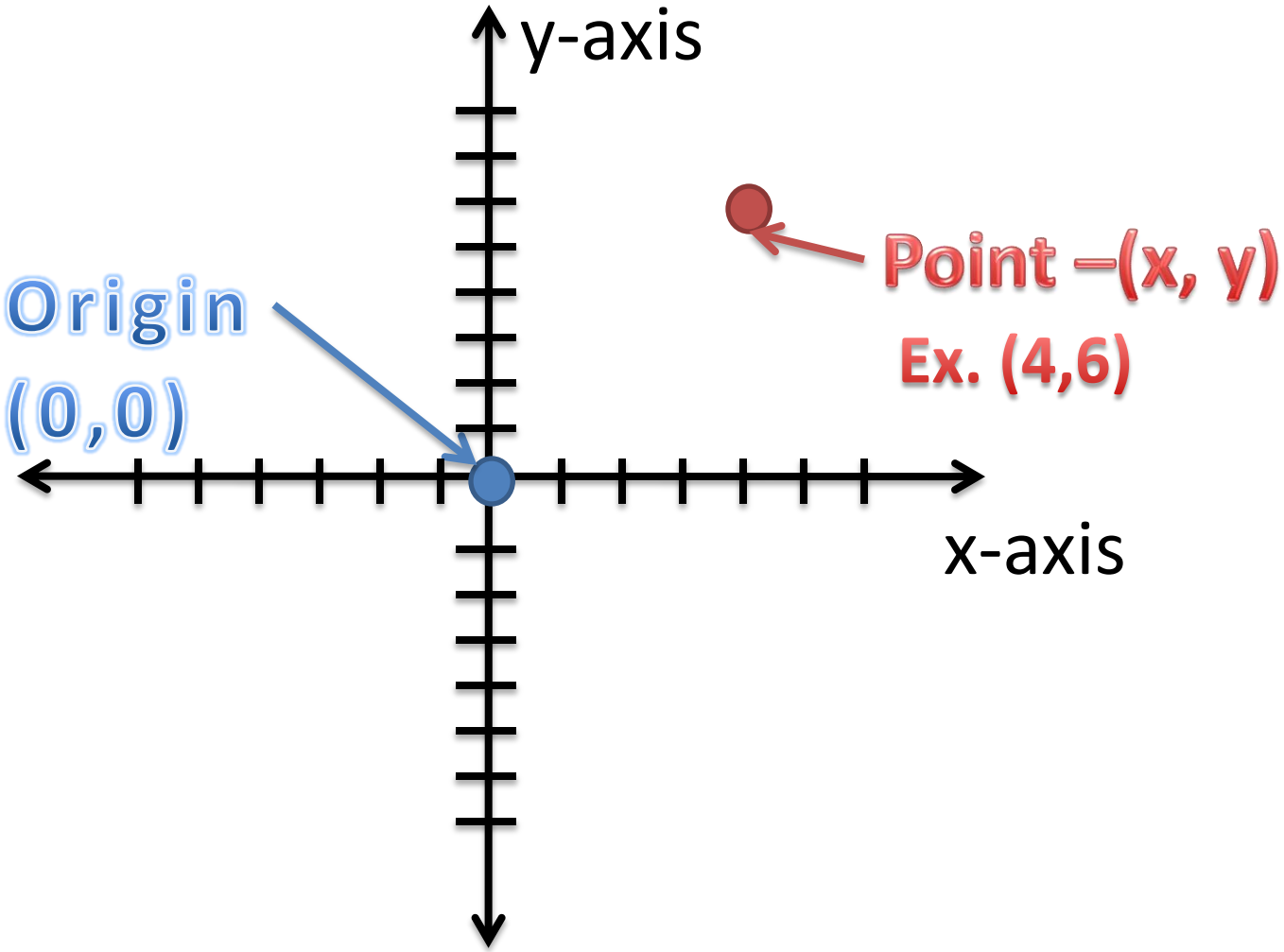
8) $7|-8|+2$

$7(8)+2$

$56+2$

58

Brief Review of Graphing



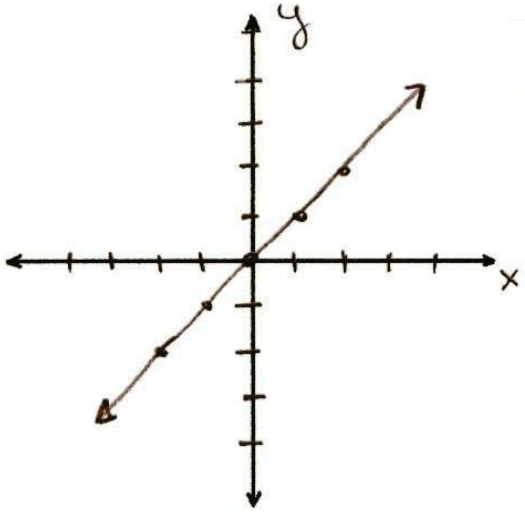
Graph the following:

1. $y = x$

x	y
-2	-2
-1	-1
0	0
1	1
2	2

all possible x-values (input) → Domain: all reals

all possible y-values → Range: all reals



What is the slope?

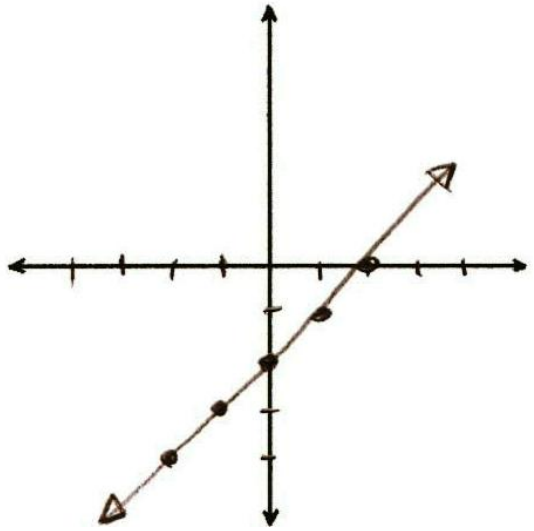
$m = 1$

2. $y = x - 2$

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

Domain: all reals

Range: all reals



What is the slope?

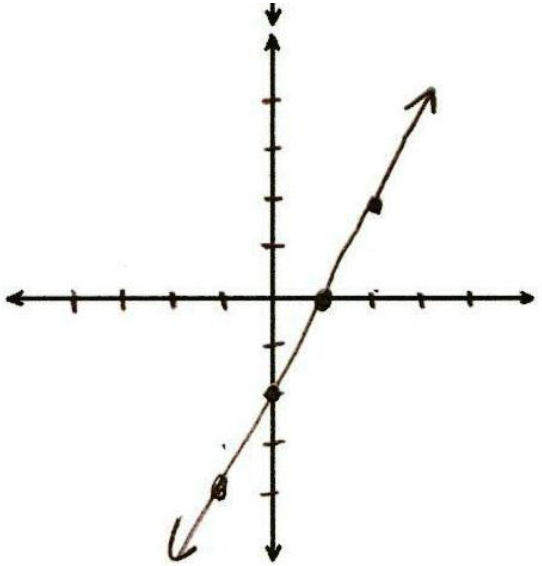
$m = 1$

3. $y = 2x - 2$

x	y
[illegible]	
-1	-4
0	-2
1	0
2	2

Domain: all reals

Range: all reals



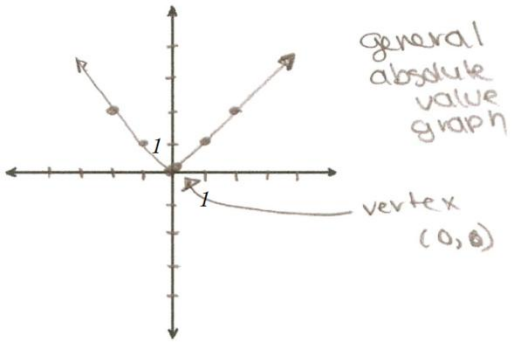
what is the slope?

$m = 2$

Graphing Absolute Value Functions

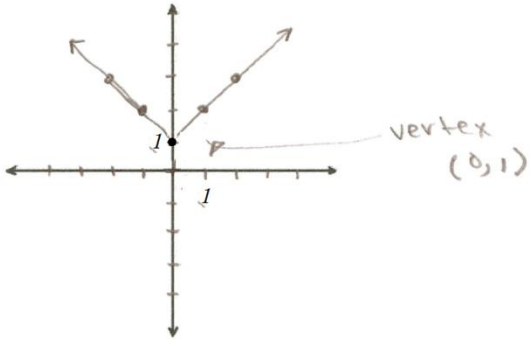
Vertical Translations

1. $y = |x|$



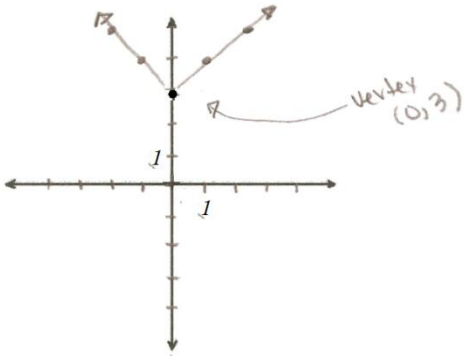
Domain: all reals
Range: [0, ∞)

2. $y = |x| + 1$



Domain: all reals
Range: [1, ∞]

3. $y = |x| + 3$

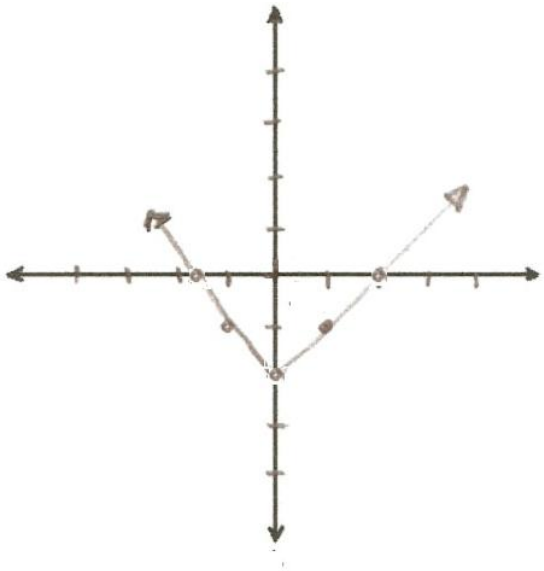


Domain: all reals
Range: [3, ∞]

Graphing Absolute Value Functions

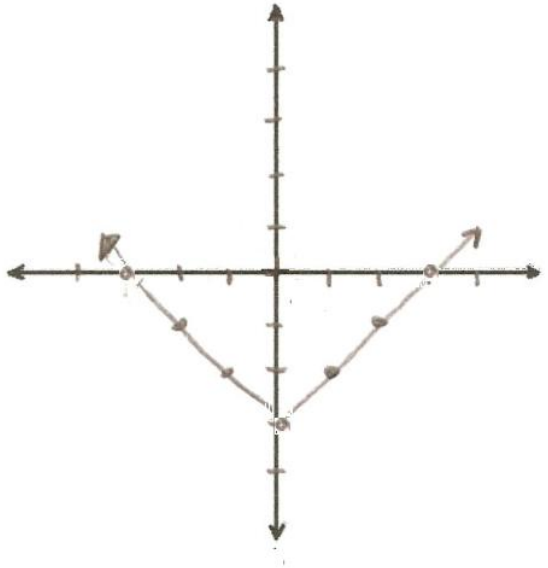
Vertical Translations

4. $y = |x| - 2$



Domain: all reals
Range: $[-2, \infty)$

5. $y = |x| - 3$



Domain: all reals
Range: $[-3, \infty]$

Things to Consider:

Given the function y= l x l +k

a. What does the "k" value do to the graph? [How does it compare to $y = |x|$?]

It shifts y=|x| up or down k units

b. How would a graph compare to $y = |x|$ if k = 8?

It would shift y=|x| up 8 units

c. What the variable "k" does to the function is called a vertical translation [also called a vertical shift].

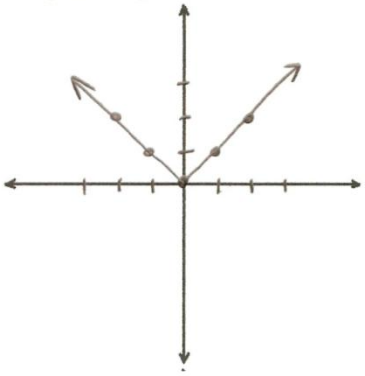
Fill in the table below given a function: $y = |x| + k$

Value of "k"	the graph will shift
k < 0 (Negative)	down "k" units
k = 0 (Zero)	would be y=|x|
k > 0 (Positive)	up "k" units

Graphing Absolute Value Functions

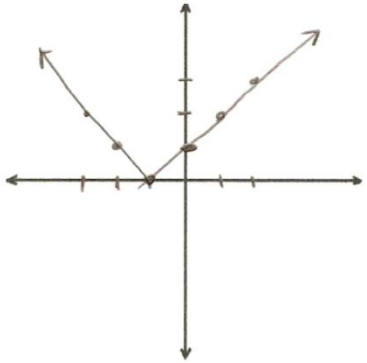
Horizontal Translations

1. $y = |x|$



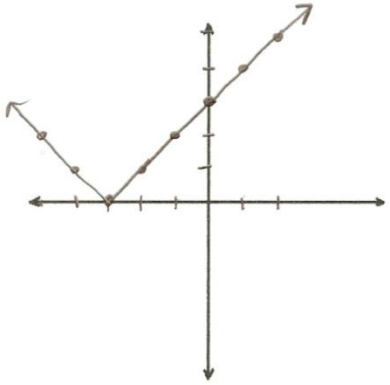
Domain: all reals
Range: $[0, \infty)$

2. $y = |x + 1|$



Domain: all reals
Range: $[0, \infty)$

3. $y = |x + 3|$

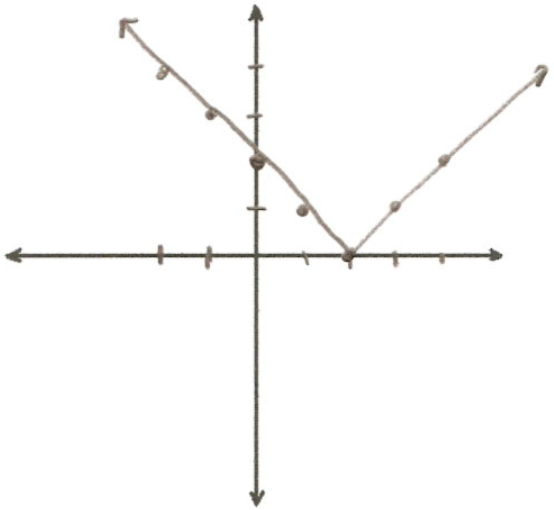


Domain: all reals
Range: $[0, \infty)$

Graphing Absolute Value Functions

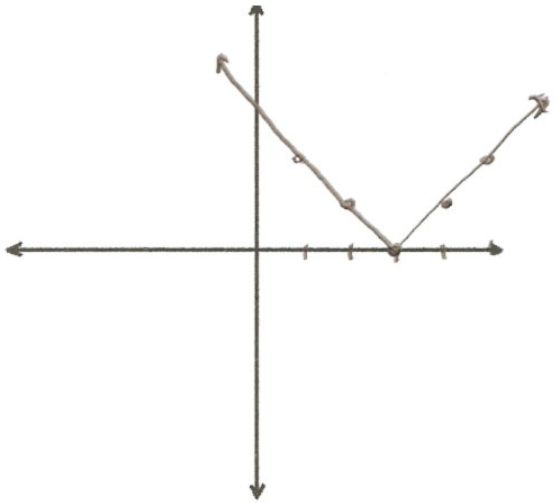
Horizontal Translations

4. $y = |x - 2|$



Domain: all reals
Range: $[0, \infty)$

5. $y = |x - 3|$



Domain: all reals
Range: $[0, \infty)$

Things to Consider:

Given the function y= l x-h l

a. What does the "h" value do to the graph? [How does it compare to $y = |x|$?]
It shifts y=|x| left or right by "h" units

b. How would a graph compare to $y = |x|$ if h = 8?
It would shift y=|x| to the right 8 units

c. What the variable "h" does to the function is called a horizontal translation [also called a horizontal shift].

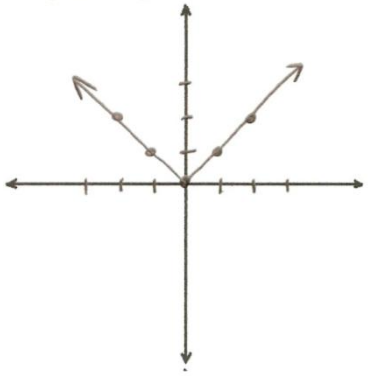
Fill in the table below given a function: $y = |x - h|$

Value of "h"	the graph will shift
h< 0 (Negative)	shifts the graph to the left "h" units
h = 0 (Zero)	is y=|x|
h > 0 (Positive)	shifts the graph to the right "h" units

Graphing Absolute Value Functions

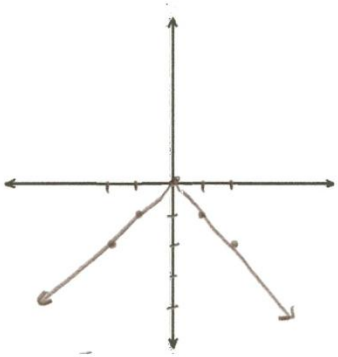
Vertical Stretch/Shrink

1. $y = |x|$



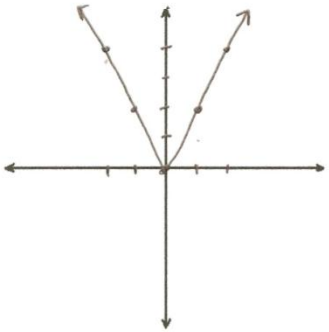
Domain: all reals
Range: $[0, \infty)$

2. $y = -|x|$



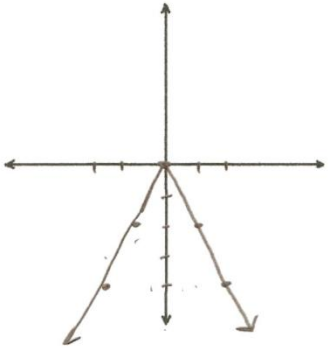
Domain: all reals
Range: $(-\infty, 0]$

3. $y = 2|x|$



Domain: all reals
Range: $[0, \infty)$

4. $y = -2|x|$

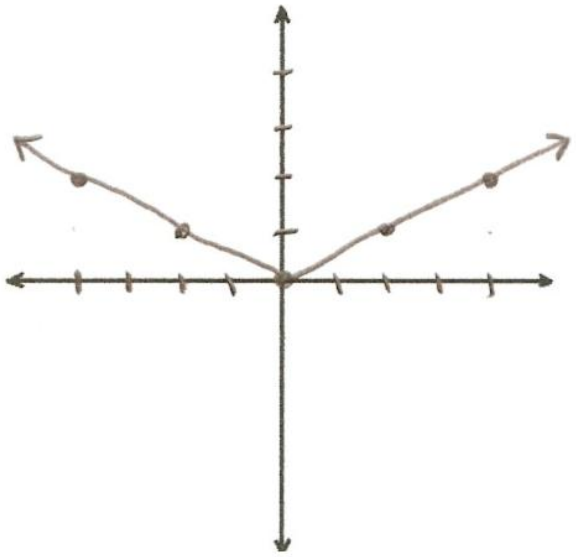


Domain: all reals
Range: $(-\infty, 0]$

Graphing Absolute Value Functions

Vertical Stretch/Shrink

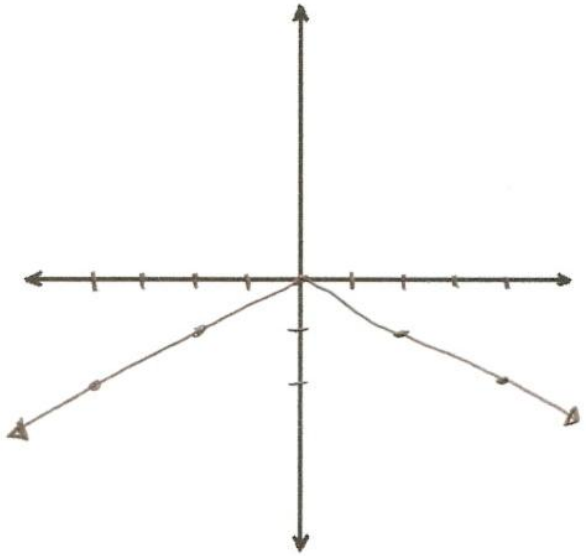
5. $y = \frac{1}{2}|x|$



Domain: all reals

Range: $[0, \infty)$

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



Domain: all reals

Range: $(-\infty, 0]$

Things to Consider:

Given the function y= a l x l

a. What does the "a" value do to the graph? [How does it compare to $y = |x|$?]
It widens or narrows y=|x| and determines if it opens up or down

b. How would a graph compare to $y = |x|$ if a = 8?
It would open up and be narrow

c. What the variable "a" does to the function is called a Vertical stretch/shrink and determines if the function opens up or down.

Fill in the table below given a function: $y = a|x|$

Value of "a"	the graph will shift
a < -1 (Negative)	open down and narrow (stretch)
-1 < a< 0 (Negative fraction)	open down and wide (shrink)
a = 0 (Zero)	———
0 < a< 1 (Positive fraction)	open up and wide (shrink)
a > 1 (Positive)	open up and narrow (stretch)

Wrapping it UP!!

Given the function y= a l x – hl+ k

Vertex	(h, k)
Opens up	a is positive
Opens down	a is negative
Shifts y = l x l up	k is positive
Shifts y = l x l down	k is negative
Shifts y = l x l right	h is positive
Shifts y = l x l left	h is negative