

# Day 33 - Graphing Absolute Value Equations



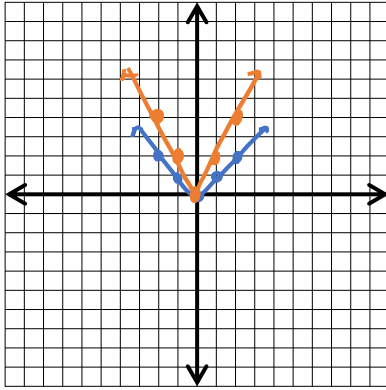
## Intro to Transformations (Vertical Stretches and Shrinks)

Graph absolute value equations with vertical stretches and shrinks

### Vertical Stretches/Shrinks: Let's Explore!

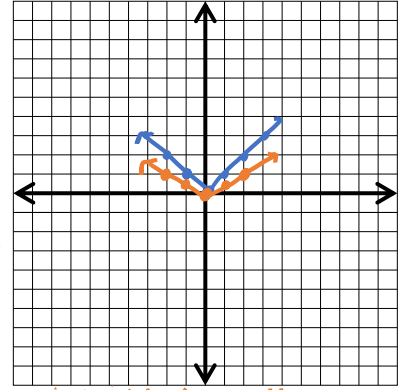
1. Graph  $y = |x|$  &  $y = 2|x|$  on the graph below.

x	$y = 2 x $
-2	$2(2) = 4$
-1	$2(1) = 2$
0	$2(0) = 0$
1	$2(1) = 2$
2	$2(2) = 4$



2. Graph  $y = |x|$  &  $y = \frac{1}{2}|x|$  on the graph below.

x	$y = \frac{1}{2} x $
-2	$\frac{2}{2} = 1$
-1	$\frac{1}{2} = \frac{1}{2}, 0.5$
0	$\frac{0}{2} = 0$
1	$\frac{1}{2} = \frac{1}{2}, 0.5$
2	$\frac{2}{2} = 1$



*\*use x-values divisible by 2!!*

\*What do you notice about the graphs above? Explain the transformations that occurred.

*The left graph stretched vertically. The right graph shrunk vertically.*



## Big Idea: Vertical Stretches/Shrinks

The absolute value graph  $y = a \cdot |x|$  is a vertical Stretch when the factor,  $a$ , is greater than 1.

The absolute value graph  $y = a \cdot |x|$  is a vertical Shrink when the factor,  $a$ , is less than 1 and greater than 0.

Without graphing, describe the transformation on the parent function  $y = |x|$ .

1.  $y = 3|x|$

*v. Stretch  
baf 3*

2.  $y = \frac{1}{3}|x|$

*v. Shrink  
baf 1/3*

3.  $y = 4|x|$

*v. Stretch  
baf 4*

4.  $y = -|x|$

*Reflection  
across  
x-axis*

5.  $y = 3 + |x|$

*up 3*

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

*Down 1/2*

7.  $y = \frac{1}{8}|x|$

*v. Shrink  
baf 1/8*

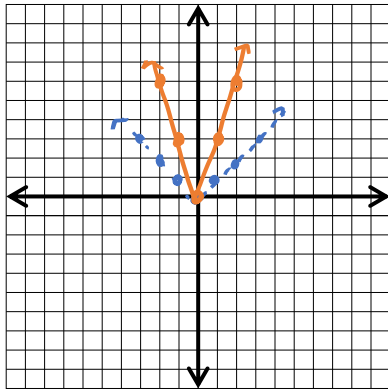
8.  $y = |x+8|$

*Left 8  
units*

**Partner Practice!** Graph the parent function  $y = |x|$  then graph the transformation graph.

1.  $y = 3|x|$

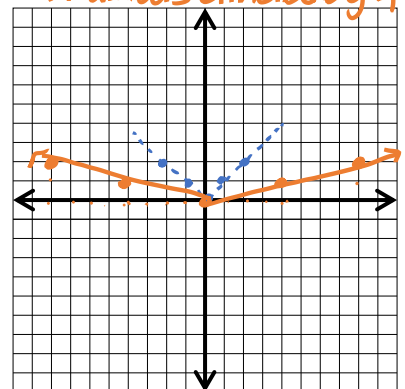
x	$y = 3 x $
-2	$3(2) = 6$
-1	$3(1) = 3$
0	$3(0) = 0$
1	$3(1) = 3$
2	$3(2) = 6$



2.  $y = \frac{1}{4}|x|$  *\*\*What x-values should you choose?!*

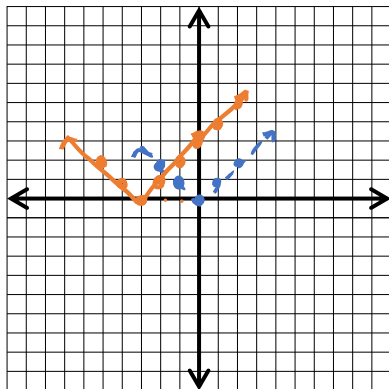
*numbers divisible by 4*

x	$y = \frac{1}{4} x $
-8	$\frac{+8}{4} = +2$
-4	$\frac{+4}{4} = +1$
0	$\frac{0}{4} = 0$
4	$\frac{4}{4} = 1$
8	$\frac{8}{4} = 2$



2.  $y = |x + 3|$  *Left + 3*

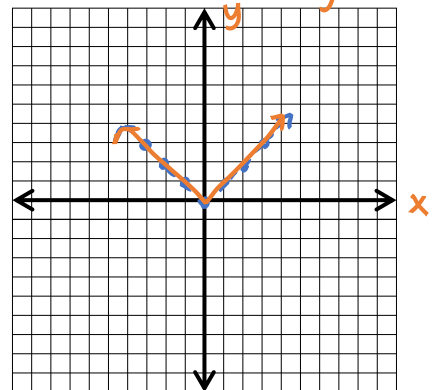
x	$y =  x+3 $
-2	1
-1	2
0	3
1	4
2	5



4.  $y = |-x|$

*Reflect across y-axis*

x	$y =  -x $
-2	2
-1	1
0	0
1	1
2	2



**More Review! WOO!**

I. Write an equation for  $h(x)$  that represents the given transformation(s) of the graph of  $y = |x|$ .

- a) Shift up 4 units      b) Shift right 7 units      c) Vertical Stretch by a factor of 6 units

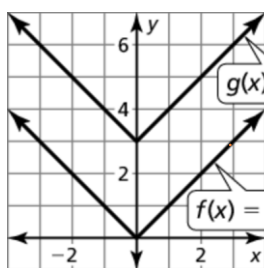
$h(x) = |x| + 4$

$h(x) = |x - 7|$

$h(x) = 6|x|$

II. For the following graphs, describe the transformation on the parent function  $f(x) = |x|$  and decide what the values of  $k$  and  $h$  would be.

a)

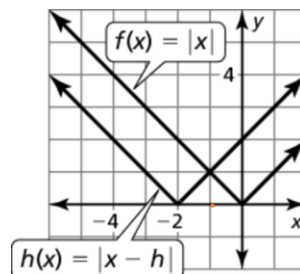


*→ up 3*

$g(x) = |x| + k$

$g(x) = |x| + 3$

b)



*Left + 2*

$h(x) = |x - 2|$

$h(x) = |x - h|$