

**Learning Target(s):** I can graph absolute value functions. I can write absolute value functions.  
I can translate an absolute value functions.

**Notes: 2.7 Use Absolute Value Functions and Transformations**

**Absolute Value Function:**  $f(x) = |x|$

**Vertex of an absolute value graph:** the highest or lowest point on the graph

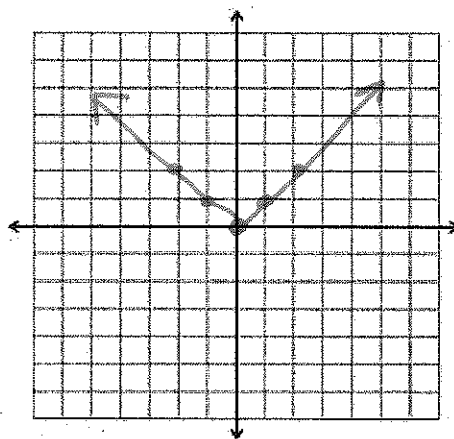
**Transformation:** changes a graph's size, shape, position, or orientation.

**Translation:** shift a graph horizontally and/or vertically but doesn't change its size, shape, or orientation

**Reflection:** when  $a = -1$ , the graph  $y = a|x|$  is a reflection of the graph  $y = |x|$  in the X-axis

**Parent Function for absolute value functions:**  $y = |x|$

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



**Transformations:**

For  $|a| > 1$  the graph is vertically stretched and is narrower than  $y = |x|$ .

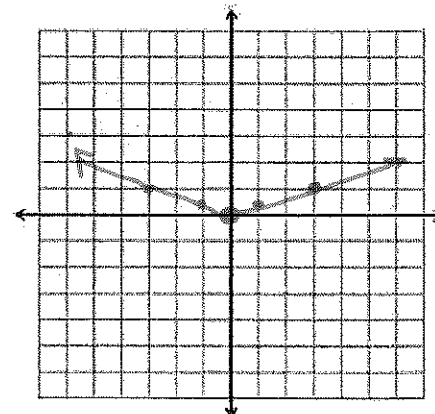
For  $|a| < 1$  the graph is vertically shrunk and is wider than  $y = |x|$ .

**Ex. 1** Graph a)  $y = \frac{1}{3}|x|$  and b)  $y = -2|x|$ . Compare with the absolute value parent function.

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

x	-3	-1	0	1	3
y	1	1/3	0	1/3	1

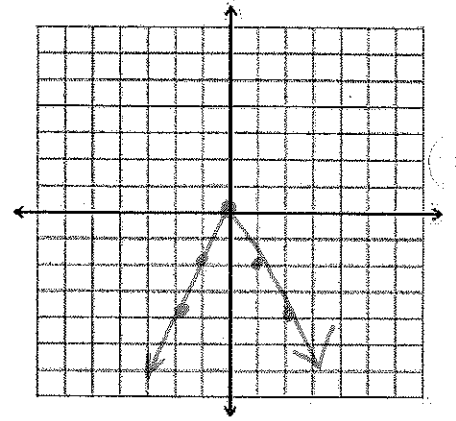
shrunk  $\rightarrow$  wider  
by  $\frac{1}{3}$   
 $\uparrow$   
a-value



b)  $y = -2|x|$ .

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

reflected  $a = -$   
stretch by 2



**Absolute Value Function with Transformations:**

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

$|a|$  is the slope of the ray

$V(h, k)$ :  $h$  represents a horizontal shift;  $k$  represents a vertical shift

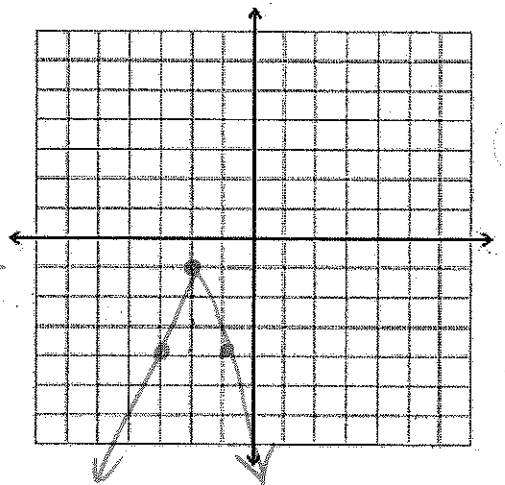
Ex. 2 Graph  $y = -3|x + 2| - 1$ . Compare with the absolute value parent function.

\*\*\* Identify the vertex first!

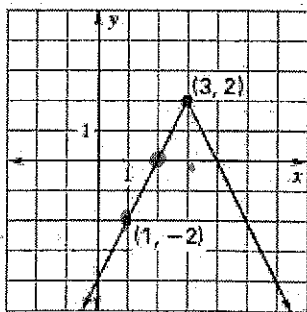
x	-4	-3	-2	-1	0
y			-1		

$(h, k)$   
 $(-2, -1)$

shift  $\leftarrow 2$ , down 1  
stretch by 3



Ex. 3 Write an equation for the graph shown.



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

$\rightarrow 3$   
 $\uparrow 2$