

# Final Review #1: Absolute Value Functions

The parent absolute value function,  $y = |x|$ , looks like this:

$|x|$  means  
"distance of  
 $x$  from zero"

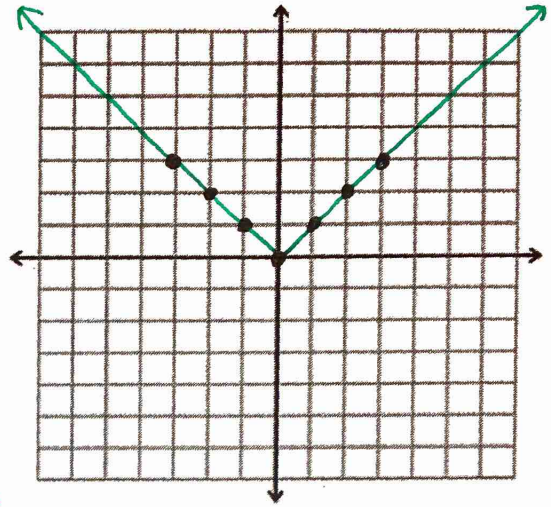
$|x|$  will always  
be positive

$|5| = 5$

$|-5| = 5$

x	y =  x
-3	$ -3  = 3$
-2	$ -2  = 2$
-1	$ -1  = 1$
0	$ 0  = 0$
1	$ 1  = 1$
2	$ 2  = 2$
3	$ 3  = 3$

symmetry



Vertex form of the absolute value function:

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

*negative! opposite sign* (pointing to 'a')  
*vertical shift* (pointing to '+ k')  
*vertex (h, k)*  
*horizontal shift* (pointing to '- h')  
*slopes of 2 lines* (pointing to '|x-h|')

Examples:

1.  $y = 2|x - 3| + 1$

Vertex:  $(3, 1)$

Slopes:  $\pm 2$

Range:  $y \geq 1$

Increasing on:  $x > 3$

Decreasing on:  $x < 3$

Description of transformations: translate/shift right 3 units, up 1 unit, and vertical stretch by a factor of 2.

2.  $y = -\frac{3}{4}|x + 1| + 6$

Vertex:  $(-1, 6)$

Slopes:  $\pm \frac{3}{4}$

Range:  $y \leq 6$

Increasing on:  $x < -1$

Decreasing on:  $x > -1$

Reflect over the x-axis

Description of transformations: Translate/shift left 1 unit, up 6 units, and vertical compression by a factor of 3/4.