Name_____

Algebra 2

Lesson 2-5

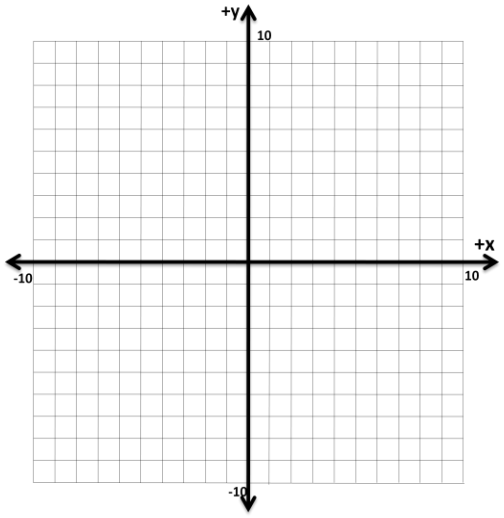
Absolute Value Functions and Graphs

An **absolute value function** is a function that contains an absolute value expression. This function is also a parent function that has the form of $y = |x|$. Graphed, it has a distinctive "V" shape with a minimum point or maximum point depending on the expression. The following examples are variations or "children" of absolute value functions.

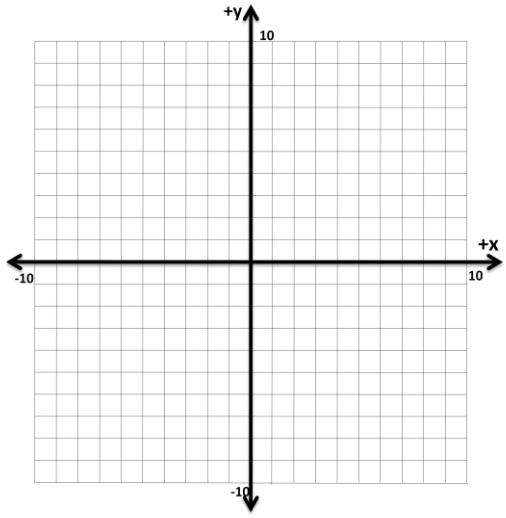
Examples: $f(x) = |x| + 3$ $g(x) = |x + 1| - 4$ $h(x) = -2|x| + 6$

Like all other parent functions, absolute value functions can have variations that move left, right, up, down. compress, stretch, or a combination of several variations. When absolute value functions move up or down (translate), they will have the form of $\boldsymbol{f(x) = |x| + c}$

$f(x) = |x| - 3$

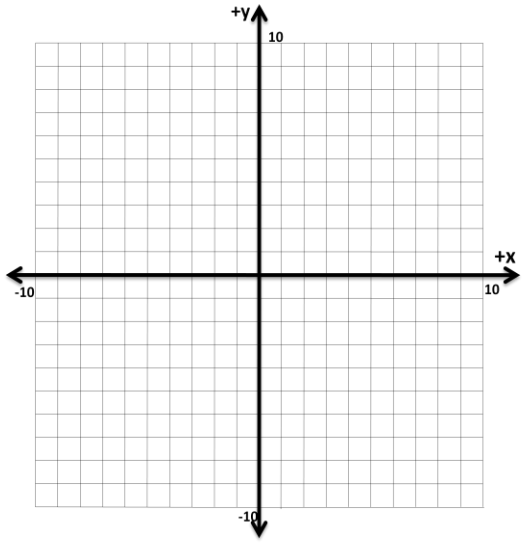


$g(x) = |x| + 2$

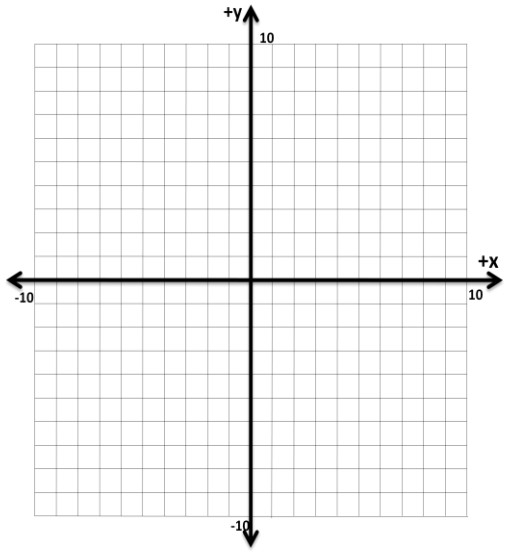


Absolute value functions that move left or right have the form: $\boldsymbol{f(x) = |mx + b| + c.}$

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



$g(x) = |x - 4|$



Notice the "vertex", the maximum or minimum point, of the graphs above is located at the point $\left(-\frac{\boldsymbol{b}}{\boldsymbol{m}}, \boldsymbol{c}\right)$.

Algebra 2

Lesson 2-5

Absolute Value Functions and Graphs

Graphing an absolute value function can be accomplished using the tried and true method by selecting x or y values and solving the equation for the remaining variable and graph the x-y coordinates.

Absolute value functions can also be graphed on a graphing calculator:

1. Y= <enter>
2. MATH →1 <enter>
3. type equation
4. ZOOM 5

your graph should appear!

An absolute value function may also be graphed by using the two linear equation method:$y = |x - 3| + 5$

1. isolate the absolute value (get it by itself) 2. using the definition of absolute value write 2 equations in the general forms: x± __≤0, and x±__≥0 3. incorporating the first equation we get 2 situations 4. graph each equation for the appropriate domain (remember the domain comes from the definition)	$y - 5 = \|x - 3\|$ $x - 3 \geq 0, and\ x - 3 \leq 0$ when $x - 3 \geq 0$ when $x - 3 \leq 0$ $y - 5 = x - 3$ $y - 5 = -(x - 3)$ $y = x + 2$ $y = -8 + x$ domains:$x \geq 3$ $x \leq 3$