

Algebra 2

Lesson 2-5: Absolute Value Functions and Graphs, Horizontal and Vertical Transformations

Mrs. Snow, Instructor

Now what do you suppose an **absolute value function** has in its equation????? Surprise! an absolute value!

The parent function is

$$y = |x|$$

General form:

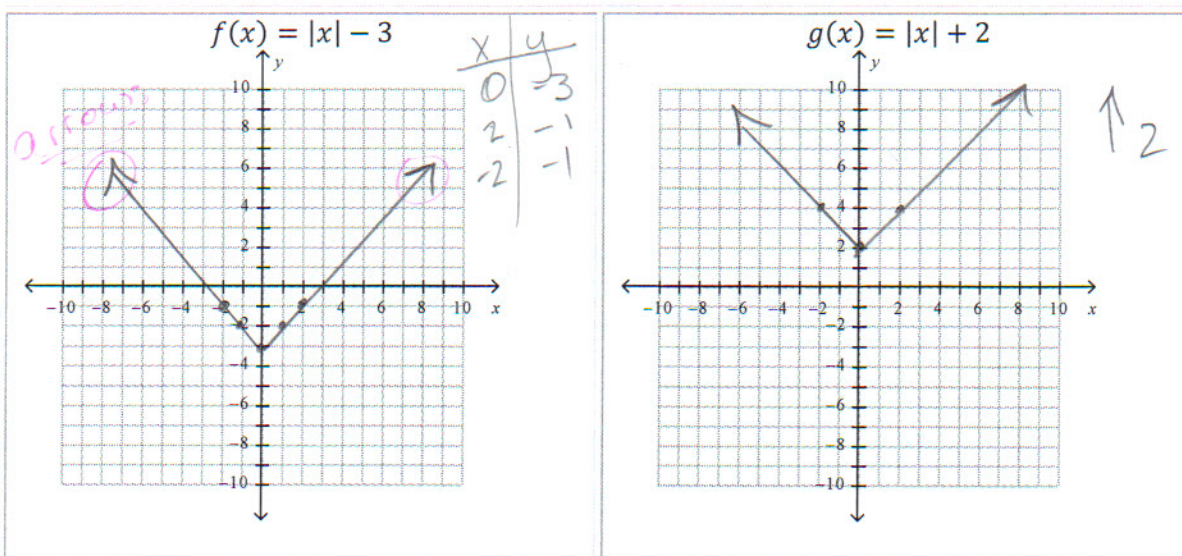
$$f(x) = a|x - h| + k$$

Vertex is: (h, k)

An absolute value function graph is characterized by a **v-shape**. Like all other parent functions, the absolute value function may be transformed with movements to the left, right, up, down, compressed, stretched, or a combination.

When absolute value functions move up or down (translate), they will have the form of

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



Absolute value functions that move left or right have the form:

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

The movement is the value of h . Hence $f(x) = |x - h|$ is a movement to the right while $f(x) = |x + h|$ is a movement to the left.

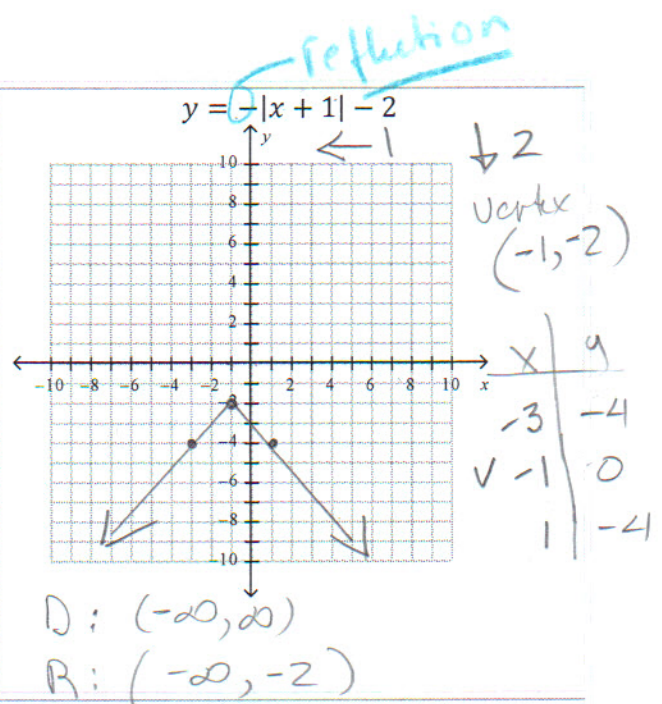
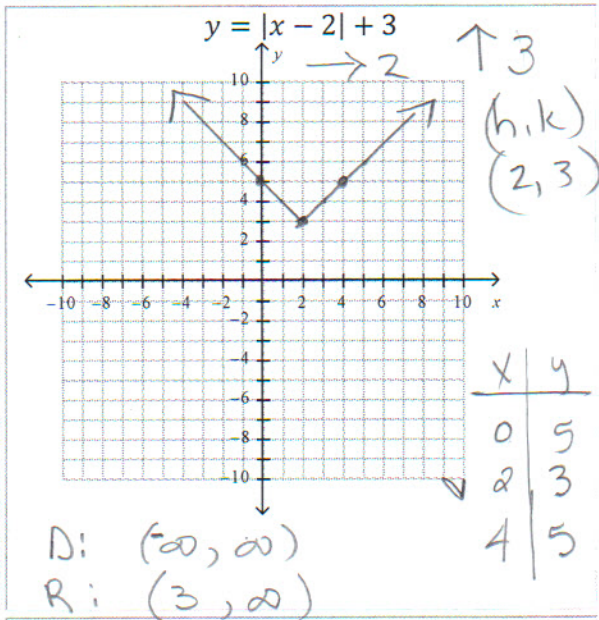
$$f(x) = |x - \boxed{h}|$$

← h $-h$ left

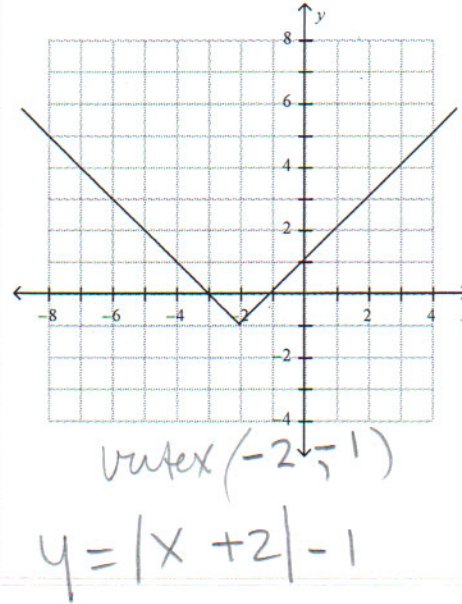
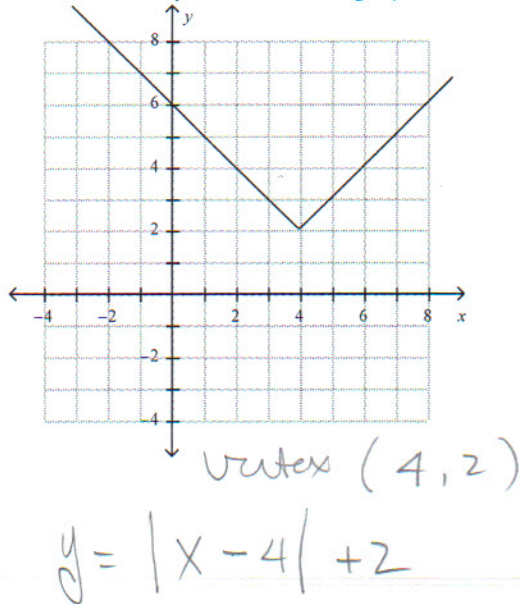
$$f(x) = |x - \boxed{h}|$$

↑ movement $h \rightarrow$ $+h$ right

Graph and ID the domain and range:



What is the equation for the graph:



Keep in mind that the vertical movement is true to what we see in positive movement up or negative movement down. The horizontal movement is based on $(x - \triangle)$. If the value in the triangle is positive we move right. If the value is negative we move left. In essence we move the opposite direction as to the sign in the expression.

Given the parent function, $y = |x|$, write a new equation for the following transformations. State the domain and range.

Left 7 and down 3

← 7 ↓ 3

(-7, 3)

$y = |x + 7| - 3$

Vertex at (-2, 3)

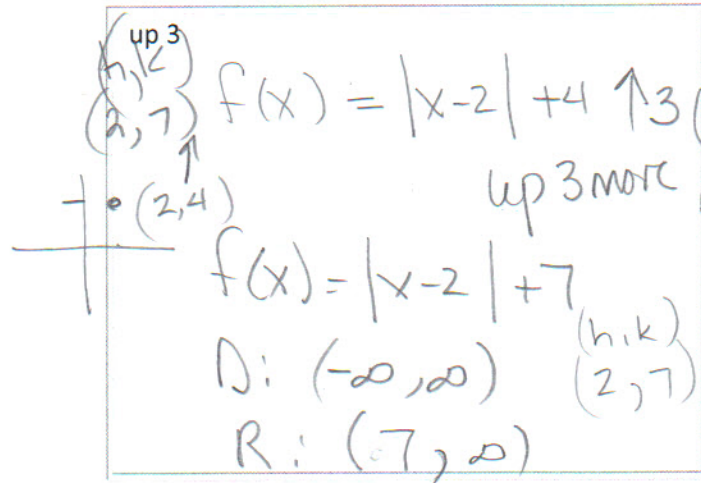
$y = |x + 2| + 3$

Right 2 and up 4

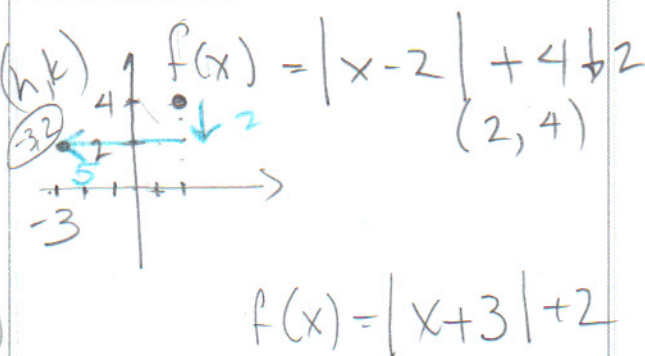
→ 2 ↑ 4

$y = |x - 2| + 4$

Given the function $f(x) = |x - 2| + 4$, write a new equation for the following transformations of that function. What is the transformed function's domain and range?



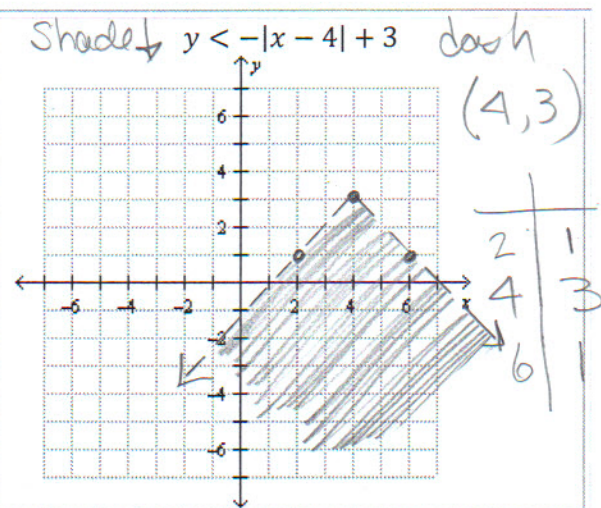
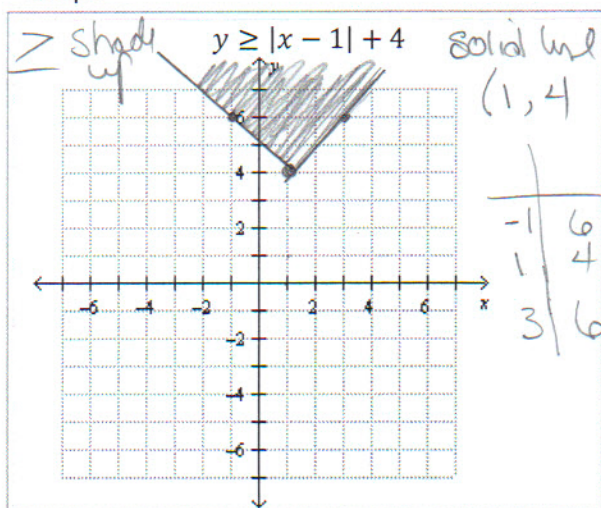
Down 2 and left 5



Absolute Value inequalities are treated in the same way linear inequalities are.

1. Graph the absolute value equation.
2. No equal sign under the inequality means a dashed line
3. y greater than is shaded up and y less than is shaded below

Graph



Write an inequality for each graph:

