Vocab Booklet

Symmetry:

Reflection

x-axis reflection:
- "upside-down"
- Flip over x-axis
- Points have the same x-coord but opposite y-coord.

y-axis reflection:
- "backwards"
- Flip over y-axis
- Points have the opposite x-coord but same y-coord.

Rotation

- Turn a figure about a point which is called the center of rotation.
- Defined by giving a
  Direction (CW or CCW)
  Distance (number of degrees)

Linear Family of Functions:

Example Equation: $y = -2x + 5$

X	Y
−2	9
−1	7
0	5
1	3
2	1

Parent Function: $y = x$

$y = -2x + 5$

$y = x$

Symmetry:

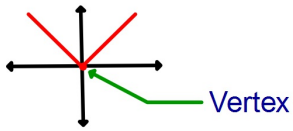
None

No Reflectional Symmetry

180° Rotational Symmetry
(symmetry about the origin)

Absolute Value Graphs Exploration.

Graph of y = |x|



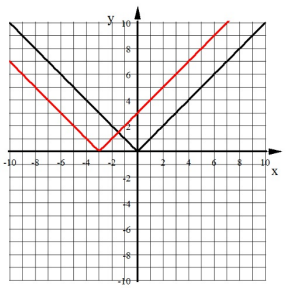
Vertex

Graphing Absolute Value on the Ti-84

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

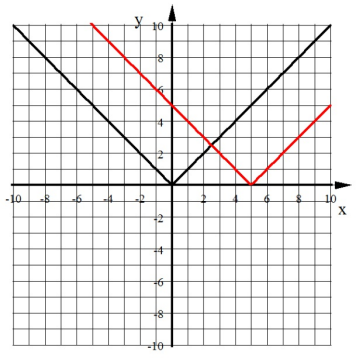
a, h, and k will transform the graph of y = |x|

1. Graph $Y_2 = |x + 3|$ How has this graph moved compared to the parent function?



Translated 3 units left.

2. Graph $Y_2 = |x - 5|$ How has this graph moved compared to the parent function?

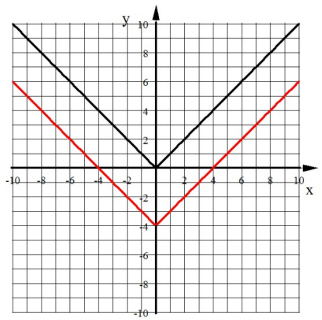


Translated 5 units right

3. What equation would move the graph of $y = |x|$ 7 units to the left?

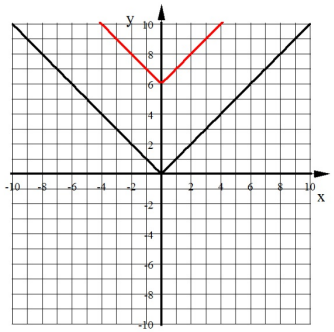
$y = |x + 7|$

4. Graph $Y_2 = |x| - 4$ How has this graph moved compared to the parent function?



Translated 4 units down

5. Graph $Y_2 = |x| + 6$ How has this graph moved compared to the parent function?



Translated 6 units up

6. What equation would move the graph of $y = |x|$ 2 units up?

$y = |x| + 2$

Use each description to write the equation of the absolute value function

7. The parent function $y = |x|$ is moved 4 units right and 6 units down.

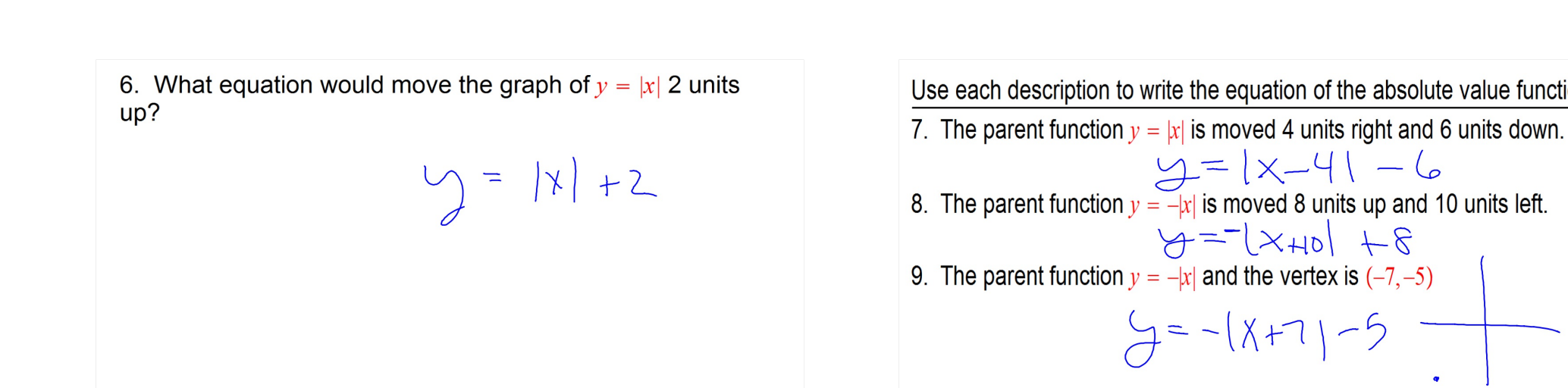
$y = |x - 4| - 6$

8. The parent function $y = -|x|$ is moved 8 units up and 10 units left.

$y = -|x + 10| + 8$

9. The parent function $y = -|x|$ and the vertex is $(-7, -5)$

$y = -|x + 7| - 5$



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

Translation left or right

|x - 5|: moves 5 units right

|x + 4| : moves 4 units left

Translation up or down

+ 7: moves 7 units up

- 1: moves 1 unit down

10. State the coordinates of the vertex for each Absolute Value function.

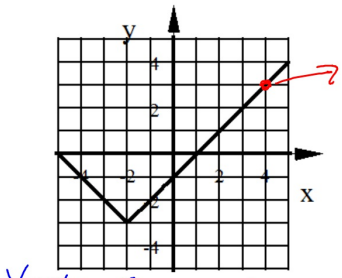
a. $y = |x - 8| + 7$

Vertex: $(8, 7)$

b. $y = |x + 10| - 9$

Vertex: $(-10, -9)$

11. The graph at the right is a translation of $y = |x|$.
Write the equation of this function.



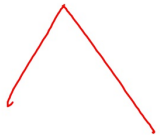
(4, 3)
x y

Vertex (−2, −3) → 2 left, 3 down

$y = |x+2| - 3$
$= |4+2| - 3$
$|6| - 3$
$3 = 6 - 3$ ✓

X-axis Reflection

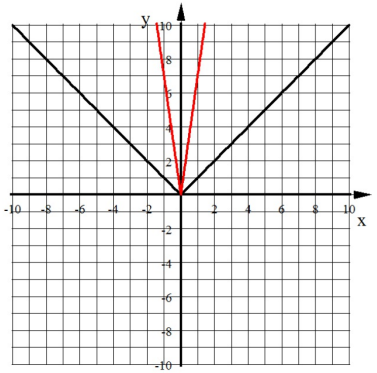
The graph of $y = -|x|$ is a reflection of $y = |x|$ over the x-axis so the graph is an upsidedown "V".



Streches and Shrinks

$y = a|x|$ This equation represents either a strecth (taller) or a shrink (shorter) V-shape.

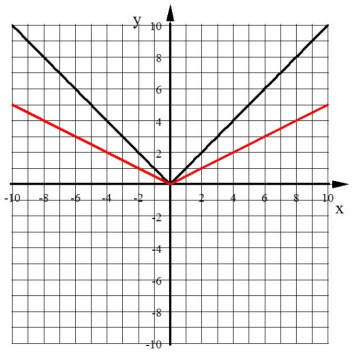
1. Graph $Y_2 = 7|x|$ How does this graph compare to the parent function $y = |x|$?



It is taller - - Vertical Stretch

Vertical Stretch Factor of 7 means it is seven times taller.

2. Graph $Y_2 = \frac{1}{2}|x|$ How does this graph compare to the parent function $y = |x|$?



It is shorter - - Vertical Shrink

Vertical Stretch Factor of 0.5
means it is half as tall

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

a > 0 V opens up
a < 0 V opens down
0 < a < 1 Vertical Shrink
a > 1 Vertical Stretch

3. Write the equation of an absolute value function that is one-fourth as tall as $y = |x|$

$y = \frac{1}{4}|x|$

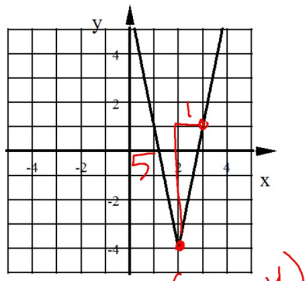
4. Write the equation of an absolute value function that is 3 times taller as $y = |x|$ but opens down.

$y = -3|x|$

$y = a|x|$ a also represents the slope of the sides of the absolute value graph.

5. Write the equation of each absolute value function shown below:

a) EQ:



vertex: (2, -4)

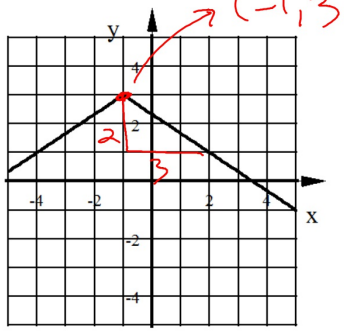
slope of the sides

$y = 5|x - 2| - 4$

2 RT
4 DOWN

b) EQ:

Vertex



(-1, 3)

1 Left

3 up

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

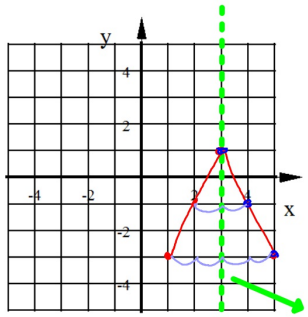
slope of the sides

The negative is because the graph opens downward.

6. Graph each absolute value function.

a) $y = -2|x-3|+1$

3 right, 1 up, 2x taller, upside down.



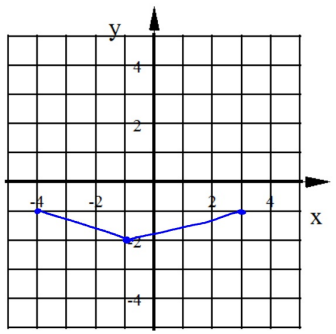
Vertex (3, 1)

$m = \frac{2}{1}$

You could also use the Line of Symmetry to reflect one side in order to plot the other side.

b) $y = \frac{1}{3}|x+1|-2$

1 left, 2 down, one-third as tall, opens up.



Vertex: (-1, -2)

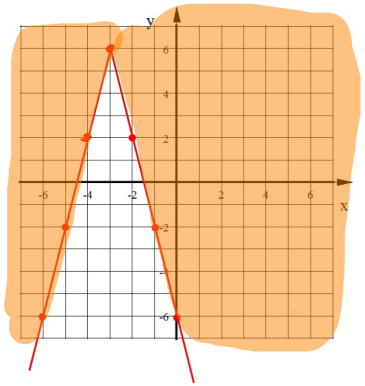
Slope of sides: $\frac{1}{3}$

You can now finish Hwk #4:

Practice Sheet: Graphs of Absolute Value Functions (Sec 2-5)

Due tomorrow

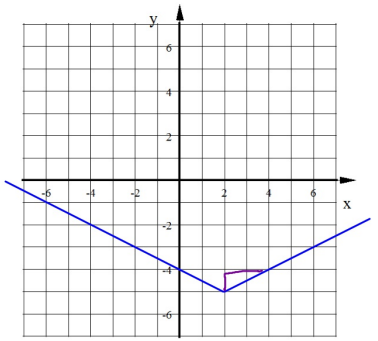
Graph this Absolute Value Inequality:



$y \geq -4|x+3|+6$

- Vertex (-3, 6)
- Opens Down
- Slope of sides is 4/1
- because of the inequality ≥ you shade above the graph.

Write the equation of this Absolute Value function:



$y = \frac{1}{2}|x-2|-5$