1. Let's make a chart of x and y values for $\boldsymbol{y = |x|}$

Input for x	Room for math work to find…	Result for y	Write as point coordinates
x	$\boldsymbol{y = \|x\|}$	y	(x, y)
0			
1			
–1			
2			
–2			
3			
–3			

None of the x values repeat – do some of the y values repeat? YES or NO

2. Go to http://www.bowerpower.net/algebra2sema/ch02/AbsoluteValueFunctionGeoGebra.html. You will probably want to press F11 so you can see everything.

3. What do you notice about the red graph and the points you listed in Step 1 (plot them, if necessary)?

4. How would you describe the shape of the pattern of your points (and the red graph)? _____

5. The red graph is for the equation

$$\boldsymbol{y = |x|}$$

but GeoGebra won't recognize the absolute value "fence posts." Instead, it is entered as

$$\boldsymbol{y = \mathbf{abs}(x)}$$

[The "abs" stands for absolute value]

6. You will notice that GeoGebra changes the $\boldsymbol{y}$ to $\boldsymbol{f(x)}$[this shouldn't bother you]!

7. Notice the Undo, Redo, and Refresh buttons in the upper right corner.

8. Refresh the image (if necessary) so the page appears with just the original red graph.

9. There is an INPUT box at the bottom of GeoGebra. Let's type another absolute value function…

$$y = 3\mathbf{abs}(x)$$

Press ENTER when you are done to see the graph of this function.

10. Try some more numbers to fill in the **???** in $y = ???\,\mathbf{abs}(x)$. Try some positive integers, negative integers, positive fractions or decimals, and negative fractions or decimals. If you enter a fraction, you'll need to put it in parentheses [$y = (-2/5)\,\mathbf{abs}(x)$, for example].

11. Notice how the graphs in Step 10 compare to the red graph of $y = |x|$. (If things get too crowded on the page, you can use Undo or Refresh in the upper right corner).

12. Describe what you are noticing about the direction of the graphs.

13. Describe what you are noticing about how wide or narrow your graphs are (compared to the red graph)

14. Discuss your answers to #12-13 with another student

15. Refresh GeoGebra so the original red graph appears alone. Click on Options → Point Capturing → On.

16. Click on the arrow in the 1st box (upper left) to select the Move option (the border of the button will turn dark blue).

17. The VERTEX of an absolute value function is the starting point for both rays. It is always an extreme (lowest or highest) point on the graph.

18. Click and drag the red graph so the vertex moves from (0,0) to (2, 3). What happened to the equation [it's on the upper left side and it used to be $= \mathbf{abs}(x)$]?

19. Move the graph a few more times and stop to notice the new equations. Be sure you check the vertex in all four quadrants.

20. Describe what you are noticing about the coordinates of the vertex and the number beside x in the ( ) and the number to the far right.

21. Discuss your answer to #20 with another student.

22. Plot a point on the graph by clicking on the point in the 2nd box to select the New Point option and then clicking somewhere on the grid.

23. Type an equation in the Input box at the bottom that you believe will make an absolute value function appear with a vertex at the point you made in #22.

24. If you were correct, congratulations! If you weren't correct, click on the 1st box to get the Move option and move your graph until the vertex does go through your point. Do you see why you were correct/incorrect?

25. Try steps #22-24 again with another point.

26. Now you are ready for the Absolute Value Functions BowerPoint!