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| **Problem 1 – Defining and Plotting Absolute Value** | | |
| The absolute value function can be defined as . | | |
| Explore this definition by using the absolute value function on the graphing calculator.  Press ». Move to the **NUM** menu and select **abs(**. |  | |
| **1.** Use the **abs** command on the Home screen to complete the following.  **a.** |10.5| = \_\_\_\_\_ **b.** |–15| = \_\_\_\_\_ **c.** |–3.14| = \_\_\_\_\_  **d.** |–12| = \_\_\_\_\_ **e.** |8| = \_\_\_\_\_ **f.** |2.71| = \_\_\_\_\_  **2.** What happens to the absolute value of numbers that are negative (to the left of zero on a number line)? How does this relate to the definition stated above? | | |
| To view a plot of the absolute value function, enter 10 random numbers (positive and negative) into **L1**using the stat editor.  To access the editor press … Í.  **Note:** If there is data already in **L1**, clear it by moving the cursor to the top of **L1** and pressing ‘ Í.) | |  | |
| Now, move the cursor on top of **L2**, press Í and let the values of **L2**be equal to **abs(L1)** to compute the absolute values of the data you entered. To enter **L1**, press y À.  The screen to the right just shows a sampling of six **L1**values you may use. | |  | |
| To graph the scatter plot of the data, press y o [stat plot] and select **Plot1**. Match the screen to the right.  Press q and select **ZoomStat**. | |  | |

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| **3.** **L1** represents the *x*-values and **L2** represents the *y*-values. What trend do you notice about the  *y*-values for the negative *x*-values? Describe the shape of the graph to the left of *x* = 0.  **4.** Describe the shape of the graph of *y* = |*x*|. Enter new numbers into the list, press q, and select **ZoomStat** to check the shape you described. | | | | | | |
| **Problem 2 – Exploring Functions with Absolute Value** | | | | | |
| Now you will explore how changing parts of an absolute value function affects its graph using the transformation graphing application.  Before you begin, turn off **Plot 1** by pressing y o [stat plot] selecting **Plot1** and choosing the **Off** Option.  Start the transformational graphing application by pressing Œ and selecting **Transfrm**. | | | | | |
| Press o and enter **A\*abs(X+D)+C** next to **Y1**. Then press q and select **Zstandard**.  To enter the letter **A**, press ƒ ». The letters **D** and **C** are entered in a similar manner by using ƒ followed by the corresponding button to your desired letter. | | | | |  | |
| To change the window setting shown at the right, press p } (up arrow).  To change the values of the constants, use the } and † arrow keys to select the desired variable and then use the | and ~ arrow keys to change the value. | | | | |  | |
| **5.** What happens to the graph when *a* is negative? When *a* is positive?  **6.** In general, what effect does *a* have on the graph? | | | | | |
| **7.** **a.**  What happens to the graph when *d* is positive? When *d* is negative?  **b.** What happens to the graph when *c* is positive? When *c* is negative?    **c.**  For this general function *y* = |*x* + *d*| + *c*, what are the coordinates of the vertex? | | | | | |
| **Problem 3 – Matching Equations to Graphs** | | | | | |
| Choose the correct equation from the options below for each graph shown. | | | | | |
| **a.** *y* = |*x* – 6| + 3  **c.** *y* = |*x* – 3| + 6 | | **b.** *y* = –|*x* + 3| – 6  **d.** *y* = –|*x* + 6| + 3 | | | |
| **8.** |  | | **9.** |  | |
| **10.** |  | | **11.** |  | |
| **Extension – General Absolute Value Function** | | | | | |
| **12.** Using the Transformation Graphing App, explore the graph of **Y1=A\*abs(BX+D)+C**. What does the graph look like when *a* is zero? What about when *b* is zero? Explain why.  **13.** List any other observations. For example, how is the slope related to *a* and *b*? Is the vertex always (–*d*, *c*)? | | | | | |