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Absolute Values and Inequalities using TI-Calculator

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To check the values of an absolute value equation or inequality using your TI-83+ or TI-84+ calculator, follow these steps:

1. Isolate the absolute value (get the |……| by itself).
2. Whatever is on the left of the =, <, >, ≤, or ≥, goes into Y₁ on your calculator.
   a. If it is an absolute value expression (has |……|), this is entered into your calculator by pressing `0 (which is ≠) and the first function is abs (which stands for absolute value. Place whatever is in between the |……| exactly as you see it and close the parentheses).
3. Whatever is on the right of the =, <, >, ≥, or ≤ goes in Y₂ on your calculator.
4. Press # 6 to see if you can see where the graphs intersect.
   a. If an equality:
      i. If you can see the intersections, then you can determine the x-values where the equation is solved (evaluate them!)
      ii. If you cannot see the intersections, change your @ until you can, then see Step i. above.
   b. If an inequality:
      i. If they are asking for < or ≤, you are looking for values below the horizontal line and you will be using an and (____ < x < ____)
      ii. If they are asking for > or ≥, you are looking for values above the horizontal line and you will be using an or (x < ____ or x > ____)

**Example 1:**

Solve |x – 3| – 2 = 5.

1. Get |x – 3| by itself:
   |x – 3| = 7

2. Press # 6

3. Set Xmax = 12 and press %

4. You can see where the graphs intersect better now. Find the values using δ (”. $”). The values are x = ____ and x = ____.
Graph the solution of \( |x - 3| = 5 \): 

\[
|3| 5 \quad x - =
\]

Example 2:
Solve: \( 3|2x + 3| - 1 \leq 14 \)

1. Remember, \textit{isolate} the \( |……| \) first!
   \[
   |2x + 3| \leq 5
   \]

2. Enter the left hand side into \( Y_1 \) and the right hand side into \( Y_2 \):

3. Press \% :

\[
\text{Only } y \text{-values less than or equal to 5 are being sought! These are indicated as those } \text{under } \text{the horizontal line}! 
\text{Find where the graphs intersect:}
\]

For what values of \( x \) is the graph of the absolute value (the "V"-shaped graph) \textbf{below the horizontal line}?*

Between _____ and _____. Our solution then is:

____ \( \leq x \leq ____ \) and the graph:

*Conversely, if asked \( |2x + 3| > 5 \), we would look for the values of \( x \) when the absolute value graph is \textbf{above the horizontal line}.

Practice:
Solve and graph the solution set of:

a. \( |x + 2| = 3 \) 

b. \( 4|2x - 1| > 8 \) 

c. \( |1 - x| < 5 \)