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Absolute Values and Inequalities using TI-Calculator

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Name: _____

Date: _____

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 $|\dots|$ by itself).
2. Whatever is on the left of the $=$, $<$, $>$, \leq , or \geq , goes into Y_1 on your calculator.
 - a. If it is an absolute value expression (has $|\dots|$), this is entered into your calculator by pressing $\boxed{\text{2ND}} \boxed{\text{ABS}}$ (which is \neq) and the first function is abs (which stands for absolute value. Place whatever is in between the $|\dots|$ exactly as you see it and close the parentheses))
3. Whatever is on the right of the $=$, $<$, $>$, \geq , or \leq goes in Y_2 on your calculator.
4. Press $\boxed{\text{2ND}} \boxed{\text{F6}}$ 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 (è Solve them!)
 - ii. If you cannot see the intersections, change your Xres until you can, then see Step i. above.
 - b. If an inequality:
 - i. If they are asking for $<$ or \leq , you are looking for values **below** the horizontal line and you will be using an **and** ($\text{___} < x < \text{___}$)
 - ii. If they are asking for $>$ or \geq , you are looking for values **above** the horizontal line and you will be using an **or** ($x < \text{___}$ or $x > \text{___}$)

Example 1:Solve $|x - 3| - 2 = 5$.❶ Get $|x - 3|$ by itself:

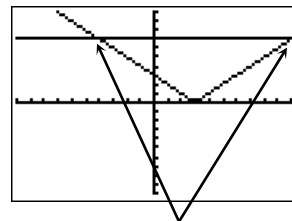
$$|x - 3| = 7$$

Put $|x - 3|$ in Y_1 :Put 7 in Y_2 :

```

Plot1 Plot2 Plot3
Y1=abs(X-3)
Y2=7
Y3=
Y4=
Y5=
Y6=
Y7=

```

❷ Press $\boxed{\text{2ND}} \boxed{\text{F6}}$ 

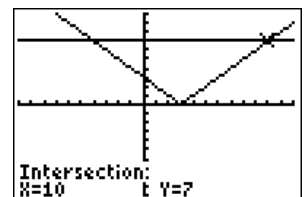
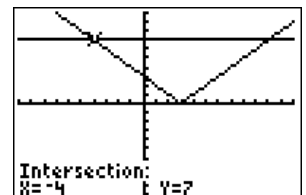
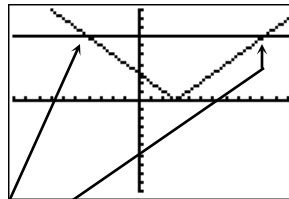
You can see where the graphs intersect, but let's change the Xres to see them better.

❸ Set $\text{Xmax} = 12$ and press $\boxed{\text{2ND}} \boxed{\text{F6}}$.

```

WINDOW
Xmin=-10
Xmax=12
Xscl=1
Ymin=-10
Ymax=10
Yscl=1
Xres=1

```

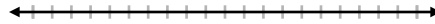


❹ You can see where the graphs intersect better now. Find the values using $\boxed{\text{2ND}} \boxed{\text{F6}}$ (Solve). The values are $x = \text{___}$ **and** $x = \text{___}$.

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Graph the solution of $|x - 3| = 5$:



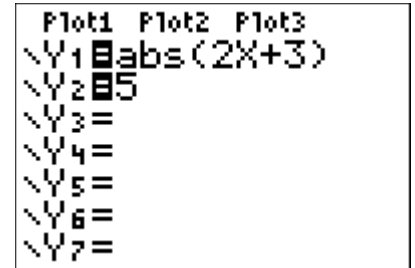
Example 2:

Solve: $3|2x + 3| - 1 \leq 14$

❶ Remember, *isolate* the $|\dots|$ first!

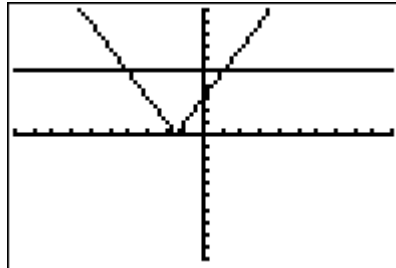
$$|2x + 3| \leq 5$$

❷ Enter the left hand side into Y_1 and the right hand side into Y_2 :



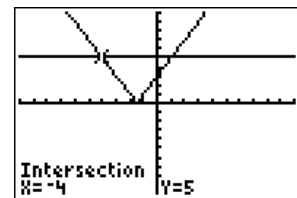
❷

❸ Press \square :



❸

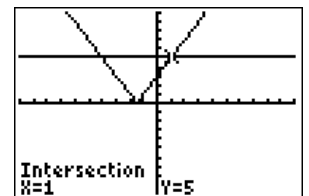
Only y-values less than or equal to 5 are being sought! These are indicated as those **under** the horizontal line*! Find where the graphs intersect:



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

Between _____ and _____. Our solution then is:

$$\underline{\hspace{1cm}} \leq x \leq \underline{\hspace{1cm}} \text{ and the graph:}$$



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

Practice:

Solve and graph the solution set of:

a. $|x + 2| = 3$

b. $4|2x - 1| > 8$

c. $|1 - x| < 5$

