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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 |.....| by itself).
2. Whatever is on the left of the =, <, >, ≤, or ≥, goes into Y<sub>1</sub> on your calculator.
  - a. If it is an absolute value expression (has |.....|), this is entered into your calculator by pressing `2nd` `0` (which is `abs`) 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 Y<sub>2</sub> 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 (è `calculate` them!)
    - ii. If you cannot see the intersections, change your @ `Window` 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  $|x - 3| - 2 = 5$ .

➊ Get  $|x - 3|$  by itself:

$$|x - 3| = 7$$

Put  $|x - 3|$  in Y<sub>1</sub>:

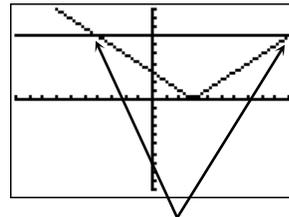
Put 7 in Y<sub>2</sub>:

```

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

```

➋ Press # `6`



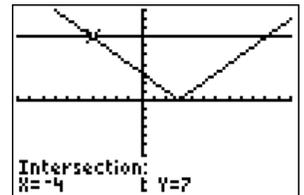
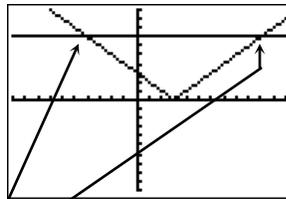
You can see where the graphs intersect, but let's change the @ `Window` to see them better.

➌ Set Xmax = 12 and press % `Window`.

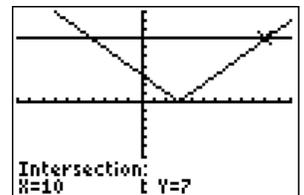
```

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

```



➍ You can see where the graphs intersect better now. Find the values using `2nd` `5` ( `2nd` `5` ). The values are  $x = \underline{\hspace{1cm}}$  **and**  $x = \underline{\hspace{1cm}}$ .



Name: \_\_\_\_\_

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



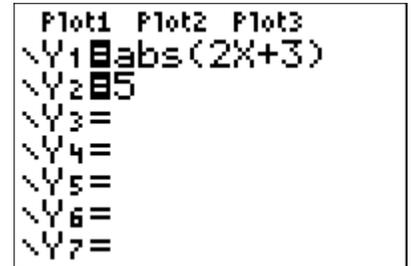
**Example 2:**

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

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

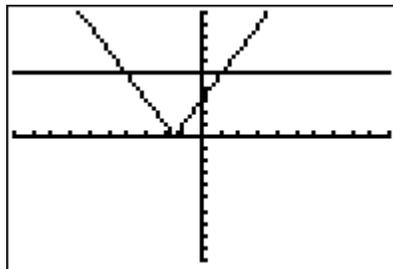
$$|2x + 3| \leq 5$$

2 Enter the left hand side into  $Y_1$  and the right hand side into  $Y_2$ :



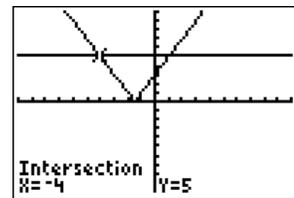
2

3 Press % :



3

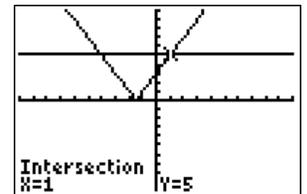
Only y-values less than or equal to 5 are being sought! These are indicated as those **under** the horizontal line\*! Find where the graphs intersect:



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:

$$\text{_____} \leq x \leq \text{_____} \text{ and the graph:}$$



\*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.  $|1 - x| < 5$

