


**ABSOLUTE VALUE INEQUALITIES**

**Example 1: Solve an absolute value inequality where you have to *isolate first*.**

**ONE STEP**

a.  $|x+3| < 12$  

$|x| < 9$

$x < 9$  AND  $x > -9$

$-9 < x < 9$

b.  $-3|x| > -6$  

$|x| < 2$

$x < 2$  AND  $x > -2$

$-2 < x < 2$

**Example 2: Solve an absolute value inequality where you have to isolate first.**

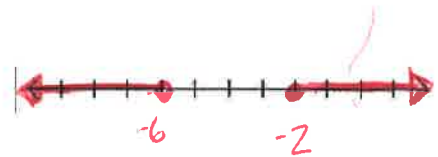
**MULTIPLE STEPS**

a.  $\frac{2|x+4|}{2} \geq \frac{4}{2}$

$|x+4| \geq 2$

$x+4 \geq 2$  or  $x+4 \leq -2$   
 $-4 -4$                        $-4 -4$

$x \geq -2$  OR  $x \leq -6$



b.  $8|x-8| - 5 \geq 11$   
 $+5 +5$

$8|x-8| \geq 16$   
 $8 \quad 8$

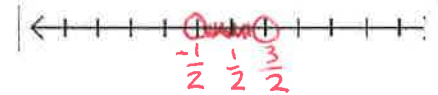
$|x-8| \geq 2$

$x-8 \geq 2$  or  $x-8 \leq -2$   
 $+8 +8$                        $+8 +8$

$x \geq 10$  or  $x \leq 6$



$$\begin{array}{r} c. \quad 3 + |2x - 1| < 5 \\ \underline{-3 \quad \quad -3} \\ |2x - 1| < 2 \end{array}$$



$$\begin{array}{r} 2x - 1 < 2 \quad \text{AND} \quad 2x - 1 > -2 \\ \underline{+1 \quad +1} \quad \quad \quad \underline{+1 \quad +1} \\ 2x < 3 \quad \quad \quad 2x > -1 \\ \underline{\quad \quad \quad} \quad \quad \quad \underline{\quad \quad \quad} \\ x < \frac{3}{2} \quad \text{AND} \quad x > -\frac{1}{2} \end{array}$$

$$\boxed{-\frac{1}{2} < x < \frac{3}{2}}$$

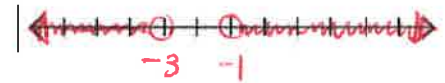
$$\begin{array}{r} d. \quad 3|x| - 2 < 4 \\ \underline{+2 \quad +2} \\ 3|x| < 6 \\ \underline{\quad \quad \quad} \\ x < 2 \end{array}$$



$$x < 2 \quad \text{AND} \quad x > -2$$

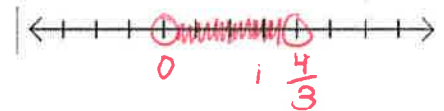
$$\boxed{-2 < x < 2}$$

$$\begin{array}{r} e. \quad 5 - |x + 2| < 4 \\ \underline{-5 \quad \quad -5} \\ -|x + 2| < -1 \\ \underline{\quad \quad \quad} \\ |x + 2| > 1 \end{array}$$



$$\begin{array}{r} x + 2 > 1 \quad \text{OR} \quad x + 2 < -1 \\ \underline{-2 \quad -2} \quad \quad \quad \underline{-2 \quad -2} \\ x > -1 \quad \text{OR} \quad x < -3 \end{array}$$

$$\begin{array}{r} f. \quad 3|-3x + 2| - 2 < 4 \\ \underline{+2 \quad +2} \\ 3|-3x + 2| < 6 \\ \underline{\quad \quad \quad} \\ |-3x + 2| < 2 \end{array}$$



$$\begin{array}{r} -3x + 2 < 2 \quad \text{AND} \quad -3x + 2 > -2 \\ \underline{+2 \quad -2} \quad \quad \quad \underline{-2 \quad -2} \\ -3x < 0 \quad \quad \quad -3x > -4 \\ \underline{\quad \quad \quad} \quad \quad \quad \underline{\quad \quad \quad} \\ x > 0 \quad \quad \quad \text{AND} \quad x < \frac{4}{3} \end{array}$$

$$\boxed{0 < x < \frac{4}{3}}$$

**Classwork:** Show to one of your teachers and you will receive your homework worksheet.

Make sure you isolate the absolute value first. CIRCLE the step where you do this.

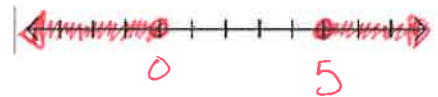
$$1. \quad \begin{array}{r} |x-5|+1 < 2 \\ \hline -1 \quad -1 \\ \hline |x-5| < 1 \end{array}$$



$$\begin{array}{r} x-5 < 1 \quad \text{AND} \quad x-5 > -1 \\ \hline +5 \quad +5 \quad \quad \quad +5 \quad +5 \\ \hline x < 6 \quad \text{AND} \quad x > 4 \end{array}$$

$$\boxed{4 < x < 6}$$

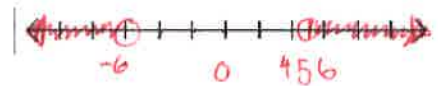
$$2. \quad \begin{array}{r} 2|2x-5|-1 \geq 9 \\ \hline +1 \quad +1 \\ \hline 2|2x-5| \geq 10 \\ \hline \frac{2|2x-5|}{2} \geq \frac{10}{2} \\ \hline |2x-5| \geq 5 \end{array}$$



$$\begin{array}{r} 2x-5 \geq 5 \quad \text{OR} \quad 2x-5 \leq -5 \\ \hline +5 \quad +5 \quad \quad \quad +5 \quad +5 \\ \hline 2x \geq 10 \quad \quad \quad 2x \leq 0 \\ \hline \frac{2x}{2} \geq \frac{10}{2} \quad \quad \quad \frac{2x}{2} \leq \frac{0}{2} \end{array}$$

$$\boxed{x \geq 5 \quad \text{OR} \quad x \leq 0}$$

$$3. \quad \begin{array}{r} -|2x+1| < -9 \\ \hline -2 \quad -2 \end{array}$$



$$\begin{array}{r} -|2x+1| < -11 \\ \hline -1 \quad -1 \end{array}$$

$$|2x+1| > 11$$

$$\begin{array}{r} 2x+1 > 11 \quad \text{OR} \quad 2x+1 < -11 \\ \hline -1 \quad -1 \quad \quad \quad -1 \quad -1 \end{array}$$

$$\begin{array}{r} 2x > 10 \quad \quad \quad 2x < -12 \\ \hline \frac{2x}{2} > \frac{10}{2} \quad \quad \quad \frac{2x}{2} < \frac{-12}{2} \end{array}$$

$$\boxed{x > 5 \quad \text{OR} \quad x < -6}$$

