

ABSOLUTE VALUE INEQUALITIES

Special Cases

* $| \quad | > \text{neg}$ or $| \quad | \geq \text{neg} \rightarrow \mathbb{R}$: All real numbers

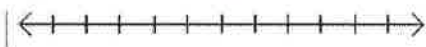
* $| \quad | < \text{neg}$ or $| \quad | \leq \text{neg} \rightarrow \emptyset$: No Solution

Example 1: Solve each open sentence and graph its solution.

1. $|7x - 8| = -9$

\emptyset Absolute value cannot equal a negative!

Leave blank!



2. $|4x - 5| < -3$

\emptyset

Blank!



3. $|y + 5| > -1$

\mathbb{R}



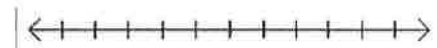
Example 2: Solve an absolute value inequality where you have to isolate first.

a. $|x + 3| + 3 < -5$

$\frac{|x + 3| + 3}{-3 \quad -3} < -5$
 $|x + 3| < -8$

$+ < -$

\emptyset



leave blank

b. $8|x+1|+5 \geq 5$

$$\frac{8|x+1|+5}{-5-5} \geq \frac{5}{-5-5}$$

$$\frac{8|x+1|}{8} \geq \frac{0}{8}$$

$$|x+1| \geq 0$$

$$\begin{array}{l} x+1 \geq 0 \\ -1 \quad -1 \end{array}$$

$$\begin{array}{l} x+1 \leq 0 \\ -1 \quad -1 \end{array}$$

$$\boxed{x \geq -1} \text{ or } \boxed{x \leq -1}$$



Entire graph is shaded

\mathbb{R}

c. $-2|2x-1|+3 < 5$

$$\frac{-2|2x-1|+3}{-3-3} < \frac{5}{-3-3}$$

$$\frac{-2|2x-1|}{-2} < \frac{2}{-2}$$

$$|2x-1| > -1$$

+ > -

\mathbb{R}



Shade entire graph!

d. $3|2x-1|-2 < 4$

$$\frac{3|2x-1|-2}{+2+2} < \frac{4}{+2+2}$$

$$\frac{3|2x-1|}{3} < \frac{6}{3}$$

$$|2x-1| < 2$$

$$\frac{2x-1}{+1} < 2 \text{ AND } \frac{2x-1}{+1} > -2$$

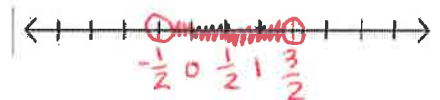
$$\frac{2x}{2} < \frac{3}{2} \text{ AND } \frac{2x}{2} > \frac{-1}{2}$$

$$x < \frac{3}{2} \text{ AND } x > \frac{-1}{2}$$

$$x < \frac{3}{2}$$

$$x > \frac{-1}{2}$$

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



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. $|-2x-5|+2 > -8$

$$\begin{aligned} & \underline{-2 \quad -2} \\ & |-2x-5| > -10 \\ & + > - \\ & \text{TRUE} \\ & \boxed{\mathbb{R}} \end{aligned}$$



2. $5-|x+6| > 4$

$$\begin{aligned} & \underline{-5 \quad -5} \\ & -|x+6| > -1 \\ & \underline{-1 \quad -1} \\ & |x+6| < 1 \\ & \underline{x+6 < 1 \quad \text{AND} \quad x+6 > -1} \\ & \underline{\quad -6 \quad -6 \quad \quad -6 \quad -6} \\ & x < -5 \quad \text{AND} \quad x > -7 \end{aligned}$$

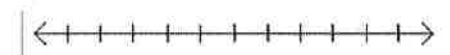
$$\boxed{-7 < x < -5}$$



3. $2|-3x+2|-2 < -4$

$$\begin{aligned} & \underline{+2 \quad +2} \\ & \frac{2|-3x+2|}{2} < \frac{-2}{2} \\ & |-3x+2| < -1 \\ & + < - \\ & \text{False} \end{aligned}$$

$$\boxed{\emptyset}$$



4. $|3x|+2 \geq 2$

$$\begin{aligned} & \underline{-2 \quad -2} \\ & |3x| \geq 0 \\ & \frac{3x}{3} \geq \frac{0}{3} \quad \text{or} \quad \frac{3x}{3} \leq \frac{0}{3} \\ & x \geq 0 \quad \text{or} \quad x \leq 0 \end{aligned}$$

$$\boxed{\mathbb{R}}$$



