

Absolute Value - $|x|$ is the distance the number is from zero on the number line.

Absolute Value Equations

Absolute Value Inequality “OR”

Absolute Value Inequality “AND”

Ex 1: Solve $|x-3|=6$.

$$\begin{array}{r} x-3=6 \\ +3 \quad +3 \\ \hline x=9 \end{array} \quad \begin{array}{r} x-3=-6 \\ +3 \quad +3 \\ \hline x=-3 \end{array}$$

Ex 2: Solve $|4x+10|=6x$. Check for **extraneous** solutions.

$$\begin{array}{r} 4x+10=6x \\ -4x \quad -4x \\ \hline 10=2x \\ \frac{10}{2}=\frac{2x}{2} \\ x=5 \checkmark \end{array} \quad \begin{array}{r} 4x+10=-6x \\ -4x \quad -4x \\ \hline 10=-10x \\ \frac{10}{-10}=\frac{-10x}{-10} \\ x=-1 \end{array}$$

~~$x=-1$~~ extraneous sol.

Ex 3: Solve $|2x+5|>3$.

$$\begin{array}{r} 2x+5>3 \\ -5 \quad -5 \\ \hline 2x>-2 \\ \frac{2x}{2}>\frac{-2}{2} \\ x>-1 \end{array} \quad \text{OR} \quad \begin{array}{r} 2x+5<-3 \\ -5 \quad 5 \\ \hline 2x<-8 \\ \frac{2x}{2}<\frac{-8}{2} \\ x<-4 \end{array}$$

$x > -1$ OR $x < -4$

Graph the solution.

OR



Ex 4: Solve $|x-1.5|\leq 4.5$

$$\begin{array}{r} x-1.5\leq 4.5 \\ +1.5 \quad +1.5 \\ \hline x\leq 6 \end{array} \quad \text{AND} \quad \begin{array}{r} x-1.5\geq -4.5 \\ +1.5 \quad +1.5 \\ \hline x\geq -3 \end{array}$$

Graph the solution.



Steps: ① Isolate the absolute value

② Setup 2 equations
= + = -

③ Solve

④ \checkmark your solution

Steps: ① Isolate the absolute value on the left

② Greater **>** \geq

③ Set up 2 inequalities
OR flip flip

④ Solve

Steps: ① Isolate the absolute value on the left

② Less than **<**
 $< \leq$

③ Set up 2 inequalities
AND flip flip