Absolute Value Definition - The absolute value of *x*, is defined as…

$$|\boldsymbol{x}| = \begin{cases} x, & if \ \ x \geq 0 \\ -x, & if \ x < 0 \end{cases}$$

where ***x*** is called the "argument"

Properties of Absolute Value

$$|a| = \begin{cases} a & \text{if } a \geq 0 \\ -a & \text{if } a < 0 \end{cases}$$

$|a| \geq 0$ $\qquad$ $|-a| = |a|$

$|ab| = |a||b|$ $\qquad$ $\left|\frac{a}{b}\right| = \frac{|a|}{|b|}$

$|a+b| \leq |a| + |b|$ Triangle Inequality

Steps for Solving *Linear* Absolute Value *Equations*: *i.e.* $|ax + b| = c$

1. Isolate the absolute value.

2. Identify what the isolated absolute value is set equal to…
   a. If the absolute value is set **equal to zero**, remove absolute value symbols & solve the equation to get **one solution**.

   b. If the absolute value is set **equal to a negative** number, there is **no solution.**

   c. If the absolute value is set **equal to a positive** number, set the argument (*expression within the absolute value*) equal to the number **and** set it equal to the opposite of the number, using an 'or' statement in between the two equations. Then solve each equation separately to get **two solutions**.

Absolute Value Equations/Inequalities

If b is a positive number

$|p| = b \quad \Rightarrow \quad p = -b \text{ or } p = b$

$|p| < b \quad \Rightarrow \quad -b < p < b$

$|p| > b \quad \Rightarrow \quad p < -b \text{ or } p > b$