RULES for absolute value equalities and inequalities.

Absolute vaule is not an algebraic operator – so you must write equivalent sentences to solve!

Remember to isolate the absolute value **before** applying these theorems (i.e., get it in proper form:

| x + 3 | = 5 the absolute value all by itself on the left side of the equation, the resulting equation must be positive on the right-hand side! (why?)

Theorem 1

To solve an absolute value equation, such as $|X| = p$, replace it with the two equations: $X = -p$ and $X = p$ and then solve each as usual. Absolute value equations can have up to two solutions. EXAMPLE below:

Note:

Absolute value equalities are **neither a conjunction or a disjunction** since (typically) two answers exist.

GIVEN: $3 \cdot |2x - 4| = 4$

GET IN PROPER FORM: $\frac{3 \cdot |2x - 4|}{3} = \frac{4}{3}$

$|2x - 4| = \frac{4}{3}$

WRITE EQUIVALENT SENTENCES: $2x - 4 = \frac{4}{3}$ AND $2x - 4 = \frac{-4}{3}$

SOLVING $x_1 := \frac{8}{3} = 2.667$ $x_2 := \frac{4}{3} = 1.333$

Theorem 2

To solve an absolute value inequality involving “less than,” such as $|X| \le p$, replace it with the compound inequality $-p \le X \le p$ (this is a conjunction using the word “and” or “overlap”.) Then solve as usual.

In math and logic, the symbol for a **conjunction** is ∧ (read as "and"), representing a statement that is true only if both parts are true. [WHERE THE SOLUTION “OVERLAP”]

The symbol for a **disjunction** is ∨ (read as "or"), representing a statement that is true if at least one of the parts is true. [THE “UNION” OF THE SOLUTIONS]

Theorem 3

To solve an absolute value inequality involving “greater than,” such as $|X| \ge p$, replace it with the compound inequality $X \le -p$ or $X \ge p$ and then solve as usual.