Name:		Date:
Topic/Objective: Solve Absolute Value equations		Class/Period:
How do you solve absolute value equations?		

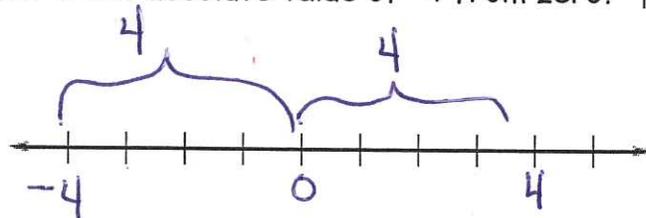| Questions/Main Ideas:	Notes:
Definition: Absolute Value Before we begin:	The distance from zero on a number line. The absolute value is always Positive The symbol: | | 1. How far is the absolute value of 4 from zero? $\|4\| = 4$ 2. How far is the absolute value of -4 from zero? $\|-4\| = 4$
EXAMPLES: Solve an absolute value equation. **Solve $\|x\| = 7$** 1.) The distance between x and 0 is 7.	1.) Solve $\|x\| = 7$ 2.) Solve $\|x\| = 15$ 7, -7 15, -15 - Notice that the expression inside the absolute value symbol equals 7 or -7 this suggest the following rules for solving absolute value equations….
Absolute value equation	Absolute Value equations have the possibility of 2 solutions.

- This is because the value inside the | | can equal either the
  − or the + value on the other side of the equal sign.

Always isolate the absolute value expression on one side of the equal sign before breaking the problem into 2 pieces

Solve $|x - 3| = 8$ **Is the absolute value sign isolated?** Yes 1.) separate as equations 2.) solve each equation separately.	1.) $|x - 3| = 8$ $\begin{array}{ccc} x - 3 = 8 & \text{or} & x - 3 = -8 \\ +3 \ +3 & & +3 \quad +3 \\ \hline x = 11 & \text{or} & x = -5 \end{array}$ $11, \ -5$
Solve $3|2x - 7| - 5 = 4$ **Is the absolute value sign isolated?** 1.) rewrite the equation in the form $|ax + b| = c$ ___ to both sides Divide both sides by 2.) Next, solve the absolute value equation	2.) $3|2x - 7| - 5 = 4$ $\qquad\qquad +5 \ +5$ $\dfrac{3|2x - 7|}{3} = \dfrac{9}{3}$ $|2x - 7| = 3$ $\begin{array}{ccc} 2x - 7 = 3 & \text{or} & 2x - 7 = -3 \\ +7 \ +7 & & +7 \quad +7 \\ \hline \dfrac{2x}{2} = \dfrac{10}{2} & & \dfrac{2x}{2} = \dfrac{4}{2} \\ x = 5 & & x = 2 \end{array}$

Examples:

1.) $|r - 7| = 9$

2.) $4|t + 9| - 5 = 19$

1.) $|r - 7| = 9$

$r - 7 = 9$ or $r - 7 = -9$
$\;+7\;+7\;\;\;\;\;\;+7\;\;+7$

$r = 16$ or $r = -2$

$-2, 16$

2.) $4|t + 9| - 5 = 19$
$\;+5\;\;\;\;+5$

$\dfrac{4|t + 9|}{4} = \dfrac{24}{4}$

$|t + 9| = 6$

$t + 9 = 6$ or $t + 9 = -6$
$\;\;\;-9\;-9\;\;\;\;\;\;\;\;\;\;-9\;\;-9$

$t = -3$ or $t = -15$

REMEMBER: The absolute value of a number is <u>NEVER</u> <u>NEGATIVE.</u>

SO.......
A negative absolute value answer = NO SOLUTION

3.) $3|4x + 2| - 7 = 11$
$\;+7\;\;+7$

$\dfrac{3|4x + 2|}{3} = \dfrac{18}{3}$

$|4x + 2| = 6$

$4x + 2 = 6$ or $4x + 2 = -6$
$\;\;\;-2\;-2\;\;\;\;\;\;\;\;\;\;\;\;-2\;\;-2$

$\dfrac{4x}{4} = \dfrac{4}{4}\;\;\;\;\;\;\;\;\;\;\dfrac{4x}{4} = \dfrac{-8}{4}$

$x = 1\;\;\;\;\;\;\;\;\;\;\;\;\;x = -2$

$\boxed{1, -2}$

4.) $|x + 4| = 3$

$x + 4 = 3$ or $x + 4 = -3$
$\;\;\;-4\;-4\;\;\;\;\;\;\;\;\;\;\;-4\;-4$

$x = -1$ or $x = -7$

$\boxed{-1, -7}$

Solve the equation if possible.	

5.) $|x| = 9$

$9, -9$

⭐ 6.) $|3x + 5| + 6 = -2$

$\underline{-6 \quad -6}$

$|3x + 5| = -8$

no solution

⭐ The Absolute Value is never negative

⭐ 7.) $3|2x - 8| + 3 = 2$

$\underline{-3 \quad -3}$

$\dfrac{3|2x-8|}{3} = \dfrac{-1}{3}$

$|2x - 8| = -\dfrac{1}{3}$

no solution

Summary: