Algebra 2 Lesson 1-5: Absolute Value Equations and Inequalities Mrs. Snow, Instructor

When you travel to school you travel a certain distance, like 5.2 miles. The distance from school to home would then be 5.2 miles as well, NOT -5.2 miles. Distance is an **absolute value**. In equations **absolute value** of a number is its distance from zero on the number line and uses the symbol |. **Remember absolute value is nonnegative!** Therefore, if $x \ge 0$ (positive), then |x| = x and |-x| = x.

For example: |-16| = 16, |53| = 53

To solve equations with absolute values remember the following steps and rules.

- 1. Absolute value equations will have two (2) solutions.
- 2. To solve and absolute value equation **first** isolate the absolute value expression on the left side of the equation.
- 3. Break down the equation into 2 separate equations using an "or" between them.
- 4. The right sides of the equations will opposites.
- 5. *Caution* you may solve and get an **extraneous** solution which is not really a solution, it is a false solution that is wrong! Extraneous solutions are found when checking the answers. So, CHECK YOUR WORK!!
- 6. Absolute value equations may not have a solution; *remember* absolute values cannot be equal to a negative value.
- 7. **Absolute value inequalities** are handled similarly to equalities. The right sides of the equations will be opposites *with* the inequality symbol will be opposite too.
- 8. **Definition:** Therefore, if $x \ge 0$, then |x| = x if x = 5, then |5| = 5x < 0, then |x| = -x if x = -6, then |-6| = 6 = -(-6)

Examples:	
2 3x - 1 = 8	$\frac{1}{4} 3t - 2 - 10 = 15$
2x + 5 = 3x + 4	4w + 9 = -7
$ 3x + 6 \ge 12$ $3x + 6 \ge 12$ or $3x + 6 \le -12$	$ 3x - 2 + 4 \le 7$