Lesson 1.6 Warm Up (Clickers)

1. Solve and graph: $-5x - 3 + 2x > 9$

2. Evaluate: $|2x - 5|$ when $x = -1$

3. Solve and graph: $9 < 3x - 5 \leq 13$

Lesson 1.6 Absolute Value Equations & Inequalities

Essential Understanding: An absolute value quantity is nonnegative. Since opposites have the same absolute value, an absolute value equation can have two solutions.

Take note **Key Concept** *Absolute Value*

Definition		Numbers	Symbols
The **absolute value** of a real number x, written $|x|$, is its distance from zero on the number line.		$|4| = 4$ $|-4| = 4$	$|x| = x$, if $x \geq 0$ $|x| = -x$, if $x < 0$

An absolute value equation has a variable within the absolute value sign. For example, $|x| = 5$. Here, the value of x can be 5 or -5 since $|5|$ and $|-5|$ both equal 5.

Both 5 and -5 are 5 units from 0.

$-6\ -5\ -4\ -3\ -2\ -1\ \ 0\ \ 1\ \ 2\ \ 3\ \ 4\ \ 5\ \ 6$

Ex. What is the solution of $|2x - 1| = 5$?

Graph the solution.

Ex. Solve $|3x + 2| = 4$? Graph the solutions.

1 Solve: $|2x + 5| = 9$

   Separate your answers with a comma.

Ex. Solve: $3|x + 2| - 1 = 8$

2 Solve $2|x + 9| + 3 = 7$. Separate your answers with a comma.

Distance from 0 on the number line cannot be negative. Therefore, some absolute value equations, such as $|x| = -5$, have no solution. It is important to check the possible solutions of an absolute value equation. one ore more of the possible solutions may be <u>extraneous.</u>

An <u>extraneous solution</u> is a solution derived from an original equation that is not a solution of the original equation.

Ex. What is the solution of $|3x + 2| = 4x + 5$? Check for extraneous solutions.

3 What is the solution of $|5x - 2| = 7x + 14$? Check for extraneous solutions.

Lesson 1.6 Day 2 Warm Up (Marker Boards)

1. What is an extraneous solution?

2. Solve for x: $|x - 4| = 12$

3. Give an example of a whole number that is not a natural number?

Essential Understanding: You can write an absolute value inequality as a compound inequality without absolute value symbols.
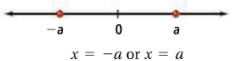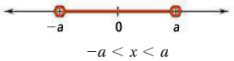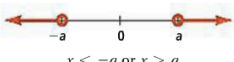• less than is 'and'
• greater than is 'or'

Ex. What is the solution of $|2x - 1| < 5$? Graph the solution.

Ex. What is the solution of $|3x - 4| \leq 8$? Graph the solution.

Ex. Solve $|2x + 4| \geq 6$? Graph the solution.

4 Solve: $|5x + 10| > 15$

   Then graph.

Concept Summary   Solutions of Absolute Value Statements

Symbols	Definition	Graph
$\|x\| = a$	The distance from x to 0 is a units.	$x = -a$ or $x = a$
$\|x\| < a$ ($\|x\| \leq a$)	The distance from x to 0 is less than a units.	$-a < x < a$ $x > -a$ and $x < a$
$\|x\| > a$ ($\|x\| \geq a$)	The distance from x to 0 is greater than a units.	$x < -a$ or $x > a$

Ex. Solve and then graph: $3| 4x - 2 | \geq 12$