Name: Key

NC Math 3 Unit: 0 Day: 5

Objective: Solve absolute value inequalities.

Foundation:

Solve each absolute value equation.

$|x-10|=6$

$x-10=6$ $\quad x-10=-6$

$x=16$ ✓ $\quad x=4$ ✓

$x=\{4,16\}$

$|4x+6|+8=3$

$|4x+6|=-5$

STOP

No solution!

$x=\{\ \}$

$|3x+2|=4x+5$

$3x+2=4x+5$ $\quad 3x+2=-4x-5$

$-3 \neq x$ $\quad 7x=-7$

$x=-1$ ✓

$x=\{-1\}$

$5-8|-2x|=-75$

$-8|-2x|=-80$

$|-2x|=10$

$-2x=10$ $\quad -2x=-10$

$x=-5$ ✓ $\quad x=5$ ✓

$x=\{-5,5\}$

$3-|8x-6|=3$

$-|8x-6|=0$

$|8x-6|=0$

$8x-6=0$

$8x=6$

$x=3/4$ ✓

$x=\{3/4\}$

$6|1-5x|-9=57$

$6|1-5x|=66$

$|1-5x|=11$

$1-5x=11$ $\quad 1-5x=-11$

$-5x=10$ $\quad -5x=-12$

$x=-2$ ✓ $\quad x=12/5$ ✓

$x=\{-2,\ 12/5\}$

Notes and Examples:

How to solve absolute value inequalities:

Step 1: Isolate the absolute value.

Step 2: Use the definition of absolute value to set up two inequalities:

To set up the two cases:

$|x| < a$

$x < a$	$x > -a$
Case 1: Write the problem without the absolute value sign, and solve the inequality.	**Case 2:** Write the problem without the absolute value sign, reverse the inequality, negate the value NOT under the absolute value, and solve the inequality.

Step 3: Solve each inequality from step 2.

Step 4: Use your calculator as visualizer when checking.

Special Cases:

An absolute value cannot be less than a negative number!

No solution!

{∅}

$|2x+7| < -12$

An absolute value will always be more than a negative number!

All real numbers

$(-\infty, \infty)$

$|x+4| > -7$

Teacher Examples:

1. $|2x+1| > 4$

$2x+1>4$ $\quad 2x+1<-4$

$2x>3$ $\quad 2x<-5$

$x>3/2$ $\quad x<-5/2$

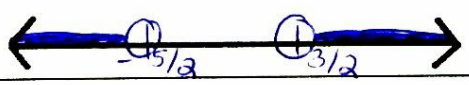
2. $|2x-1|+3 \leq 4$

$|2x-1| \leq 1$

$2x-1 \leq 1$ $\quad 2x-1 \geq -1$

$2x \leq 2$ $\quad 2x \geq 0$

$x \leq 1$ $\quad x \geq 0$



Practice:

1. $|x+4| \leq 8$

$x+4 \leq 8$ $\quad$ $x+4 \geq -8$

$x \leq 4$ $\quad$ $x \geq -12$

2. $|5x| \leq 10$

$5x \leq 10$ $\quad$ $5x \geq -10$

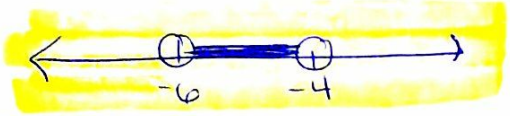
$x \leq 2$ $\quad$ $x \geq -2$

3. $|x+5|-6<-5$

$|x+5| < 1$

$x+5 < 1$ $\quad$ $x+5 > -1$

$x < -4$ $\quad$ $x > -6$



4. $|6+9x| \leq 24$

$6+9x \leq 24$ $\quad$ $6+9x \geq -24$

$9x \leq 18$ $\quad$ $9x \geq -30$

$x \leq 2$ $\quad$ $x \geq -10/3$

5. $9|x+8|+10<55$

$9|x+8| < 45$

$|x+8| < 5$

$x+8 < 5$ $\quad$ $x+8 > -5$

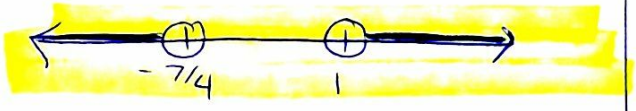
$x < -3$ $\quad$ $x > -13$

6. $|-8x-3|>11$

$-8x-3 > 11$ $\quad$ $-8x-3 < -11$

$-8x > 14$ $\quad$ $-8x < -8$

$x < -7/4$ $\quad$ $x > 1$



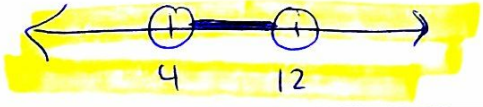
7. $9|x-8|-10<26$

$9|x-8| < 36$

$|x-8| < 4$

$x-8 < 4$ $\quad$ $x-8 > -4$

$x < 12$ $\quad$ $x > 4$



8. $3+4|3x+7| \geq -89$

$4|3x+7| \geq -92$

$|3x+7| \geq -23$

always true

all real numbers ($\mathbb{R}$)

or

$(-\infty, \infty)$

Homework: