Name _____ Date _____ Period ____

Solving Absolute Value Linear Inequalities

Algebra II Honors | Unit 2 | Day 7 | TEK A2.6.F

Objective: I can solve an absolute value linear inequality with either the sandwich method or the split method, and graph the solution on a number line.

Vocabulary

"And" statement: true only if BOTH parts are true - used for ____ or _____. Since |x| is the distance from x to 0, |x| < k means x is CLOSER to 0 than k, so it sits between -k and k.

"Or" statement: true if EITHER part is true - used for ____ or _____. |x| > k means x is FARTHER from 0 than k, so it is past k or past -k.

Sandwich method: write an "and" as ONE inequality: -k < A < k.

Split method: write the two branches separately, then combine them.

KEY IDEA

Step 1 - Isolate: get the absolute value alone.

Step 2 - Split: for < or ≤ use AND - either as one sandwiched inequality, or as two branches. For > or ≥ use OR - two separate branches.

Step 3 - Solve: solve each part, flipping the symbol any time you multiply or divide by a negative.

Step 4 - Graph: mark the solution on a number line, then write the final answer.

Let's Work Through It

Example 1 — Solve 2|x + 1| - 3 < 7 two ways: the sandwich method.

Step 1 - Isolate: |x + 1| < _____

Sandwich: -5 < x + 1 < _____ → _____

-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5

Example 2 — Solve $5|2x - 3| + 2 \le 27$ two ways: the split method.

Step 1 - Isolate: $5|2x - 3| \le$ _____ → $|2x - 3| \le$ _____

Split: $2x - 3 \le 5$ AND $-(2x - 3) \le$ _____

Solve each (flip when you divide by the negative): $x \le$ _____ AND $x \ge$ _____

Combine: _____ - same answer either way

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

Example 3 — Solve $4|2x - 5| - 6 > 14$.

Step 1 - Isolate: $4|2x - 5| >$ _____ → $|2x - 5| >$ _____

Step 2 - Split (OR): $2x - 5 > 5$ OR $2x - 5 <$ _____

Step 3 - Solve: $x >$ _____ or $x <$ _____

Example 4 — Solve $3|4 - x| + 2 \ge 17$. The inside is written $4 - x$, not $x - 4$, so watch the flip.

Step 1 - Isolate: $3|4 - x| \ge$ _____ → $|4 - x| \ge$ _____

Step 2 - Split (OR): $4 - x \ge 5$ OR $4 - x \le$ _____

Step 3 - Solve (flip both times you divide by -1): $x \le$ _____ or $x \ge$ _____

Your Turn

You Try 1 — Solve $2|x - 4| + 1 \le 9$, using whichever method you prefer.

Isolate: $|x - 4| \le$ _____ Solution: _____

You Try 2 — Using the distance meaning of absolute value, explain why $<$ gives an AND but $>$ gives an OR.

_____

_____

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