

Name _____ Date _____ Period _____

Absolute Value Inequalities: Special Cases and Interval Notation

Algebra II Honors | Unit 2 | Day 8 | TEK A2.6.F

Objective: I can decide whether an absolute value inequality has no solution or all real numbers, and write ordinary solutions in interval notation.

Vocabulary

No solution: NO value of x works at all. Written as the _____.

All real numbers: EVERY value of x works. Written as _____.

KEY IDEA

Step 1 - Isolate: get the absolute value completely alone. If you divide by a negative, flip the symbol.

Step 2 - Look at the number on the other side. If it is POSITIVE, this is an ordinary Day 7 problem - solve it normally.

Step 3 - If that number is NEGATIVE, read the symbol instead of solving:

$|\text{expression}| < \text{or } \leq \text{ a negative} \rightarrow \text{NO SOLUTION.}$ An absolute value is never negative.

$|\text{expression}| > \text{or } \geq \text{ a negative} \rightarrow \text{ALL REAL NUMBERS.}$ An absolute value is always at least 0.

Let's Work Through It

Example 1 — Solve $|2x - 3| < 3$ and write the answer in interval notation.

Step 1 - Isolate: the absolute value is already alone.

Sandwich (AND, since $<$): $-3 < 2x - 3 < \underline{\hspace{2cm}}$

Solve: $0 < 2x < \underline{\hspace{2cm}} \rightarrow \underline{\hspace{2cm}}$

Interval notation: _____

-2	-1	0	1	2	3	4	5
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Example 2 — Solve $8 - 2|3x - 1| \leq 10$.

Step 1 - Isolate: $-2|3x - 1| \leq \underline{\hspace{2cm}}$ $\rightarrow$ divide by -2 and FLIP $\rightarrow |3x - 1| \geq \underline{\hspace{2cm}}$

Step 2 - The number on the other side is $\underline{\hspace{2cm}}$

Step 3 - Read the symbol: $\underline{\hspace{2cm}}$

Interval notation: $\underline{\hspace{2cm}}$

Example 3 — Solve $3|2x + 5| + 10 \leq 4$.

Step 1 - Isolate: $3|2x + 5| \leq \underline{\hspace{2cm}}$ $\rightarrow |2x + 5| \leq \underline{\hspace{2cm}}$

Step 2 - The number on the other side is $\underline{\hspace{2cm}}$

Step 3 - Read the symbol: $\underline{\hspace{2cm}}$

Your Turn

You Try 1 — Solve $|x - 2| + 6 \leq 1$.

Isolate: $|x - 2| \leq \underline{\hspace{2cm}}$ Solution: $\underline{\hspace{2cm}}$

You Try 2 — Solve $|x - 2| + 6 \geq 1$. Same left side as You Try 1, just a flipped symbol.

Isolate: $|x - 2| \geq \underline{\hspace{2cm}}$ Solution: $\underline{\hspace{2cm}}$ Interval: $\underline{\hspace{2cm}}$