

Name _____ Date _____ Period _____

Solving Absolute Value Linear Equations

Algebra II | Unit 2 | Day 5 | TEK A2.6.E

Objective: I can solve absolute value linear equations by isolating the absolute value and splitting into two cases.

Vocabulary

Isolate: get the absolute value expression _____ on one side before splitting.

Split into two cases: $|A| = k$ ($k > 0$) becomes $A = k$ _____ $A = -k$.

KEY IDEA

Step 1 - Isolate: get the absolute value alone on one side.

Step 2 - Split: $|A| = k$ becomes $A = k$ OR $A = -k$.

Step 3 - Solve: solve each case separately.

Step 4 - Check: plug both answers into the ORIGINAL equation.

Let's Work Through It

Example 1 — Solve $|2x - 3| - 4 = 3$.

Step 1 - Isolate: $|2x - 3| =$ _____

Step 2 - Split: $2x - 3 =$ _____ OR $2x - 3 =$ _____

Step 3 - Solve: $x =$ _____ or $x =$ _____ Solution set: { _____ }

Step 4 - Check: $|2(5) - 3| - 4 =$ _____ ✓ $|2(-2) - 3| - 4 =$ _____ ✓

Example 2 — Solve $|x| + 2 = 5$.

Isolate: $|x| =$ _____

Split: $x =$ _____ OR $x =$ _____

Solve: both valid, since plugging either back in gives the same absolute value.

Example 3 — Solve $2|x + 1| - 3 = 7$.

Isolate: $2|x + 1| = \underline{\hspace{2cm}}$ $\rightarrow |x + 1| = \underline{\hspace{2cm}}$

Split: $x + 1 = \underline{\hspace{2cm}}$ OR $x + 1 = \underline{\hspace{2cm}}$

Solve: $x = \underline{\hspace{2cm}}$ or $x = \underline{\hspace{2cm}}$

Example 4 — Solve $3|x - 4| + 1 = 13$.

Isolate: $|x - 4| = \underline{\hspace{2cm}}$

Split: $x - 4 = \underline{\hspace{2cm}}$ OR $x - 4 = \underline{\hspace{2cm}}$

Solve: $x = \underline{\hspace{2cm}}$ or $x = \underline{\hspace{2cm}}$

Example 5 — Solve $|x - 4| = 9$.

Split: $x - 4 = \underline{\hspace{2cm}}$ OR $x - 4 = \underline{\hspace{2cm}}$

Solve: $x = \underline{\hspace{2cm}}$ or $x = \underline{\hspace{2cm}}$

Your Turn

You Try 1 — Solve $|3x + 6| = 12$.

Split: $3x + 6 = \underline{\hspace{2cm}}$ OR $3x + 6 = \underline{\hspace{2cm}}$

Solve: $x = \underline{\hspace{2cm}}$ or $x = \underline{\hspace{2cm}}$

You Try 2 — Solve $2|x - 5| - 1 = 9$, showing the isolate, split, and solve steps.

Isolate: $|x - 5| = \underline{\hspace{2cm}}$

Split: $x - 5 = \underline{\hspace{2cm}}$ OR $x - 5 = \underline{\hspace{2cm}}$

Solve: $x = \underline{\hspace{2cm}}$ or $x = \underline{\hspace{2cm}}$