Mastering Absolute Value Equations

An ACT Math Guide for Grades 9-12

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Target:
+2-3 Points
on your
Composite
Score!

A Guide by Irfan Mansuri, ACT Specialist

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Why This Topic Matters

- Frequency: 2–5 questions per ACT Math section.
- Difficulty: Medium difficulty but high penalty for silly mistakes.
- Impact: Foundational for inequalities, functions, and coordinate geometry.

A straightforward topic that builds a massive score foundation.

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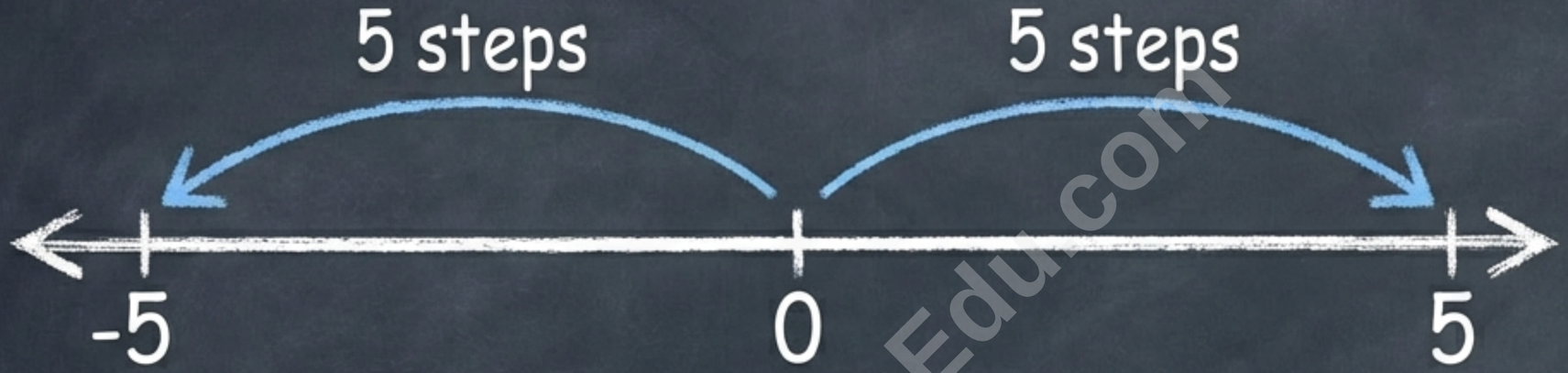
The Definition: Distance, Not Direction



Forget direction. Think Magnitude. Distance is never negative!

$|5| = 5 \quad |-5| = 5 \quad |0| = 0$

Absolute Value ($|x|$) is the distance of a number from zero.

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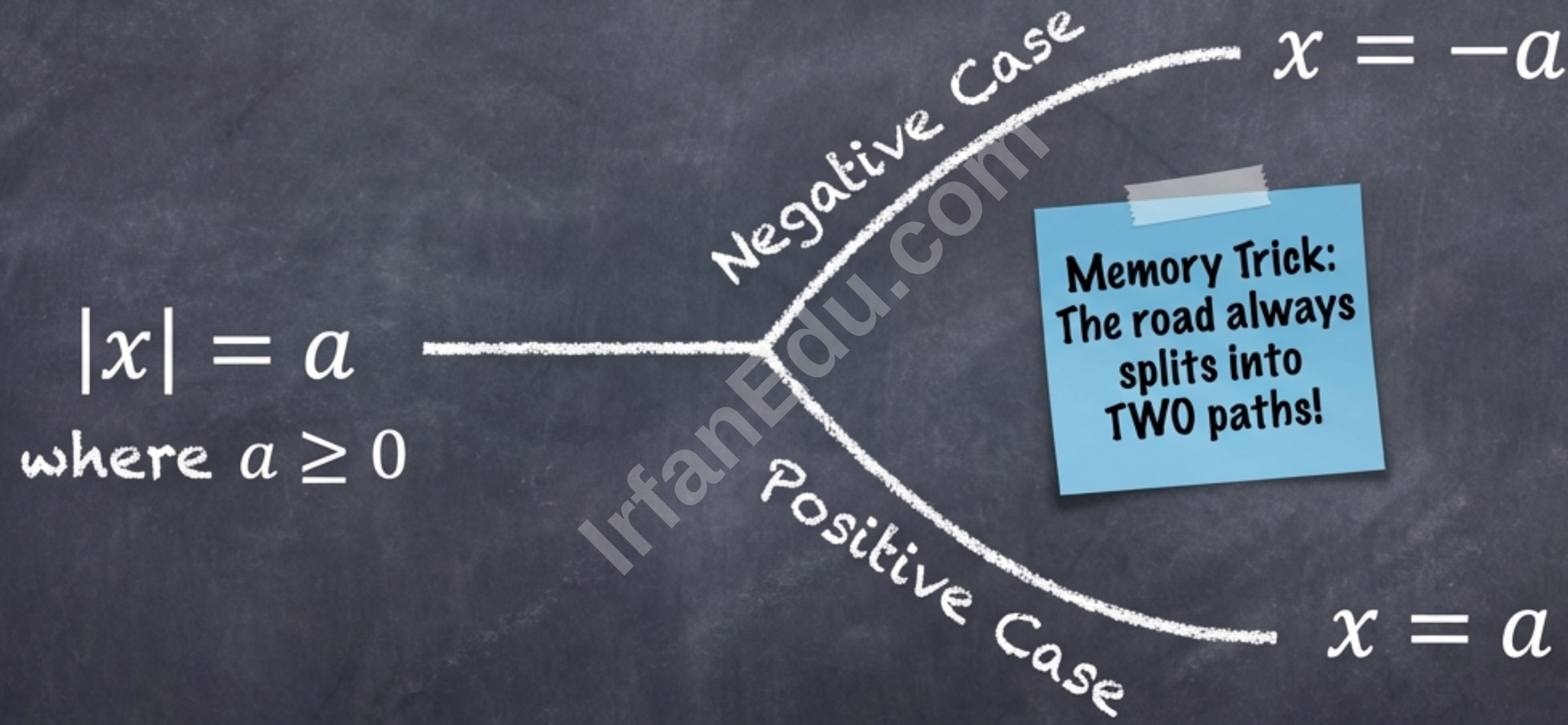
The Golden Rule: The Fork in the Road



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To remove the bars, you must create TWO separate equations.

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The Strategy: The I-S-S Method

ISOLATE: Get the absolute value bars completely alone on one side.

SPLIT: Create two separate equations (one positive, one negative).

SOLVE: Find x for both equations.

Most student errors happen because they skip Step 1 (Isolation)!

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Walkthrough: Basic Equation

Solve $|x| = 7$

$x = -7$

Check: $|-7| = 7$ (Correct)

$x = 7$

Check: $|7| = 7$ (Correct)

ACT Time Goal:
This question should take 15-20 seconds.

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Walkthrough: Intermediate (Isolate First)

$$3|x - 2| + 5 = 20$$

Step 1: Isolate

Don't split until the bars are lonely! Moving numbers after splitting leads to wrong answers.

Subtract 5: $3|x - 2| = 15$

Divide by 3: $|x - 2| = 5$

Case 1: $x - 2 = 5 \rightarrow x = 7$

Case 2: $x - 2 = -5 \rightarrow x = -3$

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The Trap: The Impossible Equation

$$|x| = -5$$

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Result: NO SOLUTION

Alert:
If |bars| = Negative Number, stop working! The answer is No Solution.

Absolute value represents distance.
Distance cannot be negative.

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Visualizing the Trap

Solve: $|x - 3| = -4$

Can you walk -4 feet?

Spotting this immediately saves you 30 seconds on the test.

Since distance ≥ 0, the equation is impossible.

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Your Turn: ACT Practice Question

Solve for x: $5|2x + 1| - 3 = 22$

A) $x = 2$ or $x = -3$
B) $x = 3$ or $x = -2$
C) $x = 2$ only
D) $x = -3$ only
E) No solution

Pause here. Grab a scrap of paper and try to solve it before flipping the slide!

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The Solution Breakdown

Step 1: Isolate

$5|2x + 1| = 25$ (Add 3)

$|2x + 1| = 5$ (Divide by 5)

Step 2: Split & Solve

$2x + 1 = 5$

$\rightarrow 2x = 4$

$x = 2$

$2x + 1 = -5$

$\rightarrow 2x = -6$

$x = -3$

Correct Answer: A

Did you get Answer A? Great work! If not, check if you isolated the bars first.

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Pro Tips & Guessing Strategy

Cheat Sheet

- **Eliminate Single Answers**: Most absolute value equations have two solutions. Cross out options with only one value.
- The **Calculator Hack**: Graph y = |expression| and y = number to find intersection points.
- **Backsolving**: Plug the answer choices back into the original equation. If it works, it works!

When in doubt, plug the answer choices into the equation. It takes longer, but it's 100% accurate.

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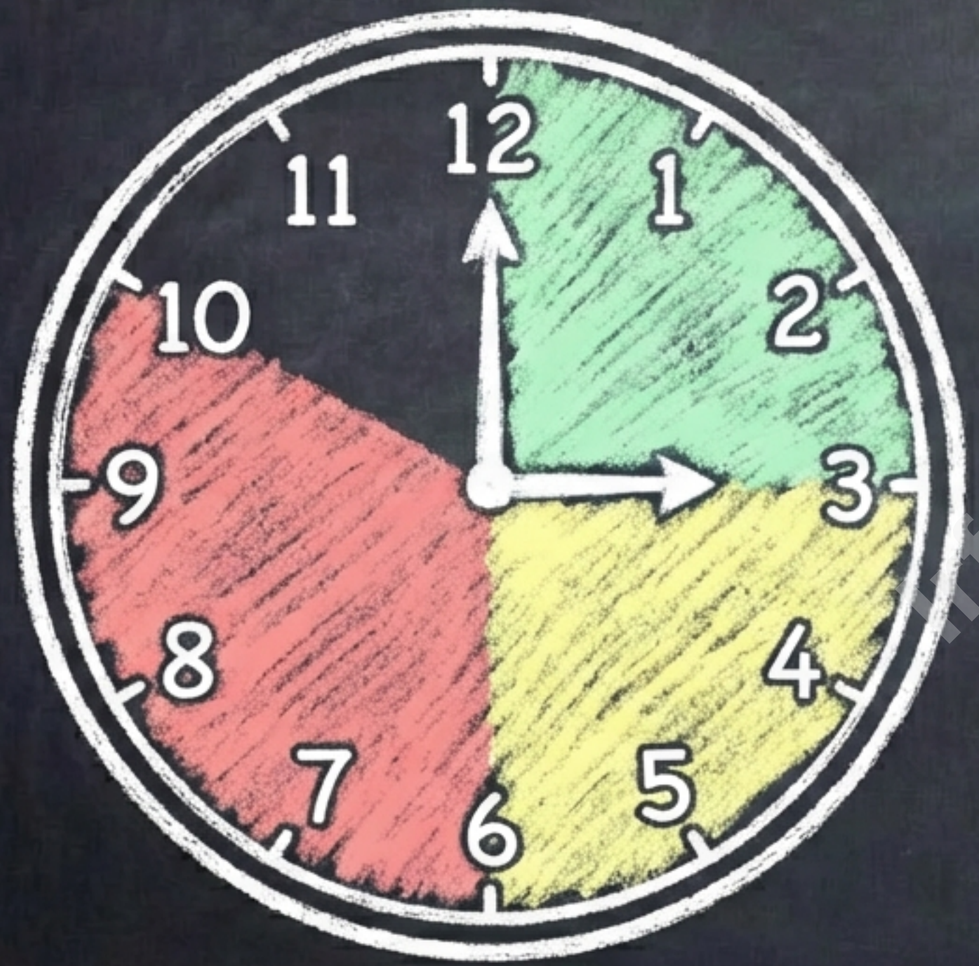
Time Management Strategy



Basic (|x|=9): 15-30 Seconds.

Intermediate (|3x-6|=12): 45-60 Seconds.

Advanced (5|2x+1|-3=22): 90-120 Seconds.

Skip Strategy: If you see nested bars like ||x-2|-3|=5, skip it and come back later. These are time drains.

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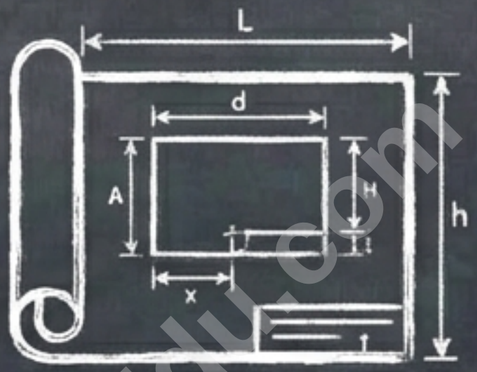
Beyond the Test: Real World Applications

GPS: Calculates distance between coordinates regardless of North/South direction.



Engineering: Tolerance calculations (`|length - target| <= 0.2`).

Finance: Measuring variance from a budget (over or under).

Math isn't just for tests—it's how we navigate the world.

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Lesson Recap

- [ ] Absolute Value = Distance (Always Positive)
- [ ] I-S-S: Isolate, Split, Solve
- [ ] Check for 'No Solution' (Negative number)
- [ ] Plug answers back in to verify

You are ready. Go get those points!

Written by Irfan Mansuri, ACT Test Prep Specialist (15+ Years Experience).

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