LESSON MAKER PRO

Check the Candidates

Find solutions, then test them in the original equation.

HIGH SCHOOL · A1P.AF.B.8

A1P.AF.B.8 "Explain why extraneous solutions to an equation involving absolute values may arise and how to check to be sure that a candidate solution satisfies an equation."

NAME _____ DATE _____

WHY CHECKING MATTERS

To solve |A| = B, use the two cases A = B and -A = B to find candidates. A case can give a candidate that fails the original equation, especially when B is negative. Substitute every candidate into the original equation before calling it a solution.

WORKED EXAMPLE

Solve $|x - 9| = 15 - 2x$.

1. Case 1: x - 9 = 15 - 2x gives x = 8.
2. Check x = 8: |8 - 9| = 1, but 15 - 2(8) = -1. Reject 8.
3. Case 2: -(x - 9) = 15 - 2x gives x = 6.
4. Check x = 6: |6 - 9| = 3 and 15 - 2(6) = 3.

Answer: x = 6

PRACTICE 6 problems

1 Solve |x - 3| = x - 5. Explain why the candidate you find is not a solution.

ANSWER _____

2 Solve |x + 4| = 10 - x. Check your answer.

ANSWER _____

3 Solve |x - 5| = x + 3. Check your answer.

ANSWER _____

4 Solve |x + 3| = 3x - 5. State which candidate fails the original equation.

ANSWER _____

5 Solve |x - 4| = 3. Check both answers.

ANSWER _____

6 Solve |x - 12| = x + 14. Check your answer.

ANSWER _____

APPLY IT Show your work

1 A school concert starts at 6:10 p.m., and your bus leaves at 6:18 p.m. Let x be the number of minutes after 6:00 p.m. When is your distance in time from the concert start equal to the time left until the bus leaves? Write an absolute value equation, solve it, and check your answer.

WORK SPACE

ANSWER _____

2 A gaming pass lasts 3 hours. Let x be the number of hours since you started playing. Is there a time during the pass when your distance from a 4-hour play goal equals the time left on the pass? Write an absolute value equation and check any candidate.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Solve $|x^2 - 4| = x - 2$. Show the candidates from both cases, then explain which candidates fail when checked in the original equation.

WORK SPACE AND ANSWER

ANSWER KEY

Check the Candidates

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve $\|x - 3\| = x - 5$. Explain why the candidate you find is not a solution.	**No solution. The candidate $x = 4$ fails because $\|4 - 3\| = 1$, but $4 - 5 = -1$.**
2	Solve $\|x + 4\| = 10 - x$. Check your answer.	**$x = 3$; $\|3 + 4\| = 10 - 3 = 7$.**
3	Solve $\|x - 5\| = x + 3$. Check your answer.	**$x = 1$; $\|1 - 5\| = 1 + 3 = 4$.**
4	Solve $\|x + 3\| = 3x - 5$. State which candidate fails the original equation.	**$x = 4$. Reject $x = 1/2$ because $\|1/2 + 3\| = 7/2$, but $3(1/2) - 5 = -7/2$.**
5	Solve $\|x - 4\| = 3$. Check both answers.	**$x = 1$ or $x = 7$. Both give $\|x - 4\| = 3$.**
6	Solve $\|x - 12\| = x + 14$. Check your answer.	**$x = -1$; $\|-1 - 12\| = -1 + 14 = 13$.**

PART 2 · APPLY IT

1. **$|x - 10| = 18 - x$; $x = 14$, so the time is 6:14 p.m.** The equation gives $x = 14$. At 6:14 p.m., it has been 4 minutes since the start and there are 4 minutes until the bus leaves.
2. **$|x - 4| = 3 - x$; no time during the pass satisfies the equation.** The cases give $x = 7/2$ as the only candidate. At $x = 7/2$, $|x - 4| = 1/2$ but $3 - x = -1/2$, so it fails the original equation and falls after the pass ends.

CHALLENGE

The cases give candidates $x = 2$, $x = -1$, and $x = -3$. Only $x = 2$ works: both sides equal 0. At $x = -1$, the sides are 3 and -3; at $x = -3$, they are 5 and -5.

Accept equivalent case work and checks by substitution. For the word problems, accept the stated times when the equation and original-context check are correct.