LESSON MAKER PRO

Check That Solution

Solve absolute value equations, then test your answers.

GRADE 8 · 8A.AF.C.10

8A.AF.C.10 "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 CHECK?

Squaring both sides can help you solve an absolute value equation, but it can also hide a sign difference. Check every candidate in the original equation. A candidate that does not make the original equation true is an extraneous solution.

WORKED EXAMPLE

Solve $|x - 4| = x - 8$.

1. Square both sides: $(x - 4)^2 = (x - 8)^2$.
2. Expand: $x^2 - 8x + 16 = x^2 - 16x + 64$, so $x = 6$.
3. Check: $|6 - 4| = 2$, but $6 - 8 = -2$.

Answer: No solution. Squaring produced the extraneous candidate x = 6.

PRACTICE 6 problems

1 Solve $|x - 9| = x - 1$. Check your candidate.

ANSWER _____

2 Solve $|x - 2| = x - 12$. Check your candidate.

ANSWER _____

3 Solve $|x + 3| = 9 - x$. Check your candidate.

ANSWER _____

4 Solve $|x + 7| = x - 1$. Check your candidate.

ANSWER _____

5 Solve $|2x - 1| = x + 1$. Check both candidates.

ANSWER _____

6 Solve $|2x - 3| = 7$. Check both candidates.

ANSWER _____

APPLY IT Show your work

1 A game tracks your score x. It says your distance from a 14-point goal equals twice your score minus 4. What score makes this true? Write an equation and check every candidate.

WORK SPACE

ANSWER _____

2 A music app says that your listening time x is this many minutes from an 11-minute goal: x - 13. Can any listening time make the app's statement true? Write an equation and check your candidate.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Solve |x - 1| = 2x + 3. Squaring gives two candidates. Check each one, then explain why one must be rejected.

WORK SPACE AND ANSWER

ANSWER KEY

Check That Solution

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve |x - 9| = x - 1. Check your candidate.	**x = 5; |5 - 9| = 5 - 1 = 4.**
2	Solve |x - 2| = x - 12. Check your candidate.	**No solution. The candidate x = 7 gives |7 - 2| = 5, but 7 - 12 = -5.**
3	Solve |x + 3| = 9 - x. Check your candidate.	**x = 3; |3 + 3| = 9 - 3 = 6.**
4	Solve |x + 7| = x - 1. Check your candidate.	**No solution. The candidate x = -3 gives |-3 + 7| = 4, but -3 - 1 = -4.**
5	Solve |2x - 1| = x + 1. Check both candidates.	**x = 0 and x = 2. Checks: |-1| = 1 and |3| = 3.**
6	Solve |2x - 3| = 7. Check both candidates.	**x = -2 and x = 5. Checks: |-7| = 7 and |7| = 7.**

PART 2 · APPLY IT

1. **x = 6 points. The equation is |x - 14| = 2x - 4. The candidate x = -10 is extraneous.** Solving |x - 14| = 2x - 4 gives x = 6 or x = -10. At x = 6, both sides equal 8; at x = -10, the sides are 24 and -24.
2. **No. The equation |x - 11| = x - 13 gives the extraneous candidate x = 12.** Squaring both sides gives x = 12. In the original equation, |12 - 11| = 1, but 12 - 13 = -1.

CHALLENGE

Squaring gives x = -4 and x = -2/3. At x = -4, the sides are 5 and -5, so reject it. At x = -2/3, both sides are 5/3, so x = -2/3 is the only solution. Squaring hid the sign difference for x = -4.

Accept equivalent checks using substitution into the original equation. A candidate found after squaring counts as a solution only if the original equation is true.