

Two Paths Out

Write and solve absolute value equations.

HIGH SCHOOL • MA.912.AR.4.1

MA.912.AR.4.1 "Given a mathematical or real-world context, write and solve one-variable absolute value equations."

NAME _____

DATE _____

TWO POSSIBLE VALUES

When an absolute value expression equals a positive number, set the expression inside the bars equal to both the positive number and its opposite. First isolate the absolute value expression, then solve both equations. If an absolute value expression equals a negative number, there is no solution.

WORKED EXAMPLE

Solve $|x - 12| = 6$.

1. Split into two equations: $x - 12 = 6$ or $x - 12 = -6$.
2. Add 12 to both sides of each equation.
3. $x = 18$ or $x = 6$.

Answer: $x = 18$ or $x = 6$

PRACTICE 6 problems

1 Solve $|x + 3| = 8$.

ANSWER _____

2 Solve $|2x - 4| = 10$.

ANSWER _____

3 Solve $|3x + 2| = 11$.

ANSWER _____

4 Solve $|x/4 - 1| = 3$.

ANSWER _____

5 Solve $|5 - x| = 9$.

ANSWER _____

6 Solve $|2x + 7| = 1$.

ANSWER _____

APPLY IT Show your work

- 1** At an esports event, a match is expected to last 32 minutes. The actual match length x is exactly 7 minutes away from the expected time. Write and solve an absolute value equation for x .

WORK SPACE

ANSWER _____

- 2** Before leaving school, a student's phone battery charge x is exactly 15 percentage points away from 70%. Write and solve an absolute value equation for x .

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Solve $|(2x - 1)/4| = 5/2$. Show both solution paths.

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve $ x + 3 = 8$.	$x = 5$ or $x = -11$
2	Solve $ 2x - 4 = 10$.	$x = 7$ or $x = -3$
3	Solve $ 3x + 2 = 11$.	$x = 3$ or $x = -13/3$
4	Solve $ x/4 - 1 = 3$.	$x = 16$ or $x = -8$
5	Solve $ 5 - x = 9$.	$x = -4$ or $x = 14$
6	Solve $ 2x + 7 = 1$.	$x = -3$ or $x = -4$

PART 2 · APPLY IT

1. **$|x - 32| = 7$; $x = 25$ or $x = 39$** Model the distance from the expected time with $|x - 32| = 7$. The match can be 7 minutes shorter or 7 minutes longer than 32 minutes.
2. **$|x - 70| = 15$; $x = 55$ or $x = 85$** Model the distance from 70% with $|x - 70| = 15$. The charge can be 15 percentage points below or above 70%.

CHALLENGE

$x = 11/2$ or $x = -9/2$

Accept solutions in either order and equivalent fraction forms. For the word problems, require both a correct absolute value equation and both values in context.