

Equation Outcomes

Simplify each equation to identify its solution type.

GRADE 8 • NY-8.EE.7.a

NY-8.EE.7.a "Recognize when linear equations in one variable have one solution, infinitely many solutions, or no solutions. Give examples and show which of these possibilities is the case by successively transforming the given equation into simpler..."

NAME _____

DATE _____

THREE POSSIBLE RESULTS

Distribute, combine like terms, and use inverse operations to make an equation simpler. If you get $x =$ a number, there is one solution. If you get a true statement, there are infinitely many solutions, and if you get a false statement, there is no solution.

WORKED EXAMPLE

Classify the equation: $29(x - 12) + 17 = 29x - 331$

1. Distribute: $29x - 348 + 17 = 29x - 331$
2. Combine like terms: $29x - 331 = 29x - 331$
3. Subtract $29x$ from both sides: $-331 = -331$

Answer: Infinitely many solutions

PRACTICE 6 problems

- 1** Simplify the equation. Then state whether it has one solution, infinitely many solutions, or no solution: $7x + 5 = 26$

ANSWER _____

- 2** Simplify the equation. Then state whether it has one solution, infinitely many solutions, or no solution: $8(x + 6) = 8x + 48$

ANSWER _____

- 3** Simplify the equation. Then state whether it has one solution, infinitely many solutions, or no solution: $6x - 10 = 6x + 11$

ANSWER _____

- 4** Simplify the equation. Then state whether it has one solution, infinitely many solutions, or no solution: $4(x - 6) + 15 = x$

ANSWER _____

- 5** Simplify the equation. Then state whether it has one solution, infinitely many solutions, or no solution: $14 - 5(x + 1) = 6 - 5x$

ANSWER _____

- 6** Simplify the equation. Then state whether it has one solution, infinitely many solutions, or no solution: $(\frac{7}{3})x + 4 = (\frac{1}{3})x - 8$

ANSWER _____

APPLY IT Show your work

1

A music app has two download plans. Plan A costs \$6 plus \$3 per download. Plan B costs \$3 per download plus \$6. Let x be the number of downloads. Write and simplify an equation that compares the costs. Do the plans cost the same for one number of downloads, no numbers of downloads, or infinitely many numbers of downloads?

WORK SPACE

ANSWER _____

2

A gaming club is choosing a server plan. Plan R costs a \$18 setup fee plus \$4 each month. Plan S costs a \$30 setup fee plus \$4 each month. Let x be the number of months. Write and simplify an equation that compares the costs. Will the plans ever cost the same?

WORK SPACE

ANSWER _____

CHALLENGE One step up

For what value of k does the equation $5(x - 4) + k = 5x - 13$ have infinitely many solutions? For what values of k does it have no solution? Can it ever have one solution? Explain using simplified equations.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Simplify the equation. Then state whether it has one solution, infinitely many solutions, or no solution: $7x + 5 = 26$	$x = 3$; one solution
2	Simplify the equation. Then state whether it has one solution, infinitely many solutions, or no solution: $8(x + 6) = 8x + 48$	Infinitely many solutions
3	Simplify the equation. Then state whether it has one solution, infinitely many solutions, or no solution: $6x - 10 = 6x + 11$	No solution
4	Simplify the equation. Then state whether it has one solution, infinitely many solutions, or no solution: $4(x - 6) + 15 = x$	$x = 3$; one solution
5	Simplify the equation. Then state whether it has one solution, infinitely many solutions, or no solution: $14 - 5(x + 1) = 6 - 5x$	No solution
6	Simplify the equation. Then state whether it has one solution, infinitely many solutions, or no solution: $(7/3)x + 4 = (1/3)x - 8$	$x = -6$; one solution

PART 2 • APPLY IT

- $6 + 3x = 3x + 6$; infinitely many numbers of downloads** Subtract $3x$ from both sides to get $6 = 6$. The equation is true for every whole-number value of x .
- $18 + 4x = 30 + 4x$; no solution, so the plans never cost the same** Subtract $4x$ from both sides to get $18 = 30$. This false statement shows there is no number of months when the costs match.

CHALLENGE

Infinitely many solutions when $k = 7$. No solution when k is any number other than 7. It can never have one solution, because simplifying gives $k - 20 = -13$, an equation with no x .

Accept equivalent transformation steps and equivalent wording for the three solution types. For the challenge, students should show that the x -terms cancel before classifying the result.