LESSON MAKER PRO

Equation Outcomes

Simplify to find out how many solutions an equation has.

GRADE 7 · 7A.AF.C.21.a

7A.AF.C.21.a "Determine whether linear equations in one variable have one solution, no solution, or infinitely many solutions of the form x = a, a = a, or a = b (where a and b are different numbers)."

NAME _____ DATE _____

THREE POSSIBLE RESULTS

Simplify both sides of an equation, then use equal steps on both sides to isolate x. If you get x = a, there is one solution. A true number statement means infinitely many solutions, while a false number statement means no solution.

WORKED EXAMPLE

How many solutions does 4(x + 9) = 4x + 36 have?

1. Distribute: 4x + 36 = 4x + 36.
2. Subtract 4x from both sides: 36 = 36.
3. This statement is true for every value of x.

Answer: Infinitely many solutions.

PRACTICE 6 problems

1 Classify 2x + 6 = 18. If it has one solution, find x.

ANSWER _____

2 How many solutions does 5(x - 2) = 5x + 1 have?

ANSWER _____

3 How many solutions does 7x - 8 = 7(x - 2) + 6 have?

ANSWER _____

4 Classify 6(x + 2) = 2x + 20. If it has one solution, find x.

ANSWER _____

5 How many solutions does 8(x - 1) = 8x - 7 have?

ANSWER _____

6 How many solutions does 2(5x - 6) = 10x - 12 have?

ANSWER _____

APPLY IT Show your work

1 Two online game clubs charge monthly fees and one-time sign-up fees. Club A charges $2 per month plus $8 to sign up. Club B charges $2 per month plus $20 to sign up. Let x be the number of months. Write an equation for when the total costs match, then classify its solutions.

WORK SPACE

ANSWER _____

2 At an arcade, Pass A costs $6 plus $5 per visit. Pass B costs $7 per visit with no sign-up fee. Let x be the number of visits. Write an equation for when the costs match, then classify its solutions and find x if there is one.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Without testing values of x, explain how many solutions $6(x - 2) + 5 = 6x - 7$ has. Then replace only the -7 on the right with a number that makes the new equation have no solution.

WORK SPACE AND ANSWER

ANSWER KEY

Equation Outcomes

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Classify 2x + 6 = 18. If it has one solution, find x.	**One solution, x = 6.**
2	How many solutions does 5(x - 2) = 5x + 1 have?	**No solution.**
3	How many solutions does 7x - 8 = 7(x - 2) + 6 have?	**Infinitely many solutions.**
4	Classify 6(x + 2) = 2x + 20. If it has one solution, find x.	**One solution, x = 2.**
5	How many solutions does 8(x - 1) = 8x - 7 have?	**No solution.**
6	How many solutions does 2(5x - 6) = 10x - 12 have?	**Infinitely many solutions.**

PART 2 · APPLY IT

1. **2x + 8 = 2x + 20; no solution.** Subtract 2x from both sides to get 8 = 20, which is false. The costs never match.
2. **6 + 5x = 7x; one solution, x = 3 visits.** Subtract 5x from both sides to get 6 = 2x. Divide by 2 to get x = 3.

CHALLENGE

The equation has infinitely many solutions because both sides simplify to 6x - 7. Replacing -7 on the right with -8 makes the new equation have no solution.

For the challenge, accept any replacement for -7 except -7. For the word problems, accept equivalent equations with the two costs on opposite sides.