LESSON MAKER PRO

Equation Endings

Rewrite each equation to reveal its solution count.

GRADE 8 · 8.AT.B.3.a

8.AT.B.3.a "Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solution. Justify each example by showing how it can be rewritten in an equivalent equation in the form x=a, a=a..."

NAME _____ DATE _____

THE FINAL FORM

Use the same operation on both sides until an equation reads x = a, a = a, or a = b, where a and b are different rational numbers. The first form gives one solution, the second is true for every x, and the third is never true.

WORKED EXAMPLE

How many solutions does $5(x + 9) = 5x + 45$ have?

1. Distribute: $5x + 45 = 5x + 45$.
2. Subtract $5x$ from both sides: $45 = 45$.

Answer: Infinitely many solutions. The final statement is true for every value of x.

PRACTICE 6 problems

1 Rewrite $3x + 8 = 20$ in a final form. Explain its solution count.

ANSWER _____

2 Rewrite $6(x - 1) = 6x - 6$ in a final form. Explain its solution count.

ANSWER _____

3 Rewrite $8x + 3 = 8x - 1$ in a final form. Explain its solution count.

ANSWER _____

4 Rewrite $(x + 12)/3 = 6$ in a final form. Explain its solution count.

ANSWER _____

5 Rewrite $10 - 2(x + 1) = 8 - 2x$ in a final form. Explain its solution count.

ANSWER _____

6 Rewrite $(3/4)x + 1 = (3/4)x + 2$ in a final form. Explain its solution count.

ANSWER _____

APPLY IT Show your work

1 An arcade offers two passes. Pass A costs $6 plus $3 per visit. Pass B costs $18 with no fee per visit. Let x be the number of visits. Write an equation for equal costs, rewrite it as x = a, and explain what the result means.

WORK SPACE

ANSWER _____

2 Two movie rental plans charge by the month. Plan A costs $8 plus $2 per rental. Plan B costs $10 plus $2 per rental. Let x be the number of rentals. Write an equation for equal costs, rewrite it in a final form, and explain whether the costs can match.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Create three different equations that each have 3(x - 2) on the left. Make one equation with one solution, one with infinitely many solutions, and one with no solution. For each, show steps to a final form and explain what it reveals.

WORK SPACE AND ANSWER

ANSWER KEY

Equation Endings

GRADE 8 · 8.AT.B.3.a

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Rewrite 3x + 8 = 20 in a final form. Explain its solution count.	**3x = 12, so x = 4. There is one solution because only x = 4 makes the equation true.**
2	Rewrite 6(x - 1) = 6x - 6 in a final form. Explain its solution count.	**6x - 6 = 6x - 6, so -6 = -6. There are infinitely many solutions because the final statement is always true.**
3	Rewrite 8x + 3 = 8x - 1 in a final form. Explain its solution count.	**Subtract 8x to get 3 = -1. There is no solution because the final statement is false.**
4	Rewrite (x + 12)/3 = 6 in a final form. Explain its solution count.	**x + 12 = 18, so x = 6. There is one solution because only x = 6 makes the equation true.**
5	Rewrite 10 - 2(x + 1) = 8 - 2x in a final form. Explain its solution count.	**8 - 2x = 8 - 2x, so 8 = 8. There are infinitely many solutions because the final statement is always true.**
6	Rewrite (3/4)x + 1 = (3/4)x + 2 in a final form. Explain its solution count.	**Subtract (3/4)x to get 1 = 2. There is no solution because the final statement is false.**

PART 2 · APPLY IT

1. **6 + 3x = 18, so x = 4. The passes cost the same for exactly 4 visits.** Subtract 6 from both sides to get 3x = 12, then divide by 3. The form x = 4 shows there is one number of visits at which the costs match.
2. **8 + 2x = 10 + 2x, so 8 = 10. The costs cannot match for any number of rentals.** Subtract 2x from both sides to get 8 = 10. Because that statement is false, the equation has no solution.

CHALLENGE

One solution: 3(x - 2) = x + 2 becomes 3x - 6 = x + 2, then 2x = 8, then x = 4. Only x = 4 works. Infinitely many solutions: 3(x - 2) = 3x - 6 becomes 3x - 6 = 3x - 6, then -6 = -6. This is true for every x. No solution: 3(x - 2) = 3x + 1 becomes 3x - 6 = 3x + 1, then -6 = 1. This is never true.

Accept any valid equivalent steps and final forms with a correct explanation of the solution count. For the challenge, accept any three equations that use the required left side and produce the three distinct solution types.