

Equation Endings

Simplify each equation to find its solution type.

GRADE 8 • 8.PAR.3.2

8.PAR.3.2 "Describe and solve linear equations in one variable with one solution ($x = a$), infinitely many solutions ($a = a$), or no solutions ($a = b$)..."

NAME _____

DATE _____

THREE POSSIBLE ENDINGS

Use properties and inverse operations to make both sides of an equation simpler. A simplified equation can end as $x = a$, which has one solution, a true statement such as $a = a$, which has infinitely many solutions, or a false statement such as $a = b$, which has no solution.

WORKED EXAMPLE

Classify and solve: $7(x + 3) = 7x + 21$

1. Distribute: $7x + 21 = 7x + 21$
2. Subtract $7x$ from both sides: $21 = 21$
3. This true statement means every value of x works.

Answer: Infinitely many solutions.

PRACTICE 6 problems

- 1** Simplify, then state the solution type: $5x - 8 = 2x + 10$

ANSWER _____

- 2** Simplify, then state the solution type: $4(x - 1) = 4x - 4$

ANSWER _____

- 3** Simplify, then state the solution type: $9x + 5 = 9x - 6$

ANSWER _____

- 4** Simplify, then state the solution type: $11 - 2x = 4x + 23$

ANSWER _____

- 5** Simplify, then state the solution type: $6(x + 2) - 5 = 6x + 7$

ANSWER _____

- 6** Simplify, then state the solution type: $8 - 2(x + 4) = -2x + 1$

ANSWER _____

APPLY IT Show your work

- 1** A gaming club compares two monthly server plans. Plan A charges a \$12 setup fee plus \$5 per month. Plan B charges \$8 per month. Let x be the number of months. After how many months will the plans cost the same? State the solution type.

WORK SPACE

ANSWER _____

- 2** A student council compares two shops for spirit shirts. Shop A charges a \$15 setup fee and \$9 per shirt. Shop B charges a \$27 setup fee and \$9 per shirt. Let x be the number of shirts. Can the total costs ever be equal? State the solution type.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Explain why this equation has infinitely many solutions. Show your simplification: $-4(2x - 5) + 2x = -6x + 20$

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Simplify, then state the solution type: $5x - 8 = 2x + 10$	$x = 6$, one solution.
2	Simplify, then state the solution type: $4(x - 1) = 4x - 4$	Infinitely many solutions.
3	Simplify, then state the solution type: $9x + 5 = 9x - 6$	No solution.
4	Simplify, then state the solution type: $11 - 2x = 4x + 23$	$x = -2$, one solution.
5	Simplify, then state the solution type: $6(x + 2) - 5 = 6x + 7$	Infinitely many solutions.
6	Simplify, then state the solution type: $8 - 2(x + 4) = -2x + 1$	No solution.

PART 2 • APPLY IT

- $x = 4$ months, one solution.** Write $12 + 5x = 8x$. Subtract $5x$ to get $12 = 3x$, so $x = 4$.
- No solution. The total costs can never be equal.** Write $15 + 9x = 27 + 9x$. Subtracting $9x$ gives $15 = 27$, a false statement.

CHALLENGE

$-4(2x - 5) + 2x = -8x + 20 + 2x = -6x + 20$. The equation becomes $-6x + 20 = -6x + 20$, so it has infinitely many solutions.

Accept equivalent simplified equations that correctly show $x = a$, a true statement, or a false statement. For one-solution equations, accept reversed forms such as $6 = x$.