One or Otherwise?

Sort equations by how many solutions they have.

8.EE.7b "Extend concepts of linear equations and inequalities in one variable to more complex multi-step equations and inequalities in real-world and mathematical situations. Recognize the three types of solutions to linear equations: one solution..."

NAME _____ DATE _____

ONE SOLUTION

Simplify both sides. If the variable terms do not cancel, exactly one value makes the equation true.

$2(y + 13) = 3y + 17$ simplifies to $2y + 26 = 3y + 17$, so $y = 9$.

NOT ONE SOLUTION

If the variable terms cancel, the equation becomes either a true statement for every value or a false statement for every value.

$4(y + 13) = 4y + 51$ simplifies to $4y + 52 = 4y + 51$, so it has no solution.

1 SORT

8 items

Circle SINGLE or OTHER for each equation, then choose one item from each category and explain your choices using simplified equations.

1.	$3(x + 2) = 2x + 10$	SINGLE OTHER
2.	$5x - 6 = 2(x + 3)$	SINGLE OTHER
3.	$6(x - 1) = 3(2x - 2)$	SINGLE OTHER
4.	$2(x + 5) - 3 = x + 9$	SINGLE OTHER
5.	$5(x + 1) = 5x + 6$	SINGLE OTHER
6.	$3(x + 2) - x = 2(x + 3)$	SINGLE OTHER
7.	$8 - 2(x - 3) = 3x - 1$	SINGLE OTHER
8.	$(x + 6)/3 = x - 2$	SINGLE OTHER

2 PROVE IT

Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write one new equation with a single solution and one with either no solution or infinitely many solutions. State the solution type for each.

SINGLE _____

OTHER _____

CHALLENGE

Write an equation with parentheses and x on both sides that has no solution. Then change just one constant so it has infinitely many solutions, and show why.

ANSWER KEY # One or Otherwise?

GRADE 8 · 8.EE.7b

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	3(x + 2) = 2x + 10	**SINGLE**	Simplifies to 3x + 6 = 2x + 10, so x = 4.
2	5x - 6 = 2(x + 3)	**SINGLE**	Simplifies to 5x - 6 = 2x + 6, so x = 4.
3	6(x - 1) = 3(2x - 2)	**OTHER**	Both sides simplify to 6x - 6, so every value works.
4	2(x + 5) - 3 = x + 9	**SINGLE**	Simplifies to 2x + 7 = x + 9, so x = 2.
5	5(x + 1) = 5x + 6	**OTHER**	Simplifies to 5 = 6, so no value works.
6	3(x + 2) - x = 2(x + 3)	**OTHER**	Both sides simplify to 2x + 6, so every value works.
7	8 - 2(x - 3) = 3x - 1	**SINGLE**	Simplifies to 14 - 2x = 3x - 1, so x = 3.
8	(x + 6)/3 = x - 2	**SINGLE**	Multiplying by 3 gives x + 6 = 3x - 6, so x = 6.

PART 2 · PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **SINGLE**: 7(x - 1) = 6x + 1; single solution, x = 8.
- **OTHER**: 2(5x + 3) = 10x + 6; infinitely many solutions.

Challenge: 3(x + 2) = 3x + 7 simplifies to 3x + 6 = 3x + 7, so it has no solution. Change 7 to 6: 3(x + 2) = 3x + 6 is true for every x.

Items 3 and 6 have infinitely many solutions; item 5 has no solution. For Part 2, accept any pair containing one item from each category if the simplification supports both choices.