Name _____ Class _____ Date _____

3-2

Analyzing Solutions

COMMON CORE

CC.8.EE.7a

Essential question: *How can you give examples of equations with a given number of solutions?*

So far, when you solved a linear equation in one variable, you found one value of x that makes the equation a true statement. When you simplify some equations, you may find that they do not have one solution.

1 EXPLORE Determining the Number of Solutions

Use the properties of equality to simplify each equation. Tell whether the final equation is a true statement.

A $4x - 3 = 2x + 13$

$4x - 3 = 2x + 13$

$\_\_ = \_\_$

$\_\_ = \_\_$

$2x = 16$

$\frac{2x}{\_\_} = \frac{16}{\_\_}$

$x = \_\_$

The statement is true / false.

B $4x - 5 = 2(2x - 1) - 3$

$4x - 5 = 2(2x - 1) - 3$

$4x - 5 = \_\_x - \_\_ - 3$

$4x - 5 = 4x - \_\_$

$\_\_ = \_\_$

$-5 = \_\_$

The statement is true / false.

C $4x + 2 = 4x - 5$

$4x + 2 = 4x - 5$

$\_\_ = \_\_$

$4x = 4x - 7$

$\_\_ = \_\_$

$= \_\_$

The statement is true / false.

REFLECT

1a. What happens when you substitute any value for x in the original equation in **B**? In the original equation in **C**?

_____

_____

_____

When you simplify an equation using the properties of equality, you will find one of three results.

Result	What does this mean?	How many solutions?
$x = a$	When the value of x is a, the equation is a true statement.	1
$a = a$	Any value of x makes the equation a true statement.	Infinitely many
$a = b$	There is no value of x that makes the equation a true statement.	0

2 EXPLORE Writing Equations with a Given Number of Solutions

Write a linear equation in one variable that has no solutions.

You can use the strategy of working backward:

A Start with a false statement such as $3 = 5$. Add the same variable term to both sides.

B Next, add the same constant to both sides and combine like terms on each side of the equation.

C Verify that your equation has no solutions by using properties of equality to simplify your equation.

REFLECT

2a. Explain why the result of the process above is an equation with no solutions.

TRY THIS!

Tell whether each equation has one, zero, or infinitely many solutions.

1. $6 + 3x = x - 8$

2. $8x + 4 = 4(2x + 1)$

Complete each equation so that it has the indicated number of solutions.

3. No solutions: $3x + 1 = 3x +$

4. Infinitely many: $2x - 4 = 2x -$