

Warm-Up

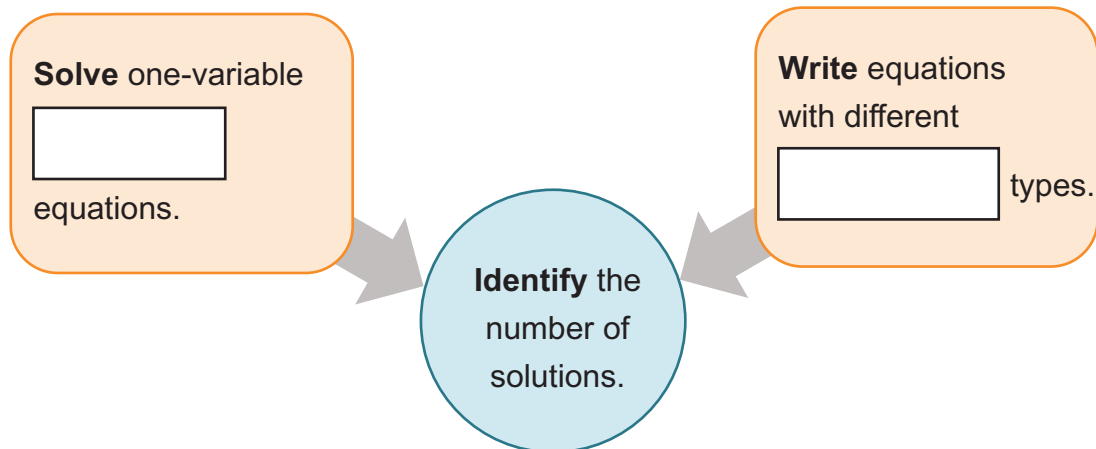
Analyzing Solutions



Lesson Question



Lesson Goals



Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

interpret	to explain in understandable terms; to understand according to <input type="text"/> beliefs
equivalent equation	equations that have the same solution set and can be formed from one another using the properties of <input type="text"/>
properties of equality	the rules that allow you to <input type="text"/> , manipulate, and solve equations
solution of a one-variable equation	a value of the variable in an equation that makes the equation <input type="text"/>

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Solving a One-Variable Linear EquationUse the **properties of equality** to solve the equation.

$$3(x + 6) = 2(x - 3) + 4x$$

$$3x + \boxed{} = 2x - 6 + 4x$$

$$3x + 18 = 6x - 6$$

$$\begin{array}{r} -3x \\ -3x \end{array}$$

$$18 = \boxed{} - 6$$

$$\begin{array}{r} +6 \\ +6 \end{array}$$

$$24 = 3x$$

$$\frac{24}{3} = \frac{3x}{\boxed{}}$$

$$x = \boxed{}$$

- What is the number of **solutions to the one-variable equation**?

Verify that the solution is correct by plugging it back into the equation.

$$x = 8$$

$$3(8 + 6) = 2(8 - 3) + 4(8)$$

$$3(\boxed{}) = 2(5) + \boxed{}$$

$$\boxed{} = 10 + 32$$

$$42 = 42$$

This is a statement. So, the solution $x = 8$ is correct.

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Finding the Number of Solutions

Use properties of equality to solve the equation.

$$8(x + 4) = 4(x + 8) + 4x$$

$$8x + 32 = \boxed{} + \boxed{} + 4x$$

$$8x + 32 = \boxed{} + 32$$

$$-8x \quad -8x$$

$$32 = \boxed{}$$

On the left, the $\boxed{}$ to the variable and the constant are the $\boxed{}$ as on the right-hand side of the equation. Whenever this happens, we have infinitely many solutions.

- What is the number of solutions to the one-variable equation?

$\boxed{}$ many

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Finding the Number of Solutions

Use properties of equality to solve the equation.

$$5x - 3 = 7(x + 4) - 2x$$

$$5x - 3 = 7x + \boxed{} - 2x$$

$$5x - 3 = \boxed{} + 28$$

$$\begin{matrix} -5x & -5x \end{matrix}$$

$$\boxed{} \neq \boxed{}$$

The terms have the same coefficient, but the constants are . Anytime you see that, there is no solution.

What is the number of solutions to the one-variable equation?

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Equivalent Equations

Complete the table.

Equivalent Equation	What does this mean?	How many solutions exist?
$x = a$	The equation is true only when the variable assumes the value of a .	
$a = a$	The equation is true for any value of the variable.	
$a = b$	There is no value of the variable that will make a equal to b .	

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Identifying the Number of Solutions

EXAMPLE

Solve each equation and the result.

$$\bullet 2(2x + 10) = 4(x - 5) + 6$$

$$4x + 20 = 4x - 20 + 6$$

$$4x + 20 = 4x - \text{$$

solution

$$\bullet 9(x - 2) = 9x - 18$$

$$9x - 18 = 9x - 18$$

solutions

$$\bullet 8x - 4 - 2x = 2(5x - 2)$$

$$8x - 4 - 2x = 10x - 4$$

$$6x - 4 = 10x - 4$$

$$-6x \quad -6x$$

$$-4 = 4x - 4$$

$$+4 \quad +4$$

$$\frac{0}{4} = \frac{4x}{\text{$$

$$0 = x \rightarrow x = \text{$$

exactly solution

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Writing an Equation with No Solution**PROCEDURE**

Create a linear equation with no solution.

1. Start with a statement in the form $a = b$.
2. Add the same variable term to sides.
3. Add the same term to both sides.
4. Combine terms on each side.
5. Verify that the equation has no solution using the properties of equality.

$$2 = 6$$

$$3x + 2 = 6 + 3x$$

$$-10 + 3x + 2 = 6 + 3x - 10$$

$$-8 + 3x = -4 + 3x$$

$$\begin{array}{r} -3x \\ -3x \end{array}$$

$$-8 = -4$$

This is not true. We end up with a statement, which means no solution.

Summary

Analyzing Solutions



Lesson Question

How can you identify the number of solutions of linear equations?



Answer

Use this space to write any questions or thoughts about this lesson.