Solving Equations with Addition and Subtraction

Today, I will…

1. Develop a procedure for solving equations using addition and subtraction.
2. Use inverse operations and the addition and subtraction properties to solve equations.
3. Correctly write or recite the addition and subtraction properties.

Steps to Solving Equations Using Addition and Subtraction

Recall from yesterday…

An _____ is a mathematical statement that two expressions are equal.

A _____ **of an equation** is a value of the variable that makes the equation true.

Amelia's Lunch

$3.00 = $_____ + _____ + _____ + _____ + _____

This equation states that the quantities

(3) and (_____ + _____ + _____ + _____ + _____)

are _____, which means they are the _____.

Maintaining Equality, Part 1

Suppose one of Amelia's friends repays Amelia the $0.50 that she borrowed the previous day. Now Amelia has $3.50 to spend on lunch. What do you have to do to maintain equality if you add $0.50 to the left-hand side of the equation?

$3.50 = $_____ + _____ + _____ + _____ + _____

The Addition Property of Equality

You can add _____ _____ _____ to _____ sides of an

equation, and the statement will still be _____.

Example: Numbers

3 = 3

3 + ____ = 3 + ____

____ = ____

Example: Algebra

a = b

a + ____ = b + ____

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Maintaining Equality, Part 2

Let's look at the original problem again. Amelia finds out that her friend Monica does not have enough money to buy her lunch. Amelia generously gives Monica $1.00 to help her out. What do you have to do to maintain equality if you subtract $1.00 from the left-hand side of the equation?

$2.00 = $_____ + _____ + _____ + _____ + _____

The Subtraction Property of Equality

You can subtract _____ _____ _____ from _____ sides of an

equation, and the statement will still be _____.

Example: Numbers

7 = 7

7 - ____ = 7 - ____

____ = ____

Example: Algebra

a = b

a - ____ = b - ____

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The Main Idea

Whatever you do to _____ _____ of the equation,

you have to do to the _____ _____.

Do everything twice!

HINT:

The **additive inverse** of a number is what you add to it to get zero.

Fill in the table to the right: What is the inverse operation of addition? Subtraction?

Operation	Inverse Operation
Addition	
Subtraction	

HINT:

What is the value of x in the problem x - 2 = 7? You know the answer because you know your math facts. Now look at the following three equations:

$$x - 3 = 4$$
$$x + 6 = 13$$
$$x = 7$$

How are they different? How are they the same? Which equation tells you the value of 'x' directly? These simple problems are easy to solve in your head, but some problems are too big to solve that way. When you have a big equation such as 'x + 619.2 = 713.7 - 23.65,' what can you do to the equation so that it tells you the value of 'x' directly like 'x = 7' above?

Do Everything Twice?

Monica watched in awe as her friend Amelia bought and ate (or drank) two tacos, two bags of chips, two containers of apple sauce, and two cartons of milk. Monica had known Amelia for a long time and had never seen her eat so much in one meal before. She had also never had such a strange conversation before. Everything Amelia said, she said twice.

"I have dance lessons tonight. I have dance lessons tonight," Amelia said.

"Are you alright," Monica finally asked. "You ate twice as much as you normally do, and everything you have said, you've said twice."

"I'm fine. I'm fine," Amelia replied. "I'm just following directions. I'm just following directions."

Who told you to eat so much and to repeat yourself?" Monica asked.

"Mr. Gabriel told us to do everything twice. Mr. Gabriel told us…"

"Stop!" Monica interrupted, holding both palms up as if to stop traffic. "I think you misunderstood! Mr. Gabriel was referring only to solving equations. You have to do everything twice when you solve a linear equation. You don't have to eat twice as much or repeat yourself."

"Oh," Amelia said with a sigh of relief. "Thank you. That was getting on my nerves."
"Well, you succeeded in doing that twice, too. You were really getting on my nerves!"