Section 2.1: The Additive Property of Equality

Definition: Linear Equation in One Variable

A linear equation in one variable can be written in the form

$$Ax + B = C$$

For real numbers A, B, and C, and $C \neq 0$.

The addition property of equality: The same number may be added to (or subtracted from) each side of an equation without changing the equation. Algebraic statement:

If $A = B$,
then $A + C = B + C$.

Section 2.2: The Multiplication Property of Equality

The multiplication property of equality: You can multiply (or divide) each side of an equation by the same NONZERO number without changing the solution. Algebraic statement:

If $A = B$,
then $AC = BC$
are equivalent equations as long as $C \neq 0$.

Section 2.3: More on Solving Linear Equations

Definition of a Linear Equation: A linear equation (after simplification) has only numbers and the variable to the first power. Algebraic description of a linear equation: $Ax + B = C$, and $A \neq 0$.

Steps for solving a linear equation:

1. Simplify each side separately.
   a. Use the distributive property to remove parentheses.
   b. Combine like terms.
2. Isolate the variable term.
   a. Use the addition property of equality to get all variable terms on one side.
   b. Use the addition property of equality to get all numbers on the other side.
3. Isolate the variable.
   a. Use the multiplication property of equality to get: x = a number.
4. CHECK YOUR WORK!!

Special situations in equation solving:

1. **Sometimes an equation has NO SOLUTIONS.** In this case, the variables disappear after you try to get them all on one side, and you are left with a false number statement. That means that the equation can't be solved for any value of the variable.
   Example: $2t + 1 = 2t$

2. **Sometimes an equation has INFINITELY MANY SOLUTIONS.** In this case, the variables disappear after you try to get them all on one side, but you are left with a true number statement. That means that the equation is solved by ANY value of the variable.