Chapter 2.1: Linear Equations

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Linear Equations and Their Solutions

An **equation** is a mathematical sentence of the form (an expression) = (another expression).

A **solution** to an equation in a variable (lets call it x) is a number that we can substitute in for x hat makes the equation true.

Two equations are **equivalent** if they have the same solutions.

Finding the solutions of an equation is called **solving** the equation.

Example: Consider the equation $2x + 3 = 9$.

- Is $x = 2$ a solution?
- Is $x = 3$ a solution?
- Is $x + 1 = 4$ an equivalent equation?

Linear Equations and Their Solutions

A **linear equation with one variable** x is an equation that is equivalent to an equation $Ax + B = 0$ where $A \neq 0$.

To **solve** a linear equation with one variable means to find the number that when substituted makes the equation true. If a is a solution to the equation with the variable x, then we may also say $x = a$, is a solution (it is a simplification of the original assertion).

Examples:

- Is $5 = 3x - 2$ a linear equation? Solve the equation.
- Is $2m + 5 = -m + 3$ a linear equation? Solve the equation.
- **On Your Own**: Solve. $5(x + 3) = 3x + 27$

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Examples:

- Solve. $\frac{x-4}{6} = 3$

- A rectangular garden has a length the is 10 feet longer than its width. The perimeter is 44 feet. What are the dimensions of the garden?

- Solve for A. $S = 3AB - 4BC - 2AC$

- Joe and Steve are saving money. Joe starts with $105 and saves $5 per week. Steve starts with $5 and saves $15 per week. After how many weeks do they have the same amount of money?

- **On Your Own**: Solve. $\frac{x-2}{4} + \frac{x+1}{2} = \frac{1}{6}$