



Introduction to Linear Equations

Welcome to the world of linear equations! In this lesson, we will introduce you to the concept of linear equations and their importance in real-world applications. Linear equations are equations in which the highest power of the variable is 1. They can be written in the form of $ax + b = c$, where a , b , and c are constants, and x is the variable.

Linear equations are used to describe a wide range of phenomena, from the motion of objects to the growth of populations. They are essential in various fields, including science, economics, and engineering.

What are Linear Equations?

Linear equations are used to describe a wide range of phenomena, from the motion of objects to the growth of populations. They are essential in various fields, including science, economics, and engineering.

Linear equations are crucial in making informed decisions, predicting outcomes, and solving problems. They help us understand the relationship between variables and make accurate predictions.



Real-World Applications of Linear Equations

Linear equations have numerous real-world applications. Here are a few examples:

- Finance: Linear equations are used to calculate interest rates, investment returns, and loan payments.
- Science: Linear equations are used to model population growth, chemical reactions, and electrical circuits.
- Engineering: Linear equations are used to design and optimize systems, such as bridges, buildings, and electronic circuits.

Real-World Scenario

A company produces and sells a product. The company's revenue is \$1000 per day, and the cost of production is \$500 per day. If the company wants to make a profit of \$200 per day, how many units should they produce and sell?



Solving Linear Equations

There are various methods to solve linear equations, including:

- Addition and Subtraction: Adding or subtracting the same value to both sides of the equation.
- Multiplication and Division: Multiplying or dividing both sides of the equation by the same value.
- Graphical Method: Graphing the equation on a coordinate plane and finding the x-intercept.

Example

Solve for x: $2x + 3 = 7$

Solution:

- Subtract 3 from both sides: $2x = 4$
- Divide both sides by 2: $x = 2$



Graphing Linear Equations

Graphing linear equations is an essential skill in mathematics. Here's how to graph a linear equation:

- Plot the y-intercept: The point where the line crosses the y-axis.
- Plot the x-intercept: The point where the line crosses the x-axis.
- Draw the line: Connect the two points to form a straight line.

Example

Graph the equation: $y = 2x + 3$



Systems of Linear Equations

A system of linear equations is a set of two or more linear equations with the same variables. Here's how to solve a system of linear equations:

- Substitution Method: Solve one equation for one variable and substitute the expression into the other equation.
- Elimination Method: Add or subtract the equations to eliminate one variable.

Example

Solve the system: $x + y = 4$, $2x - 2y = -2$



Linear Equations in Science and Engineering

Linear equations are used in various fields, including science and engineering. Here are a few examples:

- **Population Growth:** Linear equations are used to model population growth and predict future populations.
- **Chemical Reactions:** Linear equations are used to model chemical reactions and predict the amount of reactants and products.
- **Electrical Circuits:** Linear equations are used to model electrical circuits and predict the current and voltage.

Real-World Scenario

A scientist is studying the growth of a population of bacteria. The population grows at a rate of 20% per hour, and the initial population is 1000 bacteria. If the scientist wants to know the population after 5 hours, how can they use linear equations to solve the problem?



Conclusion and Next Steps

In conclusion, linear equations are essential in various fields, including science, economics, and engineering. They are used to describe a wide range of phenomena, from the motion of objects to the growth of populations.

Next Steps:

- Practice: Practice solving linear equations and graphing linear equations.
- Apply: Apply linear equations to real-world problems and scenarios.
- Explore: Explore other topics in mathematics, such as quadratic equations and functions.