Unit 1: Foundations of Linear Equations

Content Area: **Mathematics**
Course(s): **Algebra 3CP**
Time Period: **Semester 1**
Length: **4 weeks**
Status: **Published**

Standards

MA.K-12.4	Model with mathematics.
MA.F-IF.B	Interpret functions that arise in applications in terms of the context
MA.F-IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
MA.A-CED.A	Create equations that describe numbers or relationships
MA.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
MA.A-CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
MA.A-REI.D	Represent and solve equations and inequalities graphically
MA.A-REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
MA.A-REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

Enduring Understandings

Students will understand that:

- Linear equations model relationships between variables and can be represented in multiple forms.
- The slope of a line describes a constant rate of change.
- Different equation forms provide different information about a linear relationship.
- Parallel lines maintain the same rate of change and never intersect.
- Perpendicular lines intersect at right angles and possess slopes that are opposite reciprocals.
- Graphical representations provide meaningful visual interpretations of algebraic relationships.
- Mathematical models are valuable tools for analyzing and solving real-world problems.

Essential Questions

How can linear equations be used to represent real-world relationships?

What information does the slope of a line convey?

Why are multiple forms of linear equations useful?

How can the relationships between slopes be used to identify parallel and perpendicular lines?

How can equations and graphs be used together to analyze and solve problems?

How do graphical representations support mathematical understanding and decision-making?

Knowledge and Skills

- Understand the components and characteristics of linear equations in slope-intercept and standard form.
- Understand the meaning of slope, x-intercepts, and y-intercepts and how they describe linear relationships.
- Recognize that parallel lines have the same slope and perpendicular lines have opposite reciprocal slopes.
- Identify, interpret, and compare linear relationships using equations, tables, and graphs.
- Write and convert linear equations between slope-intercept and standard form.
- Determine and write equations of parallel and perpendicular lines.
- Graph linear equations using slope, intercepts, and other appropriate methods.
- Analyze and apply linear relationships to solve real-world problems and communicate mathematical reasoning.

Transfer Goals

Students will independently apply their understanding of linear relationships to analyze, represent, and solve real-world problems. They will be able to write and interpret linear equations in multiple forms, determine and compare slopes, identify and construct parallel and perpendicular lines, and graph linear equations accurately to communicate mathematical reasoning and make informed decisions.

Resources

Intermediate Algebra with Applications 5/6th ed by Aufmann/Barker/Lockwood

Online resources which include, but are not limited to: Desmos Graphing Calculator, Class Kick, Delta Math, Khan Academy, and CK-12 Foundation’s Algebra 2 with Trigonometry Concepts by CK-12/Gloag/ Rawley, last modified April 12, 2024