Essential Topic 2: Graphing and Writing Linear Equations, Systems, and Functions

Content Area: **Mathematics**
Course(s): **Algebra 1**
Time Period: **Semester 1**
Length: **12 weeks**
Status: **Published**

Standards

MA.F-IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.
MA.F-IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MA.F-IF.A.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
MA.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
MA.F-IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
MA.N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
MA.F-IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
MA.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
MA.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
MA.F-IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
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.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MA.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MA.A-REI.C.5	Prove that, given a system of two equations in two variables, replacing one equation by

	the sum of that equation and a multiple of the other produces a system with the same solutions.
MA.A-REI.C.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
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.
MA.A-REI.D.12	Graph the solutions to a linear inequality in two variables as a half plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Enduring Understandings

1. Real world situations can be represented symbolically and graphically.
2. Algebraic expressions and equations generalize relationships from specific cases.

Essential Questions

1. How can we decontextualize the numbers to find a mathematical relationship?
2. How are systems of linear equations and inequalities used in real world applications?
3. How can we use calculators to help us better understand real world application?
4. How can we use mathematical models in real world applications?

Knowledge and Skills

Graphing and Writing Linear Equations:

- Graph linear equations and inequalities
- Find and interpret the slope of a line
- Solve linear equations
- Write equations of lines
- Write linear equations from real-world applications

Systems of Linear Equations and Inequalities:

- Solve systems of linear equations by graphing, substitution, and elimination
- Identify the number of solutions in a system of equations
- Graph and solve systems of linear inequalities
- Using calculator to understand linear equations and systems

Functions:

- Use function notation
- Determine if a relation is a function or not
- Identify domain and range of a function
- Identify key features of functions

Transfer Goals

In this unit, students will be able to identify the different components of a linear equation or inequality in order to graph and then use the visual representation to make real world connections.

Students will understand that slope represents rates in both graphs and equations.

Resources

Holt Algebra 1 by Nichols Holt/1992 ISBN:0-03-005419-2
Algebra Structure and Method Book 1 by Brown McDougal Little/2000 ISBN:0-395-97722-3

graphing calculators

Khan Academy

PurpleMath

KutaSoftware

CK-12

Quizlet

Albert I/O

Desmos

Problem-Attic

Classkick