03 Equations and Inequalities

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **4 - 6 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

This unit will focus on strengthening the prerequisite skills and conceptual understanding needed to graph linear functions and find the solution to a system of equations. Lesson activities will reinforce new content and address common misconceptions and errors to support students' progress toward analyzing linear functions.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives/Enduring Understandings:

- Linear refers to a constant rate of change
- In non-constant functions, a change in one variable affects another variable.
- The solutions to a system of equations or inequalities are the values that make the system true

Essential Questions:

- How can the constant rate of change be recognized?
- What is the difference between equations, inequalities and expressions?
- In what types of specific situations, would it be helpful to form and solve a system of equations?
- How does finding a feasible region help solve a problem?
- How many solutions can a system have? Are there ways to tell how many solutions exist?

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Linear equations can be expressed in different form such as standard, slope - intercept and point slope form.
- Linear equations and inequalities can be graphed in order to provide a solution
- Slope represents rate of change of a linear function and can allow for meaningful comparisons and identifications of lines.(Positive, negative, horizontal, parallel, perpendicular)
- The x coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect as the solutions of the equation f(x) = g(x) and there are multiple methods for finding these intersections (graphing, elimination, substitution)

Procedural Knowledge

Students will be able to:

- Solve linear equations and inequalities including absolute value.
- Determine the slope of a line.
- Create an accurate sketch of graph of linear equations/inequalities with/without a calculator.
- Write equations of lines.
- Identify solutions of systems of linear equations/inequalities.
- Apply linear equations/inequalities to solve real-life problems (coin, mixture, investment, work , wind, current, distance)
- Solve and graph systems of nonlinear equations/inequalities
- Model problems with systems of inequalities.

CONTENT AREA STANDARDS

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-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
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.C.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
MA.A-REI.C.8	Represent a system of linear equations as a single matrix equation in a vector variable.
MA.A-REI.C.9	Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater).
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.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

CS.K-12.3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
CS.K-12.3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
CS.K-12.3.c	Evaluate whether it is appropriate and feasible to solve a problem computationally.
LA.K-12.NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
TECH.9.4.12.IML.3	Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).
TECH.9.4.12.IML.4	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
TECH.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
TECH.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.

EVIDENCE OF LEARNING

Formative Assessments

- Student feedback/questioning/observation
- Error analysis
- Specific skill assessment/questions
- Survey/polling

- Task completion and review of quizzes and material presented in the Algebra II class

Summative Assessments

There will be no formal assessments in this course.

RESOURCES (Instructional, Supplemental, Intervention Materials)

Desmos Activities:Graphing linear equations in slope intercept form, Graphing linear Equations in Standard Form, Point slope Form, Absolute value graphs
, Graphing linear Equalities, Graphing systems of Inequalities, Solving systems of equations by substitution, Solving systems of equations by elimination,
Kuta Software worksheets

Approved course textbook

INTERDISCIPLINARY CONNECTIONS

Interdisciplinary connections are frequently addressed through modeling and application problems whereby students solve and analyze situations taken from business, physics, engineering, biology, statistics, geography, and numerous other fields. Examples can be found in topic specific textbook problems and digital resources.

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.