Unit 2 - Linear Relationships

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

Unit Overview

Within this unit, each lesson will focus on linear relationships by understanding linear functions through slopes, intercepts and transformations of linear functions. Students will use these concepts in order to model linear functions and solve systems of equations and inequalities. This unit will also explain and interpret the definition of functions including the domain and range and how they are related; they will correctly use function notation in a context and evaluate functions for inputs and their corresponding outputs.

Enduring Understandings

Systems of linear equations/inequalities can be used to model problems and can be solved by graphing, substituting, or eliminating a variable.
Functional relationships can be expressed in real contexts, graphs, algebraic equations, tables, and words; each representation if a given function is simply a different way of expressing the same idea.
A solution to a system of equations can be applied to man situations in the real world.

Essential Questions

How are functions and their graphs related?
How can patterns, relations, and functions be used as tools to best describe and help explain real world situations?
How can you solve systems of linear equations?
How can you solve systems of linear inequalities?
How can you model a real-world situation using a system of equations/inequalities and then solve the system and interpret the solution in the context of the problem?

Learning Objectives

be able to solve system of equations algebraically.
be able to represent and solve equations and inequalities graphically.
be able to understand the concept of a function and use function notation.
be able to interpret functions that arise in applications in terms of the context.
be able to analyze functions using different representations.
be able to translate real world problems into a system.

Standards: Content

MATH.9-12.A.CED.A	Create equations that describe numbers or relationships
MATH.9-12.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.
MATH.9-12.F.IF.A	Understand the concept of a function and use function notation
MATH.9-12.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 $y = f(x)$.
MATH.9-12.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.
MATH.9-12.F.IF.A.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
MATH.9-12.F.IF.B	Interpret functions that arise in applications in terms of the context
MATH.9-12.F.IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
MATH.9-12.F.IF.C	Analyze functions using different representations
MATH.9-12.A.REI.C	Solve systems of equations
MATH.9-12.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.
MATH.9-12.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.
MATH.9-12.F.IF.C.7.a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
MATH.9-12.A.REI.C.6	Solve systems of linear equations algebraically (include using the elimination method) and graphically, focusing on pairs of linear equations in two variables.
MATH.9-12.A.REI.D	Represent and solve equations and inequalities graphically
MATH.9-12.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).
MATH.9-12.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.
MATH.9-12.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.
MATH.9-12.F.IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Standards: Interdisciplinary

PFL.9.1.8.CDM.4	Evaluate the application process for different types of loans (e.g., credit card, mortgage, student loans).

PFL.9.1.8.CP.1	Compare prices for the same goods or services.
CS.6-8.8.1.8.AP.1	Design and illustrate algorithms that solve complex problems using flowcharts and/or pseudocode.
CS.6-8.8.1.8.AP.2	Create clearly named variables that represent different data types and perform operations on their values.
CS.6-8.8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.
CS.6-8.8.1.8.DA.4	Transform data to remove errors and improve the accuracy of the data for analysis.
CS.6-8.8.1.8.DA.5	Test, analyze, and refine computational models.

Assessment Evidence

Formative	Collaborative Activities, Homework, Classwork, Discussion, Independent Class Assignment, Informal Observations of Students, Games, Exit Slips, Pre-Assessments, Math Message – Warm up, Questioning, Teacher Made Pages, Learning Centers, LinkIt, Problem of the Day, Problem of the Week, Entrance Slips, Pre-Assessments
Summative	LinkIt Benchmark Assessments, Tests, Pre-Assessments, Quizzes, Written Responses
Alternative & Benchmark	Alternative – Reteaching, One on One Conferencing, Learning Centers, Levels Homework, Higher Order Thinking Problems, Additional leveled practice Benchmark - LinkIt Benchmark Assessments, Totowa TPA
Assessment Evidence Resource	

Instructional Resources

Smartboard, Computers, iPads, websites and digital interactives/models, multi-media presentations, video streaming, Brain Pop, Microsoft 365, Primary and Secondary Source Documents, Assorted Manipulatives, Khan Academy, Crosswalk Coach for the Common Core Standards, Ready Common Core Mathematics Instruction and Practice, Common Core Coach, Calculators, Reveal Math Resources.

Instructional Resource List

Curricular Mandates

Below are the curricular requirements as defined in NJ Administrative Code and Statute

	Amistad		Diversity, Equity, and Inclusion
	Holocaust		LGBT and Disabilities (Grades 6-12)
	Climate Change		Asian American & Pacific Islander

Social Emotional Learning (SEL) Competencies

NJ Social and Emotional Learning Competencies & Sub-Competencies

	Self-Awareness	X	Relationship Skills
X	Responsible Decision-Making		Social Awareness
X	Self-Management		

21st Century Skills & Themes

	Global and Cultural Awareness	X	Technology Literacy		Planning and Budgeting
X	Creativity and Innovation		Financial Institutions		Risk Management and Insurance
X	Information and Media Literacy		Digital Citizenship		Economic and Government Influences
	Critical Thinking and Problem Solving		Credit Profile		Career Awareness and Planning
	Civic Financial Responsibility		Financial Psychology		