Unit 4: Linear Equations and Systems of Equations

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

UNIT RATIONALE

Coming from a unit where they learned how to solve linear equations, and we addressed common mistakes and misconceptions, students will now graph linear equations. Students will use linear equations to compute scenarios and see how linear equations are produced in the real world. W

ESSENTIAL QUESTIONS

Why do we learn about linear equations?

How is slope used in the real world?

How do we use linear application problems to reenact real world scenarios?

STANDARDS

NEW JERSEY STUDENT LEARNING STANDARDS: CONTENT AREA

New Jersey (NJSLS) - High School - Mathematics (2020)

MA.N-RN	The Real Number System
MATH.9-12.S.ID.B.6.a	Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.
MA.S-ID.B.6c	Fit a linear function for a scatter plot that suggests a linear association.
MA.S-ID.C	Interpret linear models
MA.F-IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
MA.S-ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
MA.S-ID.C.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MA.F-LE	Linear and Exponential Models

MA.F-LE.A	Construct and compare linear and exponential models and solve problems
MA.F-LE.A.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.
MA.F-LE.A.1a	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
MA.F-LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
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.F-LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.
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.

NEW JERSEY STUDENT LEARNING STANDARDS: CAREER READINESS, LIFE LITERACIES AND KEY SKILLS

PFL.9.1.12.CFR.1	Compare and contrast the role of philanthropy, volunteer service, and charities in community development and quality of life in a variety of cultures.
PFL.9.1.12.CFR.2	Summarize causes important to you and compare organizations you seek to support to other organizations with similar missions.
PFL.9.1.12.CFR.4	Demonstrate an understanding of the interrelationships among attitudes, assumptions, and patterns of behavior regarding money, saving, investing, and work across cultures.
PFL.9.1.12.FP.5	Evaluate how behavioral bias (e.g., overconfidence, confirmation, recency, loss aversion, etc.) affects decision-making.
WRK.9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
WRK.9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
WRK.9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
WRK.9.2.12.CAP.5	Assess and modify a personal plan to support current interests and post-secondary plans.
WRK.9.2.12.CAP.6	Identify transferable skills in career choices and design alternative career plans based on those skills.
WRK.9.2.12.CAP.10	Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans).
TECH.9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
TECH.9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and

	transition (e.g., 2.1.12.PGD.1).
TECH.9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.

NEW JERSEY STUDENT LEARNING STANDARDS: COMPUTER SCIENCE AND DESIGN THINKING

CS.9-12.8.1.12.IC.1	Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.
CS.9-12.8.2.12.EC.3	Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.

PRE-ASSESSMENTS

Students will be given this unit by completing activities to refresh their memories on plotting points. Students can not be successful in the Linear Equations unit if they do not know or remember how to plot points.

INSTRUCTIONAL PLAN

MODULE 1

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will use real world applications to remember how to plot points
Student Learning Strategies	Graphing Photos to plot points. Battle ship Bullseye Mini Golf Escape Room
Success Criteria	I can plot point correctly by going right and left fo the x coordinate and up and down for the y coordinate. I can identify the x and y part of each coordinate.

	I can write a coordinate point with the x first then y.
Formative Assessment (drives instructional decisions)	Results of activities listed above and below
Activities and Resources	Listed below
Suggested Modifications	Let the students chose which activity they would to do.

Stem Lab 11/7

MODULE 2

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning why slope is important in the rea world, and how it is used .
Student Learning Strategies	Slope Investigation-Ramps The Crow and the Pitcher Activity I Logo Slope Activity
Success Criteria	I can find a slope for a ramp so that a car can dri safely down it. I can use slope to determine how many pebbles a needed to determine water level. I can create a photo using the four different types slope and identifying the slope.
Formative Assessment (drives instructional decisions)	Rubrics given in the activity Answers to the investigation
Activities and Resources	Slope Investigation-Ramps The Crow and the Pitcher Activity I Logo Slope Activity
Suggested Modifications	Students can use the same slope more than onc the ILogo project. Students can work in groups Projects can be edited to fit the type of students i the class.

Line_ID.docx

SLOPE_INVESTIGATION-Car_Ramp.docx
Line_ID.pdf
The_Crow_and_the_PitcherStem.docx
The_Crow_and_the_PitcherStem.pdf
SLOPE_INVESTIGATION-Car_Ramp.pdf
iLogoSlopeActivityGraphingLinesProjectBasedLearningPBLwithMath-1.pdf
_Rubrics-ILOGO
I Logo Slope Intercept Project

MODULE 3

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are using trial and error to determine the safe band length for Barbie to survive a bungee jump.
Student Learning Strategies	Working in groups Barbie Bungee Project
Success Criteria	I can complete a table and graph to determine th safest distance Barbie can fall. I can create a linear equation so that I can plug ir distance to find the length of rubber bands to mal the safest drop.
Formative Assessment (drives instructional decisions)	Rubric and packet
Activities and Resources	Listed below
Suggested Modifications	Work in groups Extend the assignment to the amount of days needed

BarbieBungeeFinal.docx

BarbieBungeeFinal.pdf
barbiebungeegraphtable.docx
barbiebungeegraphtable.pdf

MODULE 4

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will create a sled and ramp so that figurines can safely slide down a ramp.
Student Learning Strategies	Trial and error Using the internet to find examples.
Success Criteria	I can create a sled that will go the furthest distanc and keep the figurines safe in the vehicle.
Formative Assessment (drives instructional decisions)	Rubric and complete
Activities and Resources	Listed below.
Suggested Modifications	Groups Use extra time if needed

Editable_Pages.pptx

Sled_and_Slope.pptx.pdf

MODULE 5

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will fill out interactive notebook pages to help them in their algebra 1 class
Student Learning Strategies	Interactive notebook pages common mistakes resource and flip books
Success Criteria	Students can fill out the pages of their interactive notebook so they have a resource for their classroom
Formative Assessment (drives instructional decisions)	There is no formative assessment for this introduction to each topic
Activities and Resources	Interactive Notebook Pages Listed
Suggested Modifications	fill out pages for absent students

MODULE 6

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will complete a Sum it Up activity to practice systems of equations by elimination.
Student Learning Strategies	Work in groups When students add up the four x's and four y's it' the answer in the middle.
Success Criteria	I can determine the solution to the system of equations by elimination
Formative Assessment (drives instructional decisions)	Answer in middle of paper makes it a self checki activity
Activities and Resources	Activity listed below
Suggested Modifications	Students only had to complete 3 of the pages an not all of them.

SystemsElimSUM.docx

SystemsElimSUM.pdf

MODULE 7

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will find the solution set of a system of inequalities by graphing.
Student Learning Strategies	The scavenger hunt around the room
Success Criteria	I can determine the solution set by shading and graphing the linear inequalities correctly.
Formative Assessment (drives instructional decisions)	Completing the scavenger hunt
Activities and Resources	Listed below
Suggested Modifications	Edited the assignment so all equations were in

	Slope Intercept Form

Stem-Systems_of_Inequalities_23.pdf

REFLECTIONS

This is my favorite unit. We did a lot during it.

Some classes move faster than others so judge the speed of activities by how they are doing as well. I know the classes can handle it with the amount of time I list in activities but since they're freshmen, some classes took longer.

INTERDISCIPLINARY CONNECTIONS: NEW JERSEY STUDENT LEARNING STANDARDS FOR ELA, SOCIAL STUDIES, SCIENCE AND/OR MATHEMATICS

LA.K-12.NJSLSA.W1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.K-12.NJSLSA.W4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LA.K-12.NJSLSA.W5	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
LA.K-12.NJSLSA.W6	Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
LA.RI.9-10.8	Describe and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.
LA.W.9-10.1.D	Establish and maintain a style and tone appropriate to the audience and purpose (e.g., formal and objective for academic writing) while attending to the norms and conventions of the discipline in which they are writing.
LA.W.9-10.6	Use technology, including the Internet, to produce, share, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LA.SL.9-10.1.B	Collaborate with peers to set rules for discussions (e.g., informal consensus, taking votes on key issues, presentation of alternate views); develop clear goals and assessment criteria (e.g., student developed rubric) and assign individual roles as needed.
LA.SL.9-10.1.D	Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.
LA.L.9-10.1.B	Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.
LA.L.9-10.2.C	Spell correctly.
LA.L.9-10.3	Apply knowledge of language to make effective choices for meaning, or style, and to

comprehend more fully when reading, writing, speaking or listening.