Unit 06 - Systems of Equations and Inequalities

Content Area: **Mathematics**
Course(s): **Algebra I**
Time Period: **March**
Length: **16 days**
Status: **Published**

Unit Overview

This unit connects and extends the concepts associated with equations and inequalities to systems of equations and inequalities. Students will learn seveal methods to solving systems of equations, such as, graphing, substitution, and elimination. This unit will also cover solving for systems of inequalites, as well as, examining constraints placed on real-world situations.

Enduring Understandings

- A linear inequality in two variables has an infinite number of solutions. These solutions can be represented in the coordinate plane as a set of all points on one side of a boundary line. The solutions of a system of linear inequalities can be represented by the region where the graphs of the individual inequalities overlap.
- One method is to graph each equation and find the intersection point, if one exists.
- Solutions to a linear inequality in two variables can be represented in the coordinate plane as a set of all points on one side of a boundary line. The solutions of a system of linear inequalities can be represented by the region where the graphs of the individual inequalities overlap.
- Some problems can be modeled by systems of linear equations.
- Some systems are written in a way that makes eliminating a variable a good method to use.
- Systems of equations can be solved in more than one way.
- Systems of linear equations can be used to model problems. System of equations can be solved by graphing, substitution, or eliminating a variable.
- There is more than one way to solve a system of equations.
- When a system has at least one equation that can be solved quickly for a variable, the system can be solved efficiently using substitution.
- You can use systems of linear equations to model problems.

Essential Questions

- Can systems of equations model real-life situations?
- How can you find the solutions to a system of equations?
- How can you solve a system of equations or inequalities?

Standards/Indicators

MA.N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
MA.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
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.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.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.

Student Learning Objectives (SLOs)

- Find approximate solutions of linear equations by making a table of values, using technology to graph and successive approximations
- Graph equations, inequalities, and systems of inequalities in two variables and explain that the solution to an equation is all points along the curve, the solution to a system of linear functions is the point of intersection, and the solution to a system of inequalities is the intersection of the corresponding half-planes
- Model and describe constraints with linear equations and inequalities and systems of equations and/or inequalities to determine if solutions are viable or non-viable
- Solve multi-step problems that can be represented algebraically with accurate and appropriately defined units, scales, and models (such as graphs, tables, and data displays).
- Solve systems of linear equations in two variables graphically and algebraically. Include solutions that have been found by replacing one equation by the sum of that equation and a multiple of the other.

Lesson Titles

- Application of Linear Systems
- Linear Inequalities
- Solving Systems by Elimination
- Solving Systems by Graphing
- Solving Systems by Substitution
- Systems of Linear Inequalities

Career Readiness, Life Literacies & Key Skills

TECH.9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
TECH.9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
TECH.9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
TECH.9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
TECH.9.4.2.DC.1	Explain differences between ownership and sharing of information.
TECH.9.4.2.DC.2	Explain the importance of respecting digital content of others.
TECH.9.4.2.DC.3	Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).
TECH.9.4.2.TL.2	Create a document using a word processing application.
TECH.9.4.2.TL.3	Enter information into a spreadsheet and sort the information.

Benchmark Assessment

Skills-based assessment- math practice

Alternate Assessment

Performance tasks

Project-based assignments

Problem-based assignments

Presentations

Inter-Disciplinary Connections

LA.RL.11-12.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (e.g., Shakespeare as well as other authors.)
LA.RST.9-10.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.W.9-10.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
LA.W.9-10.2.A	Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures,

	tables), and multimedia when useful to aiding comprehension.
LA.WHST.9-10.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
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.
9-12.HS-ETS1-4.5	Using Mathematics and Computational Thinking
9-12.HS-PS1-7.5	Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK

- Introduction, notes, and examples on solving systems of inequalities by graphing
- Solve systems of linear equations and explain your solution and the method used.
- students will work as a team and explain their work
- #1- Blooms Knowledge - Remember previously learned information
- #2 - Blooms Comprehension - Demonstrate an understanding of facts
- #3 - Blooms Application - Apply Knowledge to actual situations
- #4 - Blooms Analysis - Break down objects or ideas into simpler parts and find evidence to support generalizations
- #5 - Blooms Synthesis - Compile component ideas into a new whole or propose alternative solutions
- #6 - Blooms Evaluation - Make and defend judgments based on internal evidence or external criteria
- Compare the methods of solving systems of equations and determine which will work best for the given problem.
- Create graphs to find the shaded area of intersection when solving systems of inequalities.
- Introduction, notes, and examples on solving systems of equations by using the multiplication method.
- Introduction, notes, and examples on solving systems of linear equations by graphing.
- Introduction, notes, and examples on solving systems of linear equations by substitution.
- Introduction, notes, and examples on solving systems of linear equations by the elimination and addition method.
- review homework if need - answers posted on Edmodo
- review warm up
- students will work individually
- tutoring during Delsea One

Modifications

ELL Modifications

- Acquire the help from the Foreign Language Department if possible
- Assess ELL students continuously using formative assessment methods
- Be flexible with time frames and deadlines
- During Delsea One - one on one with a student who speaks the same language
- Intentional scheduling/grouping with student/teacher who speaks the same language if possible
- Khan Academy offers lesson in several languages: https://es.khanacademy.org/
- Offer resources for specific topics in primary language (Youtube web resources)
- Repeat, reword, clarify
- The NEA Portal offers lessons in several languages: http://neaportal.k12.ar.us/index.php/algebra-1-en-espanol/
- tutoring during Delsea One
- Use google translator, especially for application problems
- Using technology, such as but not limited to: graphing calculator and desmos

IEP & 504 Modifications

- Allow re-takes only after a tutoring session
- Assessments will allow for calculator use and/or other math tools
- Give assessments on mathxl that are from the interactive algebra 1; however, the homework/classwork on mathxl will be from algebra 1 to expose them to the material
- Higher level reasoning questions would have less weight than other questions or provide as extra credit questions to provide exposure to these questions but not something that will be a determinant to the student's ability to share knowledge of content
- if not in a co-teaching setting allowing time in the schedule for a special education teacher to consult with general education teachers on what specifically can be modified or how to paraphrase things in a different way specific to that lesson
- Keep updated videos on google classroom for reinforcement outside of the classroom
- Less questions overall or possibly break the test into two parts
- Modeling and showing several examples
- speaking to students privately when redirecting behaviors
- tutoring during Delsea One
- Use a colored highlighter to highlight the variable that needs to be isolated

G&T Modifications

- Allow to go ahead on concepts on mathxl
- Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning

- Employ differentiated curriculum to keep interest high
- Encourage students to make transformations- use a common task or item in a different way
- Flip the lessons to push further ahead
- Flip the lessons using videos of more in depth work
- Include more in depth problems involving application
- Invite students to explore different points of view on a topic of study and compare the two
- Provide more rigorous problems; either off the NJ State website or from the Pearson Algebra 2 textbook (available on mathxl)
- tutoring during Delsea One
- Videos that offer extra practice and examples in all areas are posted on google classroom and taken from: mathispower4u

At Risk Modifications

- Refer students to Organizational Management
- Require Delsea One tutoring
- Stay in contact with parents/guardians and guidance counselors on student progress
- tutoring during Delsea One

Formative Assessment

- Connecting previous lessons
- Connecting vocabulary with root words
- Discussion including vocab review/recall
- Evaluate understanding of the lesson
- Guided review
- Homework/classwork
- Mathxlforschool
- NJSLA Math type of question
- Pass out of class
- SAT question of the day
- Skill need for lesson
- Teacher observation
- Think-pair-share
- Turn to your partner and discuss
- Use What You Know -type of question
- Video clip
- Warm up review
- White boards

Summative Assessment

- Benchmark Assessment
- Marking Period Assessment
- Quiz on Application of Systems
- Quiz on Linear Inequalities
- Quiz on Solving Systems by Elimination
- Quiz on Solving Systems by Graphing
- Quiz on Solving Systems by Substitution
- Quiz on Systems of Linear Inequalities
- Unit Test on Systems of Equations and Inequalities

Resources & Materials

- Colored pencils/highlighters
- Google Slides
- Mathispower4u video clip to introduce or demonstrate concepts
- Pearson 2015 Algebra 1 Textbook
- Teacher generated worksheets
- White board paddles

Technology

- Chromebooks
- Desmos
- Edpuzzle
- Equatio
- Google Classroom
- Google Forms
- Graphing calculator
- Mathway
- Mathxlforschool
- PearDeck
- Remind
- Video Clips

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all

	worksheets to convey the results.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.