Module 2 Topic 3

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **15 Sessions**
Status: **Published**

Systems of Equations and Inequalities

Standards

MATH.9-12.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.
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.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.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.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.F.IF.C.7.a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
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.

Learning Objectives

- Lesson 1: Students explore a scenario modeled, with a system of linear equations in, standard form. They determine the, intersection of the lines graphically, and algebraically using substitution., Students write a system of equations, for given scenarios. They solve each, system graphically and algebraically,, concluding that for any system, there, is no solution, one solution, or an, infinite number of solutions.
- Lesson 2: Students explore a system of, equations with opposite y-coefficients, and isolate x by adding the equations, together. They learn the linear, combinations method and analyze, systems that they can solve by, multiplying either one or both, equations by a constant to rewrite, the system with a single variable., They apply the linear combinations, method to solve problems.
- Lesson 3: Students represent a situation with, a two-variable inequality, complete, a table of values,

and use the, table to graph the situation. They, use shading and solid or dashed, lines to indicate which regions on, the coordinate plane represent, solution sets to the problem, situation. Students use multiple, representations such as equations,, tables, and graphs to represent, inequalities and their solutions.

- Lesson 4: Students learn the definition of, constraints. They write a system of, linear inequalities to model a scenario, and graph the system, determining, that overlapping shaded regions, identify the possible solutions to, the system. They practice graphing, several systems of inequalities and, determining the solution set. Finally,, students match systems, graphs, and, possible solutions of systems.

- Lesson 5: Students write a system of linear, equations for each of three different, scenarios. They use any method to, solve the system before reasoning, about the solution in terms of the, problem context. Students write a, system composed of four linear, inequalities to model a scenario and, graph the system. They use the graph, to determine the solution set.

- Lesson 6: Students define variables and identify, the constraints as a system of linear, inequalities for different solution, regions of the system and label all, points of intersection of the boundary, lines, identifying the vertices of the, solution region. They write a function, to represent the profit or cost and, substitute each of the vertices into the, equation to determine a maximum, profit or a minimum cost.

Essential Skills

- Lesson 1: You can use the x- and y-intercepts to graph linear functions written in standard., • The graph of an equation in two variables is the set of all its solutions plotted on the, coordinate plane., • A linear system of equations is two or more linear equations that define a relationship, between quantities., • The solution of a linear system is an ordered pair that makes both equations, in the system true., • Consistent systems of equations have one or many solutions., • Inconsistent systems of equations have no solutions.

- Lesson 2: The linear combinations method is a process to solve a system of linear equations by, adding two equations together, resulting in an equation in one variable., • When using linear combinations, it is often necessary to multiply one or both, equations by a constant to create two equations in which the coefficients of one of, the variables are additive inverses.

- Lesson 3: The graph of a linear inequality is a half-plane., • You can use shading to indicate which half-plane describes the solution to the inequality., • You can use dashed and solid lines to indicate whether to include the line itself in the, solution set of an inequality., • You can use linear inequalities to represent and solve problems in context.

- Lesson 4: In a system of linear inequalities, the inequalities are known as constraints because the, values of the expressions are constrained to lie within a certain region., • The solution of a system of linear inequalities is the intersection of the solutions to each, inequality. Every point in the intersecting region satisfies all inequalities in the system.

- Lesson 5: You can model situations about choosing between two options using a system of linear, equations or inequalities., • The solution to a real-world problem may depend on where the input values lie relative, to the point of intersection., • Depending on the situation, it may be more appropriate to represent the solution to, the system using inequalities rather than a single coordinate pair.

- Lesson 6: Linear programming is a branch of mathematics that determines the maximum and, minimum value of linear expressions on a region produced by a system of linear, inequalities., • You can solve real-world problems that involve determining maximum profit or, minimum costs using linear programming., • Linear programming involves determining the solution to a system of linear, inequalities, identifying the vertices of its solution region, and substituting each vertex's, coordinates into an algebraic expression to determine a maximum or minimum value.

Instructional Tasks/Activities

- Arts inspired projects

- Exit Ticket
- Formative Assessments
- Graphic Organizers
- Ladder Activity
- Mathia
- Pie Activity
- Quizizz
- Review, makeup assignments, complete missing assignments, absent work
- Stations or rotational activities
- Workbook Pages
- Worksheets

Assessment Procedure

- Exit Ticket/Entrance Ticket/Do Now
- Kahoot
- Problem Correction
- Project
- Quiz
- Review
- Rubric
- Teacher Collected Data
- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Chromebook
- Diffit
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Forms
- Google Slides
- Kahoot
- MagicSchool AI
- MATHia

- Online assessments
- Power Point
- Quizizz
- Screencastify

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- large print
- modified quiz as needed
- modified test as needed
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list

- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Resources

- Carnegie Learning MATHbook
- Diffit
- www.KhanAcademy.com

State Mandated Topics in this Unit

State Mandated Topics Addressed in this Unit	
N/A	N/A