Unit 6: Systems of Equations

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 23**
Length: **4 weeks**
Status: **Published**

Unit Overview

This unit will utilize concepts and skills from the "Linear Relationships" unit and will focus on how to solve systems of equations. Students will begin this unit by learning how to recognize whether or not a coordinate point is a solution to a system of equations. Then, they will learn how to solve a systems of equations by graphing. This will include equations written in slope-intercept and standard form. Next, students will learn how to solve systems of equations algebraically. This will focus on using the method of elimination. Finally, students will learn how to create a system of equations in order to solve a real-world scenario. They will then analyze the problem and choose whether to use the graphing or elimination method in order to solve the problem.

Standards

MA.8.EE.C.8a	Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
MA.8.EE.C.8b	Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.
MA.8.EE.C.8c	Solve real-world and mathematical problems leading to two linear equations in two variables.

Essential Questions

- Why is it important to have a strong foundational understanding of the concepts of slope and y-intercept?
- How can one model a real-life situation using a system of equations?
- How can one construct equations in order to solve a real-world problem?

Application of Knowledge: Students will know that...

- a system of equations containing parallel lines has no solution.
- a system of equations containing the same line has an infinite amount of solutions.
- the solution to a system of equations is a coordinate point that is a solution to both linear equations.
- to create a system of equations one must write two linear equations and then utilize one of the previously learned methods to solve it.

- to solve a system of equations algebraically, one may use the elimination method.
- to solve a system of equations by graphing, one must graph both equations and find the point where they intersect.

Application of Skills: Students will be able to...

- check their solution to a system of equations by plugging the point into both equations to see if they produce true statements.
- create and solve a system of equations that represent a real-world scenario.
- determine whether or not a coordinate point is a solution to a system of equations.
- identify systems of equations that either have no solution or an infinite amount of solutions.
- solve a system of equations algebraically.
- solve a system of equations by graphing.

Assessments

- Do-Nows: These daily assessments will be used to check for prior knowledge and to determine mastery of particular topics. If needed, remediation will be completed on an as needed basis.
- Communicator practice: This will be used as a quick whole-class assessment tool to check for complete comprehension.
- Exit Tickets: These will be used to measure student understanding of the lesson and assist in determining whether remediation is needed for the topic.
- Gallery Walk: This may be used as a formative assessment (see description below).
- Practice using IXL
- Video Lesson Project (see description below)
- Mid-Unit Quiz
- Unit Test
- Information from this unit will be included on a locally developed, mid-year or end of year benchmark assessment that may take the form of a test, performance based project, or other summative assessment.

Suggested Activities

- Grade 8 Digits Topic 6 Launches
- Student-centered SMART Board lessons: including interactive coordinate graphs for solving systems of equations by graphing and interactive equation tools for writing and solving word problems
- Review games using Communicators
- Wacky Water World Investigation: Students will be given a scenario of two possible options for purchasing ride tickets for a water park. They will write equations for each option and explore the times when each option is the better deal. This will introduce students to the concept of systems of equations.
- Systems Connect Four: Students will be given a 6 x 6 grid containing a system of equations in each

box. Student will play against one another and attempt to get four correct answers in a row. Students may use two dice to aid in determining which box to pick on the board.
- Gallery Walk: Students will complete problems posted around the room that review all of the types of problems studied in this unit on solving systems of equations. The answer to each poster will lead students to the next poster. This will create a sequence that students will complete in a specific order.
- Video Lesson Project: Students will use iPads and create an instructional video for an assigned topic from this unit. They will be given specific examples that they will need to show step-by-step how to solve. Later, these videos will be posted and used as a study tool for the class when reviewing for the unit test.

Activities to Differentiate Instruction

Differentiation for special education:

- General modifications may include:
    - Modifications & accommodations as listed in the student's IEP
    - Assign a peer to help keep student on task
    - Modified or reduced assignments
    - Reduce length of assignment for different mode of delivery
    - Increase one-to-one time
    - Working contract between you and student at risk
    - Prioritize tasks
    - Think in concrete terms and provide hands-on-tasks
    - Position student near helping peer or have quick access to teacher
    - Anticipate where needs will be
    - Break tests down in smaller increments

- Content specific modifications may include:
    - Provide personal handout for integer rules
    - Provide personal handout with steps for solving systems of equations using the elimination method
    - Use highlighters to indicate which set of variables should be cancelled in the elimination method
    - Provide scaffolded steps for creating video for Video Lesson Project
    - Provide completed problems for practice work and homework

Differentiation for ELL's:

- General modifications may include:
    - Strategy groups
    - Teacher conferences
    - Graphic organizers
    - Modification plan
    - Collaboration with ELL Teacher

- Content specific vocabulary important for ELL students to understand include: solution, plug in, parallel, slope, y-intercept, graphically, algebraically, canceling out terms, least common multiple,

linear equation

Differentiation to extend learning for gifted students may include:

- Include one equation that is either vertical or horizontal in the systems of equations
- Provide problems in which the solution contains fractions
- Investigate solving systems of equations by substitution
- Include problems in which terms must be reordered before the elimination method can be utilized

Technology Integration

- iPads or Chromebooks as appropriate to the activity.
- Online learning components including use of the Digits digital textbook and resources.
- Teacher integration of the SMART board to facilitate active student engagement throughout the course of the lesson.
- Software or online programs that teachers may use to create students materials or generate problems such as Kuta software.
- Additional practice provided through the use of IXL.

Integrated/Cross-Disciplinary Instruction

- **ELA:** Practice formulating complete and grammatically correct responses to open-ended questions.
- **Technology:** Utilize video-making apps when creating and editting an instructional video
- **Economics:** Apply the concept of system of equations to finding the best deal at an amusement park or cell phone plan.

Resources

- Digits student access and support: www.MyMathUniverse.com
- Digits teacher materials and support: www.pearsonrealize.com
- IXL: www.ixl.com
- SMART Exchange: http://exchange.smarttech.com/index.html#tab=0
- SMART Board lessons
- Coordinate graph worksheets
- Algebra Connect Four grids
- iMovie and/or Educreations Interactive Whiteboard apps for iPads
- Punchline/Pizzazz worksheets (self-correcting)
- Kuta software generated worksheets

21st Century Skills

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.