Unit 4 Systems of Equations and Inequalities

Content Area: **Math**
Course(s): **Algebra 1**
Time Period:
Length: **22 days**
Status: **Published**

Algebra 1

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Algebra 1, Grade 8

Unit 4 Systems of Equations and Inequalities

Belleville Board of Education

102 Passaic Avenue

Belleville, NJ 07109

Prepared by: Instructional Coach, Lori Whittom

Dr. Richard Tomko, Ph.D., M.J., Superintendent of Schools

Ms. LucyAnn Demikoff, Director of Curriculum and Instruction K-12

Ms. Nicole Shanklin, Director of Elementary Education

Mr. George Droste, Director of Secondary Education

Board Approved:September 23, 2019

Unit Overview

- This unit is about solving and graphing systems of equations and inequalities.
- The students in this unit should learn different methods of solving systems of equations and inequalities, and graph their solution sets on the coordinate plane.

Enduring Understanding

- Interpret and represent system of equations/inequalities to model real-world situation.
- Select a solution from a variety of ways and explain the solution based on this model.
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Essential Questions

- How can you solve a system of equations or inequalities?
- How do systems of equations model real-world situations?
- What are different methods of solving systems of equations and what are the advantages and disadvantages of each?
- How might you determine which technique for solving a system of equations is appropriate?
- How do you approximate the solution of a system of equations by graphing?
- How can you use the system of equations/inequalities to model and solve contextual problems?

Exit Skills

By the end of Unit 4 Students Should be able to:

- Solve systems of equations by graphing.
- Solving systems of equations using substitution.
- Solving systems of equations using elimination
- Analyze special systems of equations/inequalities (no solution, infinite solutions).
- Solve systems by addition/ subtraction to eliminate a variable.
- Solve systems by multiplication of a row or both rows to eliminate a variable.
- Solve systems of inequalities by graphing.
- Choose the best method of solving a system of linear equations.
- Graph systems of linear inequalities in two variables.
- Explore systems of equations and inequalities, and they find and interpret their solutions.
- Model real-world situations using systems of linear equations/inequalities.

New Jersey Student Learning Standards (NJSLS)

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.

MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.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.
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.C.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
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.

Interdisciplinary Connections

LA.SL.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
LA.SL.8.1.B	Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.
LA.SL.8.1.C	Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.
LA.SL.8.1.D	Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.

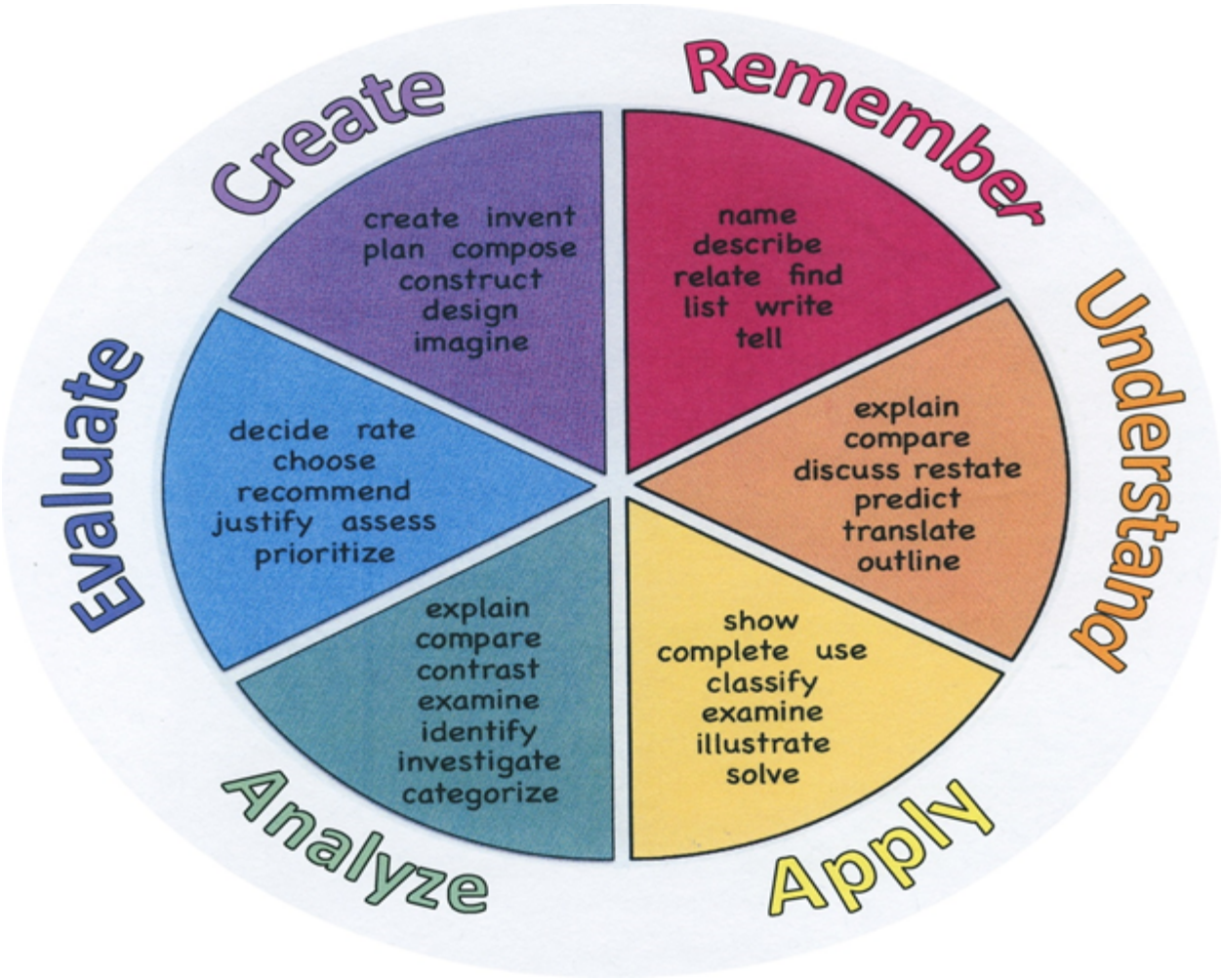
Learning Objectives

Students will be able to:

- Solve systems of equations by graphing.
- Analyze special systems of equations/inequalities (no solution, infinite solutions) by their intersections.
- Solve systems of equations using substitution.
- Solve systems by addition/ subtraction to eliminate a variable.
- Solve systems by multiplication of a row or both rows to eliminate a variable
- Choose the best method of solving a system of linear equations.
- Compare different methods of solving systems of inequalities.

- Graph system of equation/inequalities in two variables.
- Manipulate with graphing calculator to analyze set of solutions of systems of equations/inequalities in two variables.
- Model real-world situations using systems of linear equations/inequalities.

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose	Classify	Choose	Categorize	Appraise	Combine
Describe	Defend	Dramatize	Classify	Judge	Compose
Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive
Outline	Represent	Calculate	Diagram	Support	Devise
Point	Restate	Change	Discriminate	Test	Generate
Quote	Rewrite	Classify	Illustrate		Integrate
Recall	Select	Complete	Outline		Prescribe
Recognize	Show	Compute	Point out		Propose
Repeat	Summarize	Discover	Separate		Reconstruct
Reproduce	Tell	Divide			Revise
	Translate	Examine			Rewrite
	Associate	Graph			Transform
	Compute	Interpolate			
	Convert	Manipulate			
	Discuss	Modify			
	Estimate	Operate			
	Extrapolate	Subtract			
	Generalize				
	Predict				



Suggested Activities & Best Practices

System of Equations - Elimination:

https://whenmathhappens.com/2015/10/15/elimination-50min/

System of Equations - Substitiution:

https://whenmathhappens.com/2015/10/15/submethod-50min/

http://mathbitsnotebook.com/Algebra1/Systems/SYoutline.html

Real-World Applications of System of Equations:

https://betterlesson.com/lesson/427886/real-life-systems-3-easy-price?from=search

https://tapintoteenminds.com/3act-math/counting-candy-sequel/

https://teacher.desmos.com/activitybuilder/custom/5670acf05a543a6007737ea8

https://teacher.desmos.com/activitybuilder/custom/5818fb314e762b653c3bf0f3

https://www.yummymath.com/2013/souvenirs-and-concessions-2/

System of Equations, flashcard, notes, examples, practice

https://quizlet.com/subject/system-of-equations/

Textbook, eAssessment, supplemental materials:

https://my.mheducation.com/login

AI Assessment and Learning System:

https://www.aleks.com/

Mindset:

https://www.youtube.com/watch?v=3icoSeGqQtY

http://www.youcubed.org/wp-content/uploads/Positive-Classroom-Norms2.pdf

Teaching Strategies for Improving Algebra Knowledge in Middle and High School Students:

https://ies.ed.gov/ncee/wwc/PracticeGuide/20

Coaching Corner:

https://sites.google.com/belleville.k12.nj.us/thecoachingcorner/home

Algebra Tools - Functions:

https://www.state.nj.us/education/aps/cccs/math/NJISTFunctions.pdf

Algebra Tools - Algebra:

https://www.state.nj.us/education/aps/cccs/math/NJISTAlgebra.pdf

Misc Mathematics materials:

http://www.mathnstuff.com/

Algebra Kahoots:

https://kahoot.com/explore/collections/math-kahoot-algebra/

Assessment Evidence - Checking for Understanding (CFU)

- Solving Systems of Equations by Graphing https://create.kahoot.it/details/systems-of-equations-graphing/36a34bb9-d049-4cea-b9ee-d2ef426b31d0 (formative assessment)
- Homework (formative assessment)
- Benchmark #3 (summative assessment)

- Creating and solving a study guide (alternative assessment)
- Take home quizzes (alternative assessments)
- Do Nows (formative assessments)

- Admit Tickets
- Anticipation Guide
- Common Benchmarks
- Compare & Contrast
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Fist- to-Five or Thumb-Ometer
- Illustration
- Journals
- KWL Chart
- Learning Center Activities
- Multimedia Reports
- Quizzes
- Red Light, Green Light
- Study Guide
- Teacher Observation Checklist
- Think, Pair, Share
- Unit review/Test prep
- Unit tests

Primary Resources & Materials

Glencoe McGraw-Hill Algebra1 2014

Glencoe McGraw-Hill Algebra1 2010

Practice Glencoe Algebra1

Study Guide Glencoe Algebra1

Ancillary Resources

Glencoe Algebra 1 Tutor: Personal Tutor and Spanish Tutor

Glencore Algebra 1 Geometer's Sketchpad

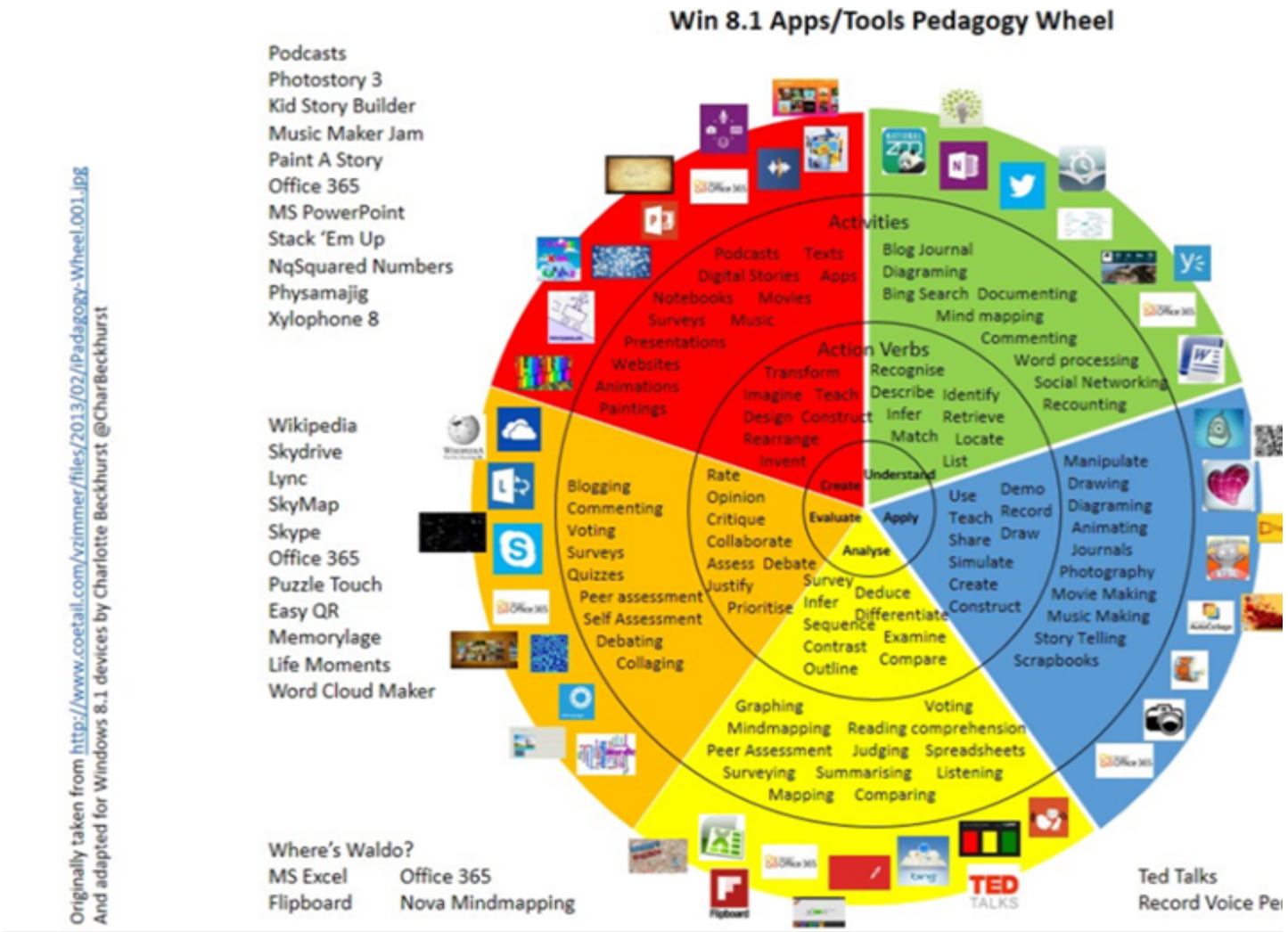
Glencoe Algebra 1 Glencoe Mathematics Secondary Series

ALEKS

Technology Infusion

- Kahoot https://create.kahoot.it/details/b83429c3-489f-4232-8ca6-c3c996131c63

- Youtube
- Khan academy
- Edulastic
- Google Sheets
- Google Classroom
- Office 365
- Google Docs
- PodCasts
- Google Slides
- Wikipedia
- Skype
- Twitter
- Ted Talks
- QR Barcode Generator
- Calculator/Graphic calculator
- desmos.com
- geogebra.org



Alignment to 21st Century Skills & Technology

- English, reading or language arts
- Economics
- Science

- Geography
- History
- Government and Civics

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP11	Use technology to enhance productivity.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
TECH.8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
TECH.8.1.12.F.1	Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
TECH.8.2.12.D.CS2	Use and maintain technological products and systems.

21st Century Skills/Interdisciplinary Themes

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy

21st Century Skills

- Civic Literacy
- Financial, Economic, Business and Entrepreneurial Literacy
- Health Literacy

Differentiation

- Use of larger version of coordinate plane to graph systems of equations
- Color coding each equation in the system of equations
- Graphic organizer with steps to solving systems of equations utilized in multiple methods

- Use of graphing calculator TI 84 to graph and solve system of equations
- Cooperative groups
- Pairing oral instruction with visuals
- Team work
- Center based instruction
- Repeat directions as needed
- Study guide
- Tests/quizzes reviews
- Notes taking/transparencies
- Organizer
- Calculator/graphing calculator
- Extra time
- Students work with assigned partner
- Choice boards
- Stations/Learning centers

Special Education Learning (IEP's & 504's)

- Use of larger version of coordinate plane to graph systems of equation
- Color coding each equation in the system of equations
- Graphic organizer with steps to solving systems of equations utilized in multiple methods
- Use of graphing calculator TI 84 to graph and solve system of equations

- printed copy of board work/notes provided
- additional time for skill mastery
- assistive technology
- Center-Based Instruction
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test format
- modified test length
- preferential seating
- preview of content, concepts, and vocabulary
- Provide modifications as dictated in the student's IEP/504 plan
- secure attention before giving instruction/directions
- shortened assignments

- student working with an assigned partner
- Use open book, study guides, test prototypes

English Language Learning (ELL)

- Use of larger version of coordinate plane to graph systems of equations
- Color coding each equation in the system of equations
- Graphic organizer with steps to solving systems of equations utilized in multiple methods
- Use of graphing calculator TI 84 to graph and solve system of equations

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarif
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
- allowing students to correct errors (looking for understanding)
- allowing the use of note cards or open-book during testing
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers

At Risk

- Use of larger version of coordinate plane to graph systems of equations
- Color coding each equation in the system of equations
- Graphic organizer with steps to solving systems of equations utilized in multiple methods
- Use of graphing calculator TI 84 to graph and solve system of equations

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.

- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using videos, illustrations, pictures, and drawings to explain or clarify

Talented and Gifted Learning (T&G)

- Solving System of Equations in Context https://tapintoteenminds.com/3act-math/counting-candy-sequel/

- Above grade level placement option for qualified students
- Advanced problem-solving
- Allow students to work at a faster pace
- Complete activities aligned with above grade level text using Benchmark results
- Flexible skill grouping within a class or across grade level for rigor
- Higher order, critical & creative thinking skills, and discovery
- Multi-disciplinary unit and/or project
- Teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- Utilize exploratory connections to higher-grade concepts

Sample Lesson

Using the template below, please develop a **Sample Lesson** for the first unit only.

Unit Name:

NJSLS:

Interdisciplinary Connection:

Statement of Objective:

Anticipatory Set/Do Now:

Learning Activity:

Student Assessment/CFU's:

Materials:

21st Century Themes and Skills:

Differentiation/Modifications:

Integration of Technology: