Algebra 1H, Unit 2 , Linear Inequalities

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Title Section

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Algebra 1H

Unit 2 Linear Inequalities

Belleville Board of Education

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Unit Overview

This unit is about solving and graphing inequalities and compound inequalities.

The students should learn how to solve inequalities using different methods, graph their solution sets on number line, identify and solve compound inequalities.

Enduring Understanding

Algebraic expressions and equations generalize relationships from specific cases.

The solution to an inequality is a set, not just a single solution.

Make sense of problems and persevere in solving them.

Reason abstractly and quantitatively.

Model with mathematics.

Attend to precision.

Look for and make use of structure.

Look for and express regularity in repeated reasoning.

Essential Questions

- How do you represent relationships between quantities that are not equal?
- How do you justify the solution to a linear inequality?
- Can inequalities that appear to be different be equivalent?
- How can you solve inequalities?
- How to distinguish between to types of inequalities: unions and intersection?
- What are real-life applications of inequalities?

Exit Skills

By the end of Unit 2 Students Should be able to:

- Write, graph, and identify solutions of inequalities.
- Solve inequalities using addition or subtraction.
- Solve inequalities using multiplication or division.
- Solve multi-step inequalities involving the distributive property.
- To solve inequalities with coefficients represented by letters.
- Graph linear inequalities on the coordinate plane.
- Identify compound statements connected by the word and/or.
- Solve compound inequalities containing the word and/or and graph their solution set.
- Model real world problems using inequalities.

New Jersey Student Learning Standards (NJSLS)

MA.K-12.1	Make sense of problems and persevere in solving them. Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★).
MA.K-12.2	Reason abstractly and quantitatively.
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.K-12.7	Look for and make use of structure.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-REI.B	Solve equations and inequalities in one variable
MA.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. Inequalities can be solved by reasoning about the properties of inequality. Many, but not all, of the properties of equality continue to hold for inequalities and can be useful in solving them.

Interdisciplinary Connections

LA.W.9-10.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.L.9-10.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
9.3.12.FN.1	Utilize mathematical concepts, skills and problem solving to obtain necessary information for decision making in the finance industry.
9-12.HS-PS1-4.2.1	Develop a model based on evidence to illustrate the relationships between systems or between components of a system.
9-12.HS-PS1-3.3	Planning and Carrying Out Investigations
9-12.HS-PS2-4.5	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.

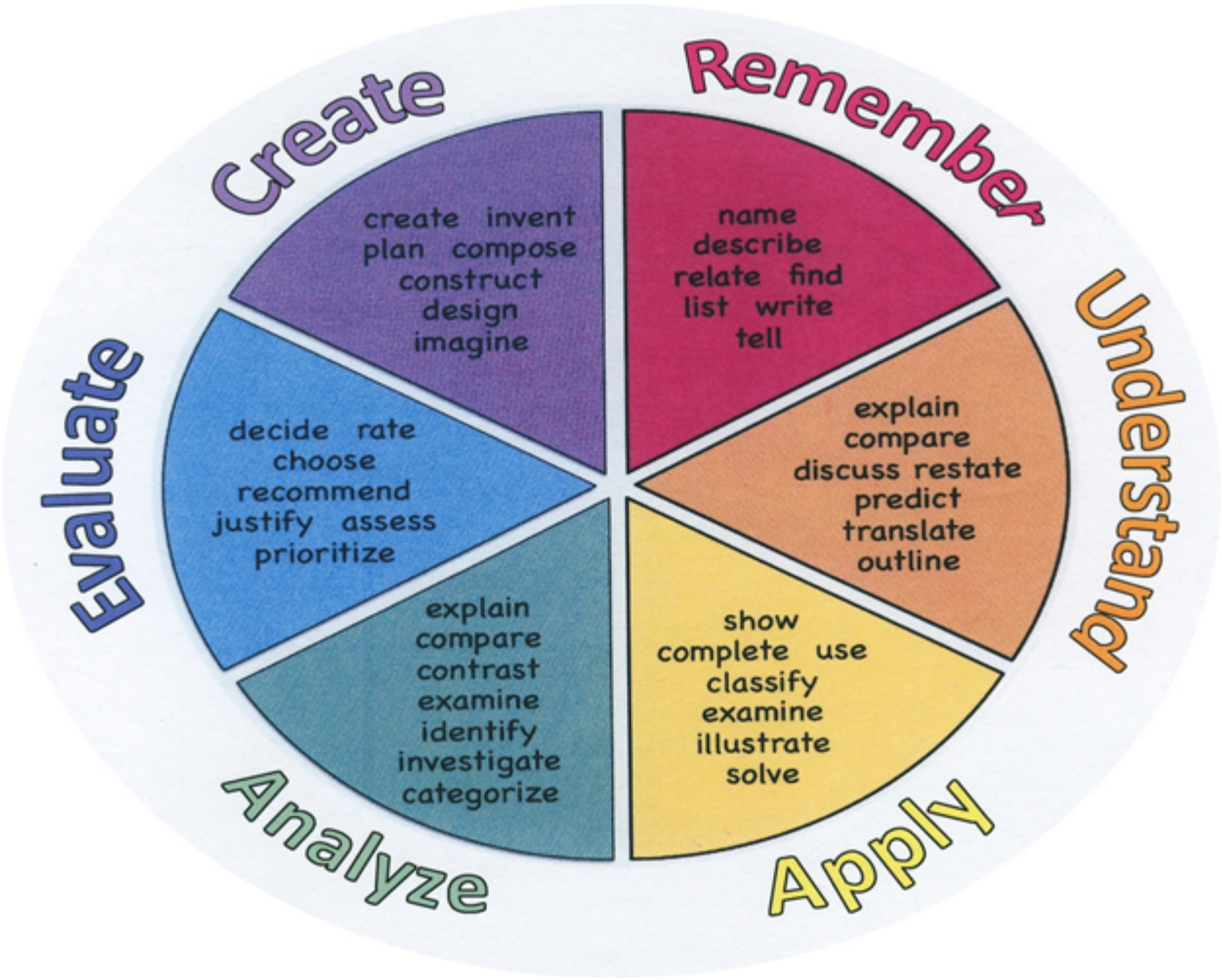
Learning Objectives

Students will be able to:

- Represent relationship algebraically and evaluate them using properties.
- Interpret real-word examples into linear inequalities .

- Solve one-step inequalities in one variable using different operations.
- Solve multi-step inequalities and justify each step using properties.
- Solve inequalities with the variables on both sides by using like terms and the distributive property.
- Identify inequalities that are unions and intersections by analyzing the signs of inequalities.
- Graph solution sets on the number line using number theory .
- Solve inequalities by graphing.
- Investigate the graphs of inequalities by using a graphing calculator.
- Analyze the difference between the words phrases "at least" and " the most" and be able to use their symbols in inequalities.
- Model real-world situations using inequalities.
- Investigate and extend classroom activities into self research and long term projects.
- Determine the process,including properties of equality and justifications, to solve equations and 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

Equations and Inequalities , Basketball problem:

https://www.illustrativemathematics.org/content-standards/HSA/CED/A/1/tasks/702

Find Errors in Solutions to Inequalities

https://www.illustrativemathematics.org/content-standards/HSA/REI/A/1/tasks/807

Explore Linear Inequalities:

https://teacher.desmos.com/activitybuilder/custom/57d9fdc6ebf48f73093807b2

Simple and Compound Inequalities:

https://teacher.desmos.com/activitybuilder/custom/57ed6233b22885ee08944fce

Videos on Solving Inequalities:

https://mathtv.com/topic/algebra/35

https://www.youtube.com/watch?v=oElmCg5fcWU

Solving Linear Inequalities:

https://whenmathhappens.com/2013/11/22/solveineqintro-50min/

Quizlet, Inequalities:

https://quizlet.com/322332626/solve-graph-write-inequalities-flash-cards/

Textbook, eAssessment, supplemental materials(Hardcopy and digital versions):

https://my.mheducation.com/login

Teaching Algebra with Manipulatives, McGrawHill Resource -

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)

McGraw Hill :

Solving inequalities (Summative):

https://connected.mcgraw-hill.com/c2j/resourceLibrary.do?bookId=DFRTR2RBH9YT25W7OSMM6J3XM1&libraryId=DZDJJ7M7F3O5CNLMT8JK7ZQ4L4

EAssessment test generator (Summative):

https://assess.k12.mhedu.com/Instructor/TestGenerator.aspx

Edulastic Formative assessments (Formative):

Solving and graphing multi-step inequalities (Formative):

https://app.edulastic.com/#renderResource/close/NzA1ODgzNTgy

Solving and graphing compund inequaitites (Formative):

https://app.edulastic.com/#renderResource/close/NzExODQ3MzU4

Benchmark 1 - Common Assessment on Oncourse (Benchmark)

NJSLA (Formative)

"Do Now/Exit Ticket" Activity (Formative)

- Admit Tickets
- Anticipation Guide
- Common Benchmarks
- Compare & Contrast
- Create a Multimedia Poster
- DBQ's
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Fist- to-Five or Thumb-Ometer
- Illustration
- Journals
- KWL Chart
- Learning Center Activities
- Multimedia Reports
- Newspaper Headline
- Outline
- Question Stems
- Quickwrite
- Quizzes
- Red Light, Green Light
- Self- assessments
- Socratic Seminar
- Study Guide
- Surveys
- Teacher Observation Checklist

- Think, Pair, Share
- Think, Write, Pair, Share
- Top 10 List
- Unit review/Test prep
- Unit tests
- Web-Based Assessments
- Written Reports

Primary Resources & Materials

Glencoe McGraw-Hill Algebra1 2014

Glencoe McGraw-Hill Algebra1 2010

Practice Glencoe Algebra1

Study Guide Glencoe Algebra1

Ancillary Resources

ALEKS

The Glencoe Personal Tutor Plus

The Glencoe Personal Tutor Plus(Spanish)

Technology Infusion

Create and have students complete exit tickets using Edulastic
{ https://app.edulastic.com/#renderResource/close/Mjk0MjE2ODUwOA%3D%3D } or Google forms

Create classes on Google classroom and post assignments, monitor student progress, and offer feedback.

Use graphing calculator to model problems.

Other technology that can be infused into this unit to enhance learning may include

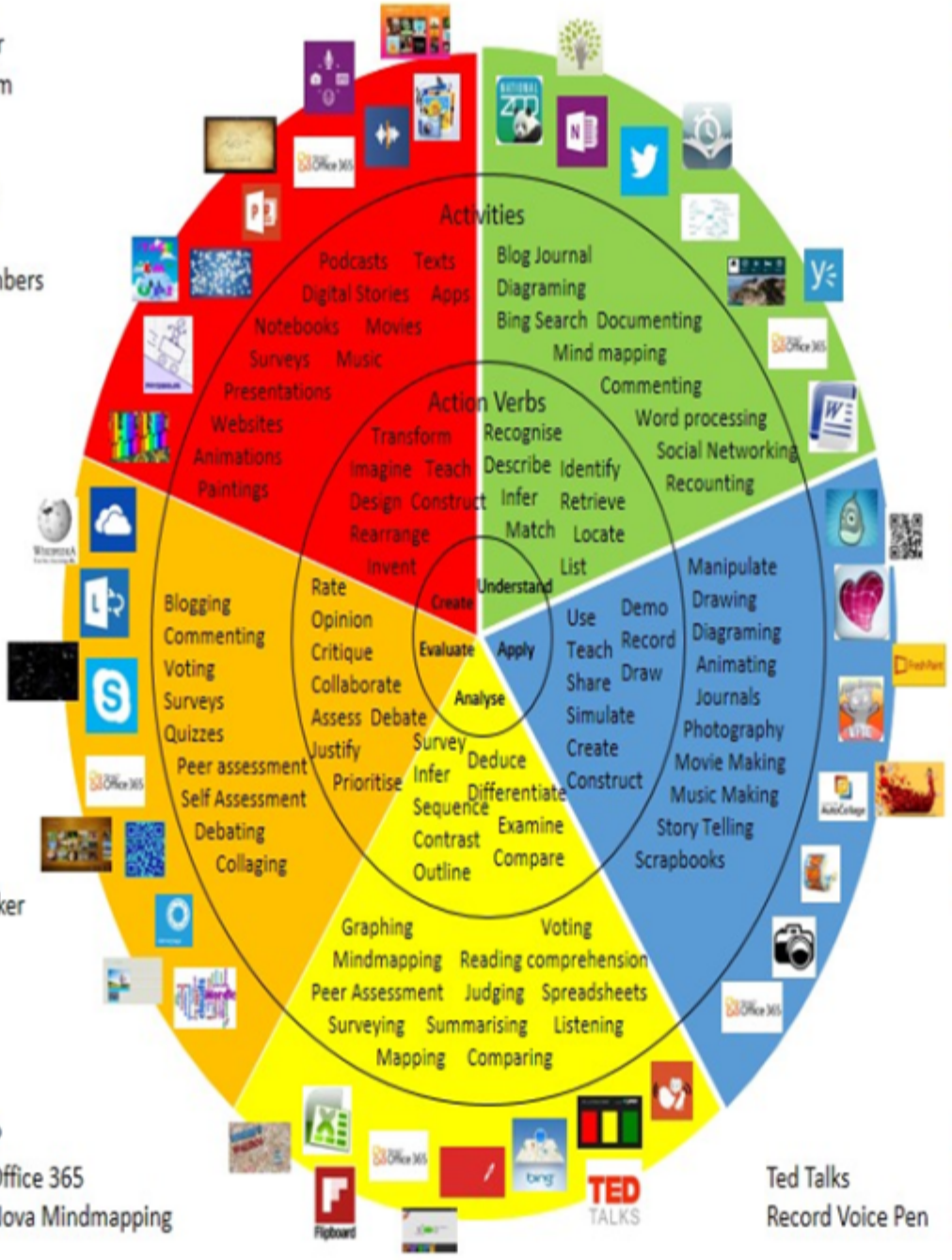
- Youtube
- Khan academy
- Google Classroom
- GSuite

- Kutasoftware
- Edulastic
- PodCasts
- Skype
- Twitter
- Ted Talks
- QR Barcode Generator
- Calculator/Graphing calculator
- Flipgrid
- Peardeck
- Nearpod
- McGraw-Hill Education
- Desmos.com
- Geogebra.org

Win 8.1 Apps/Tools Pedagogy Wheel

Podcasts
Photostory 3
Kid Story Builder
Music Maker Jam
Paint A Story
Office 365
MS PowerPoint
Stack 'Em Up
NqSquared Numbers
Physamajig
Xylophone 8

Wikipedia
Skydrive
Lync
SkyMap
Skype
Office 365
Puzzle Touch
Easy QR
Memorylage
Life Moments
Word Cloud Maker



Where's Waldo?
MS Excel Office 365
Flipboard Nova Mindmapping

Ted Talks
Record Voice Pen

Originally taken from http://www.coetail.com/vzimmer/files/2013/02/iPadagogy-Wheel.001.jpg
And adapted for Windows 8.1 devices by Charlotte Beckhurst @CharBeckhurst

Alignment to 21st Century Skills & Technology

Develop mathematical thinking using real world problems in the Glencoe Interactive Student Guide Workbook https://catalog.mcgraw-hill.com/repository/private_data/DOC/50001167/94/30.pdf

Mastery and infusion of 21st Century Skills & Technology and their Alignment to the core content areas is essential to student learning. The core content areas include:

- English Language Arts;
- Mathematics;
- Science and Scientific Inquiry (Next Generation);
- Social Studies and Economics;
- Technology;
- Visual and Performing Arts.

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.CS1	Identify and define authentic problems and significant questions for investigation.

21st Century Skills/Interdisciplinary Themes

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

- Media Literacy

21st Century Skills

- Civic Literacy
- Environmental Literacy
- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness
- Health Literacy

Differentiation

Glencoe -McGrawHill Resources:

Teaching with Manipulatives: Algebra Tiles

Algebra Labs

Math Triumphs

Algebra 1 Study Notebook

TI-84 Calculator Activities

McGraw Hill Graphing Calculator lessons on inequalities:

https://catalog.mcgraw-hill.com/repository/private_data/DOC/50000011/82/64.pdf

Algebra Tiles:

Use of algebra tiles to model solving inequalities(McGraw Hill Alg 1 textbook pages 291)

Vocabulary of inequalities:

https://connected.mcgraw-hill.com/media/repository/protected_content/COMPOUND/50000579/76/84/index.html?mghCourseID=DFR

TR2RBH9YT25W7OSMM6J3XM1

Kutasofware Algebra 1

Differentiations:

- Small group instruction
- Small group assignments
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Center-based instruction
- Token economy
- Study guides
- Teacher reads assessments allowed
- Scheduled breaks
- Rephrase written directions
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts
- Story guides
- Behavior management plan
- Highlight text
- Student(s) work with assigned partner
- Visual presentation
- Assistive technology
- Auditory presentations
- Large print edition
- Dictation to scribe
- Small group setting

Hi-Prep Differentiations:

- Alternative formative and summative assessments
- Choice boards
- Games and tournaments
- Group investigations
- Guided Reading
- Independent research and projects
- Interest groups
- Learning contracts
- Leveled rubrics
- Literature circles
- Multiple intelligence options
- Multiple texts
- Personal agendas
- Project-based learning
- Problem-based learning
- Stations/centers

- Think-Tac-Toes
- Tiered activities/assignments
- Tiered products
- Varying organizers for instructions

Lo-Prep Differentiations

- Choice of books or activities
- Cubing activities
- Exploration by interest
- Flexible grouping
- Goal setting with students
- Jigsaw
- Mini workshops to re-teach or extend skills
- Open-ended activities
- Think-Pair-Share
- Reading buddies
- Varied journal prompts
- Varied supplemental materials

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

Graphing calculator(Ti-84)

The Glencoe-McGrawHill Personal Tutor

Glencoe -McGrawHill Resources:

Teaching Algebra with Manipulatives:https://catalog.mcgraw-hill.com/repository/private_data/DOC/50000008/74/21.pdf

Algebra Lab

Math Triumphs

Algebra 1 Study Notebook

- printed copy of board work/notes provided
- additional time for skill mastery
- assistive technology
- behavior management plan
- 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
- multi-sensory presentation
- multiple test sessions
- preferential seating
- preview of content, concepts, and vocabulary
- Provide modifications as dictated in the student's IEP/504 plan
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

English Language Learning (ELL)

The Glencoe Personal Tutor(Spanish):

Solve and graph an Intersection

Solve and graph a Union

Teaching Algebra with Manipulatives

- 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
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

At Risk

Graphing calculator(TI-84)

Graphing Inequalities p.323 textbook

Glencoe -McGrawHill Resources:

Teaching Algebra with Manipulatives, McGrawHill Resource - (digital version accessible)

- Compound inequalities
- Reading Compound sentences

Math Triumphs

Algebra 1 Study Notebook

- 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 or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

Talented and Gifted Learning (T&G)

Glencoe Enrichment Activities

Glencoe Chapter Projects

Math Forum: Problems of the Week, Sample Lesson, Reasoning and Making Sense Task Library

Enrichment: Solving Compound Inequalities (5-4)

Kutasoftware Algebra 1 Software

- Above grade level placement option for qualified students
- Advanced problem-solving
- Allow students to work at a faster pace
- Cluster grouping
- Complete activities aligned with above grade level text using Benchmark results
- Create a blog or social media page about their unit
- Create a plan to solve an issue presented in the class or in a text
- Debate issues with research to support arguments
- 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
- Utilize project-based learning for greater depth of knowledge

Sample Lesson

Unit Name: Linear Equations

NJSLS:

MA.9-12.A-REI.A.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

MA.9-12.A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Statement of Objective: After reviewing the Do Now and HW the learner will solve equations with one variable by combining like terms and using the distributive property to show whether there is one, none, or infinitely many solutions

Learning Activity:

Anticipatory Set/Do Now: 5 minute check - https://catalog.mcgraw-hill.com/repository/private_data/DOC/50000178/67/56.pdf

Distribute graphic organizer with steps to Solving multi-step equations (Suggested Activities & Best Practices)

Ask questions to discern understanding of distributive property, combining like terms, and inverse operations.....first? next? ... How can we check our answer? - Model with Algebra tiles or digital tiles

Model Problems on Smart TV :

Powerpoint(https://connected.mcgraw-hill.com/c2j/resourceLibrary.do?facet=GROUP%7cN&facet=TAG%7cBBW9KBBEFF7MXHDNLPLD2YQZSE&bookId=DFRTR2RBH9YT25W7OSMM6J3XM1&libraryId=Z6G2OY1GBWQ6VGCOF13O5Z16LO&mode=BROWSE)

Discuss no solutions to an equation? infinitely many solutions to an equation?

Practice with their partner/group -think/pair/share

Have students go to board or post to show and explain their work and answer

Student Assessment/CFU's: Questions and Answers, Oral Response, Board work ,Observation, Self-Assessment,Exit ticket https://connected.mcgraw-hill.com/media/repository/protected_content/COMPOUND/50000178/12/35/index.html?mghCourseID=DFRTR2RBH9YT25W7OSMM6J3XM1 OR
Edulastic: https://app.edulastic.com/#renderResource/close/ODg0MTQxNTAy

Differentiation/Modifications: Cooperative groups, peer partners, Algebra tiles, Teacher's step by step notes, read aloud, graphic organizers, worked examples, videos, digital tutorials McGraw-Hill Personal Tutor Plus, Calculator, shorten homework assignments

Interdisciplinary Connection: Number Theory,Financing.

Materials: Notebook, Textbook, McGraw-Hill digital Resources, Study Guide, Teacher's worksheet, Suggested Activities & Best Practices.

21st Century Themes and Skills: Financial,Economic,Business and Entrepreneurial Literacy.

Integration of Technology: SmartTV, Peardeck, Google Slides, Powerpoint, Edulatic, McGraw-Hill digital Resources, Calculator.