Algebra 1H, Unit 1 ,Expressions & Equations

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Title Section

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Algebra 1H

UNIT 1 - Expressions and Equations

Belleville Board of Education

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Unit Overview

Unit1 : Solving linear equations, equations involving absolute value and problems involving percent.

From this unit students should expect to learn how to solve one and multi-step equations, write mathematical sentences into equations and vice versa, solve absolute value equations, compare ratios, solve proportions, find percent of change and solve problems involving percent.

Enduring Understanding

Students will be able to use their learning to:

- Interpret and represent expressions and equations to model real-world situation.
- Use the structure of an expression to help simplify and regroup terms to find solutions to problems. This will help to

interpret more complex expressions, as well as equations and inequalities.

- Communicate about ideas in Algebra in a standard and understandable manner.
- Relate the topics learned in Algebra to things that they do in their everyday lives.
- Become proficient in daily skills involving mathematics.
- The transfer of skills and perseverance are necessary when utilizing various techniques to reach a solution.

Essential Questions

- How is thinking algebraically different from thinking arithmetically?
- How do you interpret and evaluate algebraic expressions that model real-world situation?
- What kinds of relationships can proportions represent?
- Can equations that appear to be different be equivalent?
- How can you rewrite algebraic expressions?
- How can you solve equations?
- How do you write algebraic expression to model quantities?
- How do you represent relationship algebraically?

Exit Skills

By the end of Unit 1 Students Should be able to:

- Translate sentences into equations and equations into sentences
- Solve equations involving more than one operation
- Solve equations involving consecutive integers
- Solve equations with the variable on each side
- Solve equations involving grouping symbols
- Justify each step in solving equations using properties
- Evaluate absolute value expressions
- Solve absolute value equations
- Analyze and explain the process of solving an equation and justify the process used in solving a system of equations.
- Develop fluency in writing, interpreting, and translating among various forms of linear equations and use them to solve

problems.

- Master the solution of linear equations and apply related solution techniques.
- Compare ratios
- Solve proportions
- Solve problems involving percent
- Find percent of change
- Use formulas to solve real-world problems
- Represent real world problems symbolically

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.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
MA.K-12.6	Attend to precision.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
MA.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.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Interdisciplinary Connections

9.3.12.FN.1	Utilize mathematical concepts, skills and problem solving to obtain necessary information for decision making in the finance industry.
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.
9-12.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.

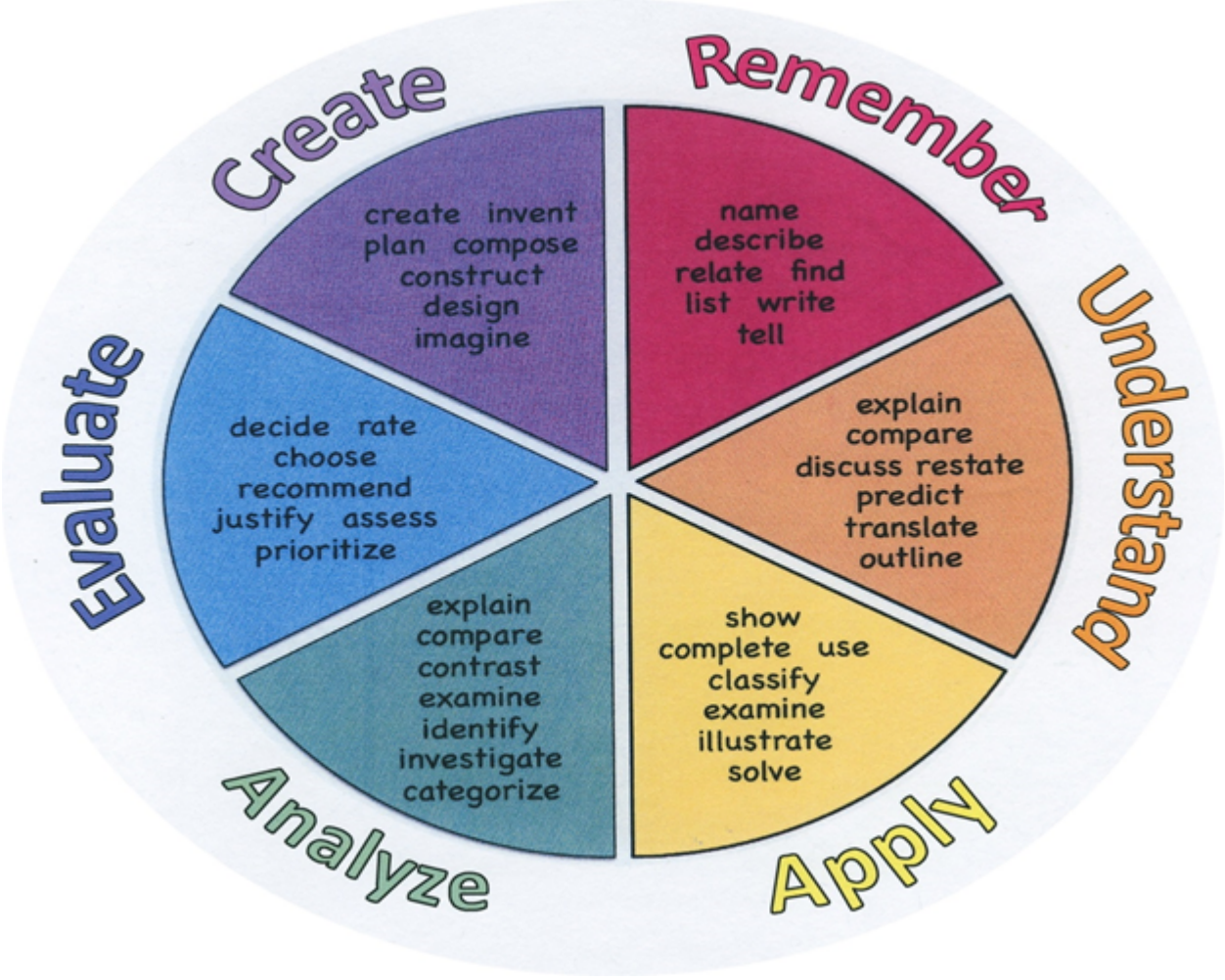
Learning Objectives

Students will be able to:

- Represent relationships algebraically and evaluate them using properties .
- Interpret and evaluate real-word expressions bu introducing a variable.
- Solve one-step equations in one variable using different operations.
- Solve multi-step equations and justify each step using properties.
- Solve equations with the variables on both sides using like terms and the distributive property.
- Identify equations that are identities or have no solution.
- Rewrite and use literal equations and formulas by solving them for the specific variable.
- Convert units and rates into different ones and understand the difference between them.
- Apply proportions to solve the real-world situations by applying the cross product method .
- To solve percent problems and find percent change by using proportions and equations.
- Model real-world situations using expressions and equations.
- Investigate and extend classroom activities into self research and long term projects.

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 Draw Outline Point Quote Recall Recognize Repeat Reproduce	Match Paraphrase Represent Restate Rewrite Select Show Summarize Tell Translate Associate Compute Convert Discuss Estimate Extrapolate Generalize Predict	Use Add Calculate Change Classify Complete Compute Discover Divide Examine Graph Interpolate Manipulate Modify Operate Subtract	Combine Detect Diagram Discriminate Illustrate Outline Point out Separate	Rank Rate Support Test	Role Play Drive Devise Generate Integrate Prescribe Propose Reconstruct Revise Rewrite Transform



Suggested Activities & Best Practices

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

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/

Coaching Corner:

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

Videos:

https://www.mathantics.com/

https://mashupmath.com/high-school-math-lessons

Solve Equations:

https://www.youtube.com/watch?v=WHeK1eNy1YQ

https://www.youtube.com/watch?v=l3XzepN03KQ

Solving Eq with Variables on both sides

https://www.youtube.com/watch?v=-NgHrnVgeWY

Graphic Organizers:

https://www.scaffoldedmath.com/2017/10/solving-equations-graphic-organizer.html

https://www.teacherspayteachers.com/Product/Solving-Equations-Graphic-Organizer-1669054

https://www.teacherspayteachers.com/Product/Graphic-Organizer-for-Solving-Equations-with-Identity-and-No-Solutions-354314

Algebra Tic-Tac-Toe:

https://www.education.com/activity/article/tic-tac-equations/

Activites for Solving Equations:

https://lzlomek.wordpress.com/2012/10/10/activities-for-solving-equations/

Introduction to Linear Equations:

https://betterlesson.com/lesson/487890/introduction-to-linear-equations-and-inequalities-in-one-variable

Solving Equations with a variable on both sides:

https://whenmathhappens.com/2013/11/12/bothsides1-50min/

Equations, Choice board:

https://www.corwin.com/sites/default/files/upm-binaries/18260_Gregory_ActDiffClssrm_MSMath_Pages_30_31.pdf

Misc Problems:

http://figurethis.nctm.org/challenges/c74/challenge.htm

Algebra Kahoots:

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

Assessment Evidence - Checking for Understanding (CFU)

Glencoe McGraw Hill : Chapter Assessments, Midchapter Assessments (Summative) - https://connected.mcgraw-hill.com/c2j/assetBuckets.assess.do?bookId=DFRTR2RBH9YT25W7OSMM6J3XM1&selectedCategoryId=3KTMO6D7VZ6SJ4YD3XNOQB3O44

EAssessment test generator (Summative): https://assess.k12.mhedu.com/Instructor/TestGenerator.aspx

Edulastic Formative Assessments (Formative): https://app.edulastic.com/#renderResource/close/Mjk0MjE2ODUwOA%3D%3D

Common Benchmark 1 on OnCourse (Benchmark)

"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)

Kutasoftware

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.

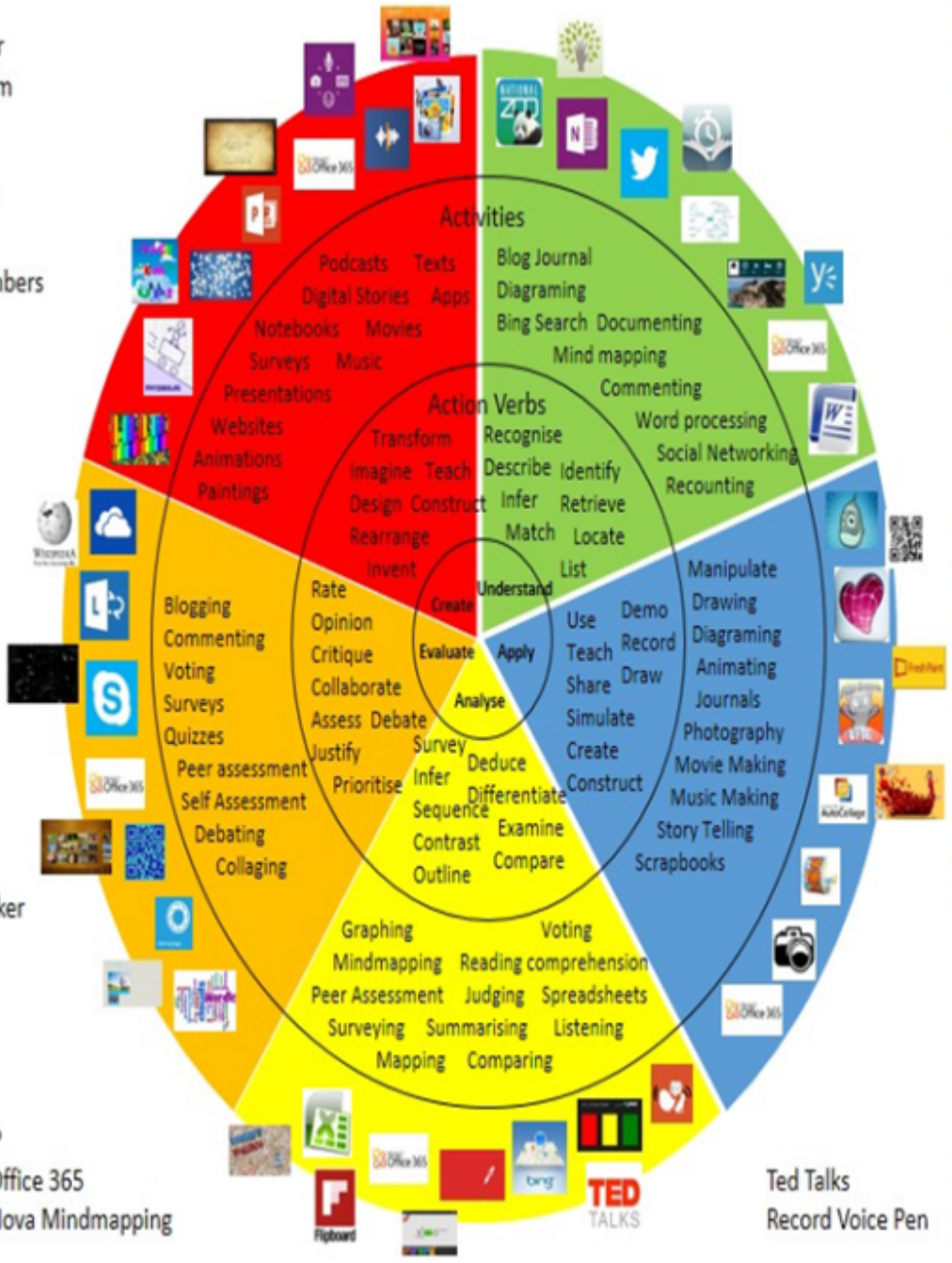
Other technology that can be infused into this unit to enhance learning may include

- Youtube
- Khan academy
- Google Classroom
- GSuite
- Kutasoftware
- PodCasts
- Skype
- Twitter
- Ted Talks
- ALEKS
- QR Barcode Generator
- Calculator/Graphing calculator
- Flipgrid
- Peardeck
- Edulastic
- 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, including American History, World History, Geography, Government and Civics, and Economics;
- World languages;
- 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

- English Language Arts;
- Mathematics;
- Science and Scientific Inquiry (Next Generation);

- Social Studies/Economics;
- Technology

- 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, Model solving Equations(textbook p. 81, 90)

Algebra Labs

Math Triumphs

Algebra 1 Study Notebook

Kutasoftware Algebra 1

Choice boards:https://www.corwin.com/sites/default/files/upm-binaries/18260_Gregory_ActDiffClssrm_MSMath_Pages_30_31.pdf

Equations Tic-Tac-Toe board: https://www.education.com/activity/article/tic-tac-equations/

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) introduction

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 Tiles

Use of algebra tiles to model solving equations (p. 81)

Use of algebra tiles to model solving multi-step equations (p.90)

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 a consecutive integer tutorial

Write and solve a multistep equation tutorial

Teaching Algebra with Manipulatives:

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

- 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) introduction

The Glencoe Personal Tutor

Glencoe -McGrawHill Resources

Teaching Algebra with Manipulatives: Algebra Tiles (pgs.81, 90)

Math Triumphs

Algebra 1 Study Notebook

Solving Equations with a variable on both sides:

https://whenmathhappens.com/2013/11/12/bothsides1-50min/

- 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)

Writing Expressions and Equations Figure This! Bet I can Guess your Color Magic:Writing Expressions and Equations https://figurethis.nctm.org/challenges/c60/challenge.htm

Glencoe Enrichment Activities

Glencoe Chapter Projects

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

- 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, Boardwork ,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.