# Unit 5 Solving Equations & Inequalities

Content Area: **Math**
Course(s): **Math Essentials**
Time Period: **JanFeb**
Length: **20 days**
Status: **Published**

## Title Section

## Department of Curriculum and Instruction

**Belleville Public Schools**

**Curriculum Guide**

# MATH ESSENTIALS GRADES 11-12

# UNIT 5 SOLVING EQUATIONS & INEQUALITIES

**Belleville Board of Education**

**102 Passaic Avenue**

**Belleville, NJ 07109**

**Prepared by:** CHRISTINE D. PUCCIO

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 K-8, ESL Coordinator K-12

Mr. George Droste, Director of Secondary Education

Board Approved:September 23, 2019

## Unit Overview

Unit 5: Equations and Inequalities

In this unit, students should learn to solve 1-step equations/inequalities, solve 2-step equations/inequalities, solve equations/inequalities with variables on both sides, solve equations/inequalities that require the distributive property and combining like terms, solve equations with letter coefficients/constants, and use equations to solve word problems.

## Enduring Understanding

**Unit Enduring Understandings: Students will understand that..**

- Inverse operations are necessary to undo operations when solving equations.
- Variables represent one number and any given solution may be checked for precision.
- The opposite sign is used when moving a number/variable to the opposite side of the equation/inequality.
- Multiplying or dividing by a negative number reverses the symbol of an inequality.
- Inequalities have an infinite number of solutions, and they can be represented on a number line.
- Inequalities are graphed by using rays with an open or closed endpoint.
- It is best to solve an equation after the Distributive Property has been done and all like terms are combined.
- The same operations can be used when solving an equation with letter coefficients/constants.
- Equations and inequalities may be used as models to solve mathematical and real world problems.

## Essential Questions

**Unit Essential Questions: Students will keep considering..**

- How do you solve equations/inequalities with multiple operations?
- How can you check a solution to an equation/inequality?
- What is the difference between an equation and an inequality?
- How can we simplify equations/inequalities before trying to solve them?
- How can we deal with negative coefficients when solving inequalities?
- Can we solve equations/inequalities with letter coefficients/constants the same way as the other ones?
- How do we graph solutions to equations/inequalities?
- How can we create an equation/inequality for a given situation?

## Exit Skills

**By the end of Unit 5 Students will be able to:**

- Use algebra to solve equations using techniques of making zero (as a constant) and one (as a coefficient) to find the variable.
- Use substitution and order of operations to check the correctness of a solution to an equation/inequality.
- Explain the difference between an equation and an inequality.
- Know when to move terms and when to simplify expressions when solving equations/inequalities.
- Use the properties of algebra and numbers to solve equations/inequalities.
- Solve inequalities with negative coefficients.
- Solve equations/inequalities with letter coefficients/constants.
- Graph the solution to an inequality.
- Create an equation/inequality for a given situation described in a word problem.

## New Jersey Student Learning Standards (NJSLS-S)

| | |
|---|---|
| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.A-SSE.A.1 | Interpret expressions that represent a quantity in terms of its context. |
| MA.K-12.2 | Reason abstractly and quantitatively. |
| MA.K-12.4 | Model with mathematics. |
| MA.A-SSE.B.3 | Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. |
| 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.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

| | |
|---|---|
| LA.RL.11-12.4 | Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (e.g., Shakespeare as well as other authors.) |
| LA.W.11-12.2.D | Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. |
| LA.SL.11-12.4 | Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience. |
| LA.L.11-12.6 | Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. |

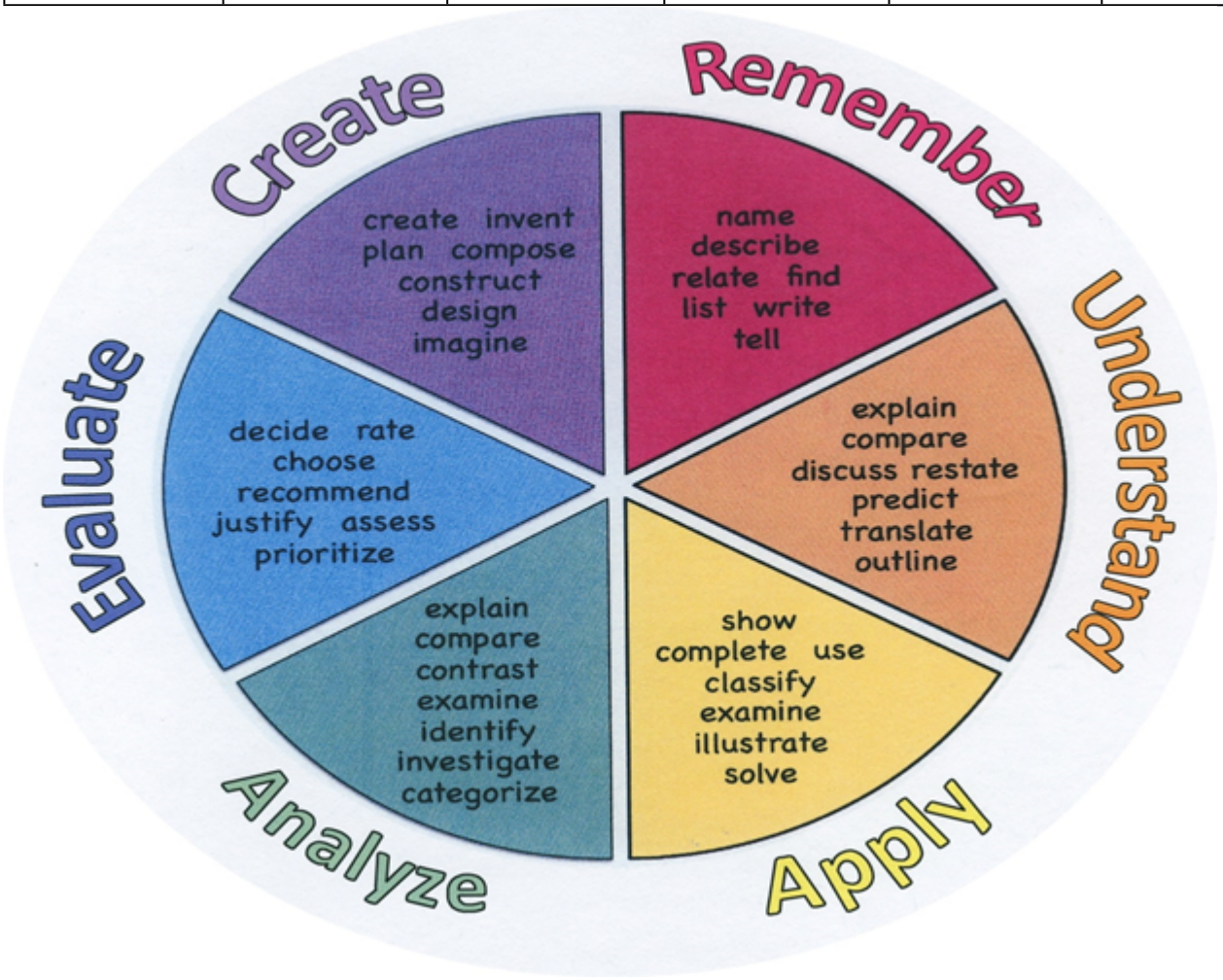
## Learning Objectives

**Students will be able to...**

- Decide the proper order of inverse operations necessary to make zero (as a constant) and one (as a coefficient) when solving an equation.
- Justify the correctness of a solution to an equation/inequality by using substitution and order of operations.
- Compare and contrast the process of solving equations to that of solving inequalities.
- Distinguish between when to use inverse operations and when to simplify expressions when solving equations/inequalities.
- Decide when it is necessary to reverse the symbol when solving inequalities.
- Compare the steps of solving an equation with letter coefficients/constants to solving an equation with number coefficients/constants.
- Compare and contrast the solutions of equations to those of inequalities.
- Make an equation/inequality to represent a given situation/real-world problem.

| 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<br>State<br>Count<br>Draw<br>Outline<br>Point<br>Quote<br>Recall<br>Recognize<br>Repeat<br>Reproduce | Interpret<br>Infer<br>Match<br>Paraphrase<br>Represent<br>Restate<br>Rewrite<br>Select<br>Show<br>Summarize<br>Tell<br>Translate<br>Associate<br>Compute<br>Convert<br>Discuss<br>Estimate<br>Extrapolate<br>Generalize<br>Predict | Sketch<br>Solve<br>Use<br>Add<br>Calculate<br>Change<br>Classify<br>Complete<br>Compute<br>Discover<br>Divide<br>Examine<br>Graph<br>Interpolate<br>Manipulate<br>Modify<br>Operate<br>Subtract | Arrange<br>Breakdown<br>Combine<br>Detect<br>Diagram<br>Discriminate<br>Illustrate<br>Outline<br>Point out<br>Separate | Justify<br>Measure<br>Rank<br>Rate<br>Support<br>Test | Plan<br>Produce<br>Role Play<br>Drive<br>Devise<br>Generate<br>Integrate<br>Prescribe<br>Propose<br>Reconstruct<br>Revise<br>Rewrite<br>Transform |



## Suggested Activities & Best Practices

Supplemental Materials:

- khanacademy.com
- njctl.org
- coolmath.com
- mathbitsnotebook.com/
- https://parcc-assessment.org/released-items/
- https://accuplacer.collegeboard.org/student/practice
- https://collegereadiness.collegeboard.org

Assessment and Learning:

- aleks.com
- Google Forms
- edulastic.com
- Google Classroom
- https://kahoot.com/explore/collections/math-kahoot-algebra/ (has all levels of math in the collections)

Strategies:

- https://mashupmath.com
- virtualnerd.com
- https://ies.ed.gov/ncee/wwc/docs/practiceguide/wwc_algebra_040715.pdf

## Assessment Evidence - Checking for Understanding (CFU)

Edulastic Formative Assessment (Formative(

Kahoots - Various Topics (Formative)

Glencoe McGraw-Hill EAssessment Test Generator (Summative)

Common benchmarks on OnCourse (Benchmark)

"Do Now/Exit Ticket" Activity (Formative)

- Admit Tickets
- Anticipation Guide
- Common Benchmarks
- Compare & Contrast
- Create a Multimedia Poster
- Define
- Describe
- Evaluate

- Evaluation rubrics
- Exit Tickets
- Explaining
- Illustration
- Journals
- KWL Chart
- Learning Center Activities
- Multimedia Reports
- Outline
- Question Stems
- Quickwrite
- Quizzes
- Red Light, Green Light
- Self- assessments
- Socratic Seminar
- Study Guide
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Top 10 List
- Unit review/Test prep
- Unit tests
- Web-Based Assessments

## Primary Resources & Materials

- https://www.nj.gov/education/cccs/2016/math/standards.pdf
- aleks.com
- edulastic.com
- njctl.org
- Glencoe McGraw-Hill Algebra 1 2014
- https://accuplacer.collegeboard.org/student/practice
- https://collegereadiness.collegeboard.org

## Ancillary Resources

- teacher-prepared worksheets, notes and slides
- ASVAB for Dummies
- CliffsTestPrep ASVAB

- collegeboard.org
- homeschoolmath.net
- Glencoe Math Accelerated 2017

## Technology Infusion

Create and assign exit tickets using Google Forms

Create and display slide presentations using Google Slides

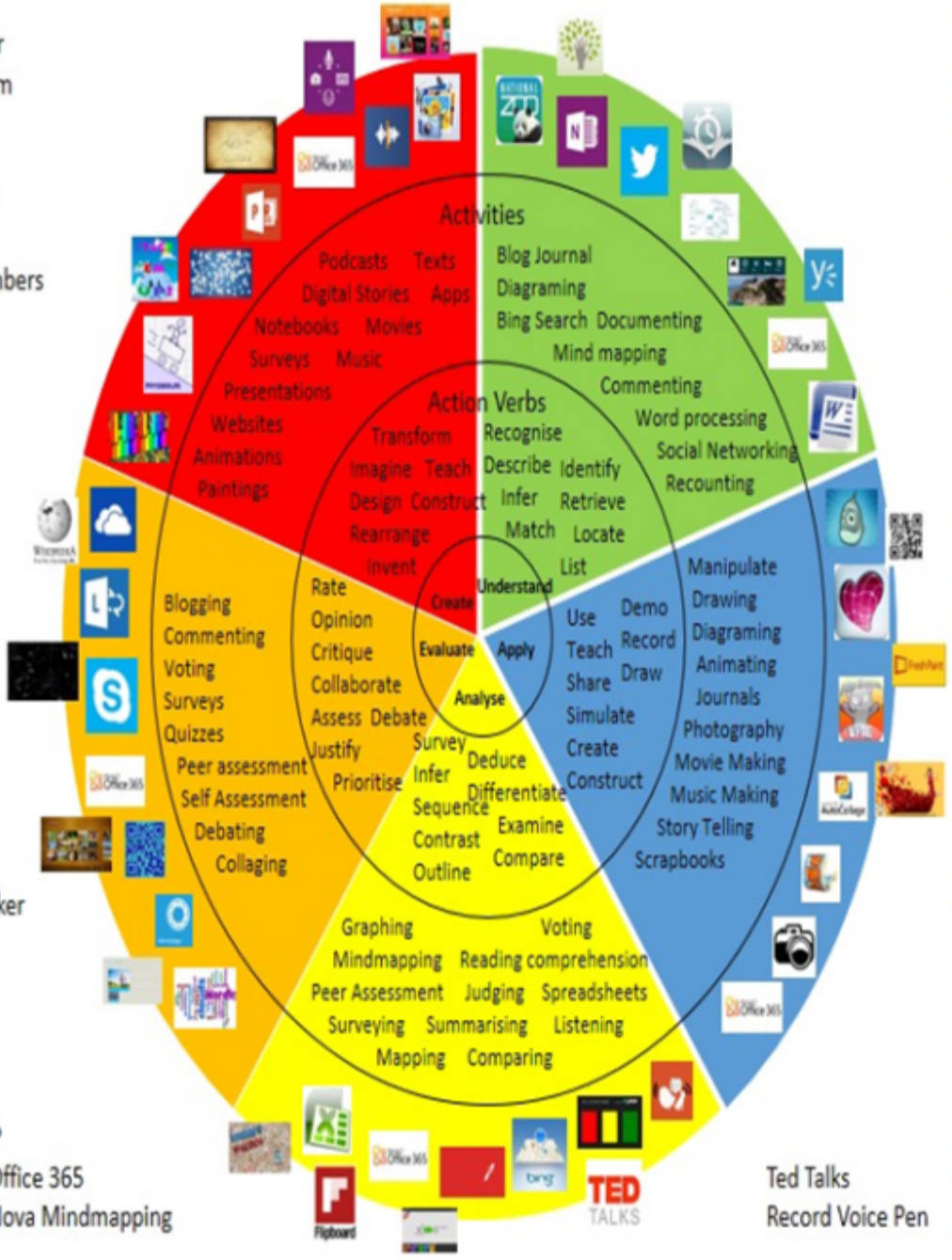
Practice solving equations using Geogebra: https://www.geogebra.org/m/nNQa6S9H (with sliders to change coefficients)

- Youtube
- Khan academy
- MS Word
- Google Slides
- Google Classroom
- Google Forms
- Edulastic
- ALEKS
- Desmos.com
- Geogebra.org
- Smart Exchange
- McGraw-Hill Education

# 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

| | |
|---|---|
| CRP.K-12.CRP2 | Apply appropriate academic and technical skills. |
| CRP.K-12.CRP4 | Communicate clearly and effectively and with reason. |
| 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.F.1 | Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs. |

## 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

- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness

## Differentiation

**GENERAL EXAMPLES INCLUDE:**

Use of Glencoe virtual manipulatives: http://www.glencoe.com/sites/common_assets/mathematics/ebook_assets/vmf/VMF-Interface.html
Study Guides provided prior to tests and quizzes
Use of ALEKS for differentiated practice or extension of skills

**Differentiations:**

- Small group instruction
- Small group assignments

- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Center-based instruction
- 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
- 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)

Flash cards for vocabulary and new concepts
One-on-one questioning during testing to elicit responses
Use of Glencoe personal tutor or The Video Math Tutor for additional instruction

- 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)

Use of multilingual mathematics glossary including definitions in English and its translations to other languages:
https://my.hrw.com/math06_07/nsmedia/tools/glossary/msm/glossary.html
Use of Spanish instructional videos of concepts:
https://www.youtube.com/user/KhanAcademyEspanol/videos
https://www.mathtv.com/
Peer partners for assignments with students that can verbally translate material and meanings of concepts

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarify
- 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 work presented 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

Printed or video copy of material missed during excessive absences
Retests or test corrections of incorrect work on tests
Working contract to ensure completion of prioritized tasks

- 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 work presented 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 and Chapter Projects

Complete higher level learning problems in textbook

Complete math league sample contest problems:

https://www.mathleague.com/index.php/annualcontestinformation/samplecontests

- 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 plan to solve an issue presented in the class or in a text
- 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: Solving 2-Step Equations Involving Like Terms & the Distributive Property

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

Interdisciplinary Connection: Science Application: Formulas are often derived by 2-step equations.

Statement of Objective: SWDT Solve all equations with variables on the same side.

Anticipatory Set/Do Now: Solve two-step equations involving multiplication.

Learning Activity: Practice at seats: Solving equations with variables on the same side - Like Terms & The Distributive Property., Assessment on Edulastic – Solve equations; Class Discussion as Summary.

Student Assessment/CFU's: questioning, observation checklist, explaining, compare & contrast

Materials: Edulastic (Chromebooks), Practice WS - Solving equations with variables on the same side - Like Terms & The Distributive Property

21st Century Themes and Skills: critical thinking, communication, information literacy

Differentiation: study guides, team work with peer tutoring, classroom discussions

Integration of Technology: use of Edulastic (Chromebooks)