Unit 2 Expressions and Equations

Content Area: **Mathematics**
Course(s): **Honors Pre-Algebra 7, CCSS Math 7**
Time Period: **November**
Length: **1 Marking Period**
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Unit Overview

In this unit students will translate verbal phrases into numerical equations; evaluate equations. They will add, subtract, multiply, and divide rational numbers when solving equations. They will also extend their knowledge of rational numbers to decimals and real world applications. Students will study how to use the Distributive Property to combine like terms in order to simplify algebraic expressions and equations, solve equations using properties of equality, and learn how to write and solve two-step equations. Students will expand their skill in solving equations to solving equations with variables on each side, solve equations involving grouing symbols, write and graph inequalities by using properties of inequality, use formulas to solve real-world problems such as finding the area and perimeter of shapes. This unit will also allow students to evaluate squares and radicals. They will explore how to simplify and approximate square roots to help solve expressions. The unit will also introduce different properties of exponents and solving equations using them. These skills will be necessary when solving problems involving Pythagorean Theorem or exponential notations.

Enduring Understandings

- Inequalities are used when solving for real life application problems.
- Previous understanding of operations of numbers can be directly applied to solving expressions and equations
- Sometimes there is more than one step to solving an equation.
- Squares and radicals affect the numbers that are being used within an operation.
- Squares and radicals can help solve real world problems.
- The different properties of exponents and solving equations using them.
- The rules for radicals can be applied to variable expressions.

Essential Questions

- How are equations solved?
- How are radicals and squares useful for solving equations and manipulating numbers?
- How can we use rational numbers to solve expressions and equations?
- How do radicals and squares help solve real world problems?
- How do you graph and inequality?
- How do you solve an algebraic equation with variables on both sides?
- What are the properties of inequalities?

- What happens when two side of an equation are not equal?
- What is the difference between rational and irrational numbers?
- Why are different properties of equations and how can they help solve them?

Student Learning Objectives (SLOs)

- Apply prior knowledge of rational numbers to help them solve equations.
- Evaluate the Area or Perimeter of a given figure
- Find squares and square roots of both rational and irrational numbers.
- Graph inequalities
- Identify like terms, constants, coefficients and terms
- Identify properties
- Simplify Algebraic Expressions
- Simplify perfect squares radial expressions as well as non-perfect square radicands.
- Solve multi-step equations involving different techniques.
- Solve real world problems using rational numbers.
- Solving equations by adding or subtracting
- Solving equations by multiplying and dividing
- Translate equations into a written form
- Translate inequalities into written form
- Understand the properties of exponents and will use them to solve equations with perfect square and cube roots.
- Use Properties to solve equations
- Use the Distributive Property
- use the perfect squares to approximate square roots.

Standards/Indicators

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.8.NS.A	Know that there are numbers that are not rational, and approximate them by rational numbers.
MA.K-12.2	Reason abstractly and quantitatively.
MA.8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2).
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.8.EE	Expressions and Equations
MA.8.EE.A	Work with radicals and integer exponents.
MA.K-12.4	Model with mathematics.
MA.8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.

MA.K-12.5	Use appropriate tools strategically.
MA.8.EE.A.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.7.NS	The Number System
MA.7.NS.A	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.7.NS.A.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
MA.8.EE.C.7	Solve linear equations in one variable.
MA.7.NS.A.1d	Apply properties of operations as strategies to add and subtract rational numbers.
MA.8.EE.C.7a	Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
MA.8.EE.C.7b	Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
MA.7.NS.A.2c	Apply properties of operations as strategies to multiply and divide rational numbers.
MA.7.EE	Expressions and Equations
MA.7.EE.A	Use properties of operations to generate equivalent expressions.
MA.7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
MA.7.EE.A.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
MA.7.EE.B	Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MA.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
MA.7.EE.B.4a	Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
MA.7.EE.B.4b	Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

Lesson Titles

- Inequalities
- Negative Exponents
- Perimeter and Area
- Powers and Exponents
- Simplifying Algebraic Expressions
- Solving Equations by adding or Subtracting
- Solving Equations by Multiplying or Dividing
- Solving Two Step Equations
- Squares and Square Roots
- The Distributive Property
- Writing Equations

Career Readiness, Life Literacies & Key Skills

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.

Inter-Disciplinary Connections

- History- current events
- LAL - Vocabulary
- LAL Word Wall
- Note Taking
- Sci - making predictions
- Science - balancing equations
- Tech - Web

Anticipatory Set

- Current Evens
- Display
- Mathematics History
- Relate to prior knowledge
- Videos

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK

- Analyze equations by finding terms, like terms, constants and coefficients
- Blooms #1 - Knowledge - Remember previously learned information
- Blooms #2 Comprehension - Demonstrate an understanding of facts.
- Blooms #3 Application - Apply knowledge to an actual situations
- Blooms #4 Analysis - Break down objects or ideas into simpler parts and find evidence to support generalizations.
- Blooms #5 Synthesis - Complete Component ideas into a new whole or prose alternative solutions.
- Blooms #6 Evalaution - Make and defend judgements based on internal evidence or external criteria
- Complete worksheets on graph inequalities
- complete worksheets on solving equations
- Introduction, notes and examples on Adding and subtracting equations
- Introduction, notes and examples on Distributive property
- Introduction, notes and examples on inequalities
- Introduction, notes and examples on multiplying and dividing equations
- Introduction, notes and examples on properties
- Introduction, notes and examples on simplifying expressions by finding terms, like terms, constants and coefficents
- Introduction, notes, and examples on negative exponents.
- Introduction, notes, and examples on powers and exponents.
- Introduction, notes, and examples on squares and square roots.
- Match game for like terms, constants and coefficients
- Note cards on combining like terms
- Practice simplifying algebraic expressions
- Review properties
- Show sample problems and give examples
- Students will view videos for further explanation
- Students will work in groups or with a partner
- Students will work independently
- Tutoring during Academic Enrichment

Modifications

ELL Modifications

Content specific vocabulary important for ELL students to understand include:

Expressions and Equations

Expression, equation, inverse, constant, coefficient, like terms, inequality, shading, distribute, number line.

Inequalities

Numerical expression, variable, algebraic expression, exponent, term, coefficient, constant, like terms, associative property, commutative property, identity property, distributive property, simplify, evaluate, inverse operation, solution, function, sequence, inequality

- Anticipate where needs will be
- Assign a peer to help keep student on task
- Break tests down in smaller increments
- Collaboration with ELL Teacher
- Graphic organizers
- Increase one-to-one time
- Modification plan
- Modifications & accommodations as listed in the student's IEP
- Modified or reduced assignments
- Personal handout for remembering inter rules (can be taped to desk)
- Position student near helping peer or have quick access to teacher
- Prioritize tasks
- Provide numbered lines for graphing inequalities
- Provide worked out examples on classwork and homework that students can use as a guide when working independently
- Reduce length of assignment for different mode of delivery
- Strategy groups
- Teacher conferences
- Think in concrete terms and provide hands-on-tasks
- Tutoring during Academic Enrichment
- Use a balance to show how equations are solved
- Use a balance to show how equations are solved
- Use algebra tiles to provide more hands on and visual representation of variables and expressions
- Use patterns that are easily discernible in function tables
- Working contract between you and student at risk

IEP & 504 Modifications

- Anticipate where needs will be
- Assign a peer to help keep student on task
- Break tests down in smaller increments
- Graphic organizer for remembering integer rules.
- Increase one-to-one time
- Modifications & accommodations as listed in the student's IEP
- Modified or reduced assignments
- Personal handout for remembering integer rules (can be taped to desk)
- Position student near helping peer or have quick access to teacher
- Prioritize tasks
- Provide example list of rational and irrational numbers
- Provide guided notes and step-by-step instructions on solving equations
- Provide numbered lines for graphing inequalities
- Provide personal handout for integer rules
- Provide worked out examples on classwork and homework that students can use as a guide when working independently
- Reduce length of assignment for different mode of delivery
- Think in concrete terms and provide hands-on-tasks
- Tutoring during Academic Enrichment
- Use a balance to show how equations are solved
- Use algebra tiles to provide more hands on and visual representation of variables and expressions
- Use patterns that are easily discernible in function tables
- Working contract between you and student at risk

G & T Modifications

- Finding function rules that are two step
- Multi-step equations containing only fractions
- Multi-step equations containing variables on both sides of the equal sign
- Tutoring during Academic Enrichment
- When completing the project have students try to come up with a word problem based around a multi-step equation
- Writing algebraic expressions with more than one operation
- Writing and solving two step equations
- Writing and solving two step equations Finding function rules that are two step
- Writing, solving, and graphing two step inequalities

Formative Assessment

- Choral Responses
- Constructive Responses
- Exit cards
- Guided Practice
- Mid Chapter Test - Inequalities
- Mid Chapter Test Expressions and Equations
- Quiz - Distributive Property
- Quiz - Solving Equations by adding or subtracting
- Quiz - Solving equations by Multiplying and Dividing
- Quiz - Solving Inequalities by adding and subtracting
- Quiz - Square roots
- Quiz - Two Step Equations
- Quiz - Writing equations
- Quiz on Area and Perimeter
- Rubric
- Self Assessments
- Teacher Observation
- Think - Pair - Share
- Thumbs-up for understanding
- Turn to your partner

Summative Assessment

- MPA 2
- Project
- Test on Expressions and Equations
- Test on Inequalities

Benchmark Assessment

- MPA 1
- MPA 2
- MPA 3
- MPA 4
- Skills-based assessment- math practice

Alternative assessments:

- Performance tasks
- Presentations
- Problem-based assignments
- Project-based assignments

Resources & Materials

- Calculators
- Chromebooks
- PMI practice questions online
- Senteo Response Questions
- Smartboard

Technology Standards

TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.8.A.2	Create a document (e.g., newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
TECH.8.1.8.A.CS1	Understand and use technology systems.
TECH.8.1.8.A.CS2	Select and use applications effectively and productively.
TECH.8.1.8.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.8.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.8.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.1.8.D.CS2	Demonstrate personal responsibility for lifelong learning.