Unit 2: Expressions, Equations, & Inequalities

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 2**
Length: **8-9 weeks**
Status: **Published**

Brief Summary of Unit

Introduction: The "Expressions, Equations, & Inequalities" unit aims to provide 7th-grade students with a thorough understanding of algebraic expressions, fundamental operations, and solving various types of equations and inequalities. This unit aims to build a strong foundation in algebra by introducing students to the concepts of writing, simplifying, adding, subtracting, and factoring expressions, as well as applying the distributive property. Students will learn to solve one-step, two-step, and multi-step equations and inequalities, write and graph inequalities, and apply these skills to real-world problems. This unit emphasizes both procedural fluency and conceptual understanding, ensuring that students not only know how to solve equations and inequalities but also understand why the methods work.

Revision Date: 5/30/24

Standards

Diversity and Inclusion: Students will focus on equity, inclusion, and tolerance when analyzing the comparison of various quantities regarding characteristics of people. Equality will also be highlighted which can be associated with both numerical representations and the connection between people. This can be associated with treating people fairly and equally.

MATH.K-12.1	Make sense of problems and persevere in solving them
MATH.K-12.2	Reason abstractly and quantitatively
MATH.K-12.3	Construct viable arguments and critique the reasoning of others
MATH.K-12.4	Model with mathematics
MATH.K-12.5	Use appropriate tools strategically
MATH.K-12.6	Attend to precision
ELA.L.VL.7.3	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, including technical meanings, choosing flexibly from a range of strategies.
MATH.K-12.7	Look for and make use of structure
MATH.K-12.8	Look for and express regularity in repeated reasoning
ELA.L.VI.7.4	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
MATH.7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

MATH.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.
MATH.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.
MATH.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.
MATH.7.EE.B.4.a	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 with accuracy and efficiency. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
MATH.7.EE.B.4.b	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.
SCI.MS-PS1-5	Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.
CS.K-12.3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
CS.K-12.3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
TEC.K-12.8.1	All students will use computer applications to gather and organize information and to solve problems.
TEC.K-12.8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world as they relate to the individual society, and the environment.

Essential Questions

- How can algebraic expressions be used to represent and solve real-world problems?
- How can equations and inequalities be used to model and solve real-world problems?
- How do the properties of equality and inequality help us understand and solve mathematical problems?
- How do the properties of operations (addition, subtraction, multiplication, and division) apply to algebraic expressions?
- What strategies and methods can be used to efficiently solve different types of equations and inequalities?
- What strategies can be employed to simplify and manipulate algebraic expressions efficiently?

Enduring Understandings

- An inequality has many solutions.
- An open circle means that the corresponding value is not a solution; a closed circle is part of the solution.

- Clearing equations of decimals and fractions is a useful method for solving equations.
- Commutative, Associative, and Distributive properties can be used to perform mental math when simplifying expressions.
- Equations can be solved using the Properties of Equality.
- Exponents are used to write multiplication expressions that have repeated factors.
- Formulas can be written as algebraic expressions that show relationships between quantities. When these expressions are evaluated, they get a value for the formula.
- In order to keep an equations balanced or “equal,” the same operations must be done to both sides.
- Inverse operations can be used to solve equations in the opposite order from the order of operations.
- One is the coefficient of a variable when no other coefficient is visible.
- Order of operations are rules for simplifying expressions and ensures that everyone gets the same answer.
- The direction of the inequality symbol must be reverse when multiplying or dividing by a negative number.
- The set of all solutions is called the solution set.
- The solution set of an equation or inequality can be shown by graphing on a number line.
- Words can be translated into algebraic expressions and algebraic expressions can be translated into words.

Students Will Know

- How to graph inequalities on a number line.
- How to translate verbal descriptions and real-world scenarios into mathematical equations and inequalities.
- How to translate verbal phrases into algebraic expressions and vice versa.
- The definition and components of algebraic expressions, including variables, coefficients, and constants.
- The definitions and components of equations and inequalities, including variables, constants, coefficients, and inequality symbols.
- The distributive property and its application in expanding and simplifying expressions.
- The principles of balancing equations and maintaining the equality/inequality relationship.
- The process of factoring expressions by identifying and extracting the greatest common factor (GCF).
- The rules for combining like terms to simplify expressions.
- The steps and strategies for solving one-step, two-step, and multi-step equations.
- The steps and strategies for solving one-step, two-step, and multi-step inequalities.

Students Will Be Skilled At

- Adding and subtracting linear expressions by combining like terms.
- Analyzing and solving word problems involving addition, subtraction, multiplication, and factoring of algebraic expressions.
- Applying the distributive property to expand expressions.

- Applying their understanding of equations and inequalities to solve complex word problems.
- Factoring algebraic expressions by identifying and extracting the GCF.
- Graphing the solutions of inequalities on a number line.
- Identifying and labeling the parts of algebraic expressions.
- Simplifying algebraic expressions using the distributive property and combining like terms.
- Solving one-step equations using addition, subtraction, multiplication, and division.
- Solving one-step inequalities using addition, subtraction, multiplication, and division.
- Solving real-world problems using algebraic expressions.
- Solving two-step and multi-step equations by combining operations and using the distributive property.
- Solving two-step and multi-step inequalities by combining operations and understanding the effects of multiplying or dividing by negative numbers.
- Writing algebraic expressions from verbal descriptions.
- Writing and graphing inequalities from verbal descriptions and real-life situations.
- Writing and solving equations from real-world scenarios.

Evidence/Performance Tasks

Assessments

- Formative: Daily assessments using examples from class notes, NJSLA test bank problems, and/or Albert/AP Classroom assessments
- Summative: Teacher-created assessments, NJSLA test bank problems, Big Ideas Math online platform problems, Albert/AP Classroom and/or Big Ideas Math unit assessments
- Benchmark: IXL or teacher created diagnostic assessments in addition to unit assessments from Big Ideas Math
- Alternative Assessments: Student-centered activities such as scavenger hunts, various projects involving real world applications, and differentiated learning tasks in Khan Academy, DeltaMath, and IXL

- Answer essential questions
- Class discussion of daily topic
- Classwork and homework that assess the essential questions
- Combine like terms in expressions with and without models
- Complete Grade 7 Unit 2 Model Curriculum Assessment
- Create an equation or inequality to represent a given "verbal story problem"
- Give words or phrases that can be used to express each operation: addition, subtraction, multiplication, division
- Given an equation or inequality, make up a "verbal story problem" that could be solved by using the four properties of equality or inequality

- Provide alternative means of assessments for certain students
- Solve word problems
- Teacher Observation
- Tests and quizzes that assess the essential questions
- Use balance algebra tiles to model algebraic expressions, then substitute values for the values for the variables and evaluate the expressions
- Use order of operations to correctly simplify a variety of expressions
- Written assignments that assess the essential questions that involves providing explanations

Learning Plan

Week 1&2: Algebraic Expressions and Operations

Day 1-2: Algebraic Expressions

- Introduction to Algebraic Expressions: Define algebraic expressions and discuss the components (variables, coefficients, constants).
- Identifying Parts of Expressions: Practice identifying and labeling parts of expressions.
- Writing Algebraic Expressions: Translate verbal phrases into algebraic expressions.
- Simplifying Expressions: Combine like terms and simplify expressions.
- Real-World Applications: Apply algebraic expressions to real-life scenarios, such as calculating the cost of multiple items or determining distances.

*Advanced Math 7 will incorporate more complex algebraic expressions including variables with many terms and exponents. (Math 7 will use these problems as challenge problems)

Day 3-4: Adding and Subtracting Linear Expressions

- Review of Linear Expressions: Recap the concept of linear expressions.
- Adding Linear Expressions: Practice adding linear expressions by combining like terms.
- Subtracting Linear Expressions: Practice subtracting linear expressions and simplify the results.
- Guided Practice: Step-by-step exercises on adding and subtracting linear expressions.
- Problem-Solving: Apply addition and subtraction of linear expressions to solve word problems and analyze real-life situations.

Day 5-6: Distributive Property

- Introduction to the Distributive Property: Define the distributive property and explain its use in algebra.
- Applying the Distributive Property: Practice expanding expressions using the distributive property (e.g., $a(b+c)=ab+ac$ and a(b+c)=ab+ac).

- Simplifying Expressions: Combine the distributive property with combining like terms to simplify expressions.
- Visual Models: Use area models to illustrate the distributive property.
- Problem-Solving: Solve word problems that require the application of the distributive property.

Day 7-8: Factoring Expressions

- Introduction to Factoring: Define factoring and explain its relationship to the distributive property.
- Factoring Out the Greatest Common Factor (GCF): Identify the GCF and factor it out from algebraic expressions.
- Practice Problems: Factor various expressions by identifying and extracting the GCF.
- Guided Practice: Step-by-step exercises on factoring expressions.
- Real-World Applications: Apply factoring to solve problems involving areas and perimeters, simplifying equations, and other practical scenarios.

*Advanced Math 7 will incorporate more problems that involve factoring out variables or fractions. (Math 7 will use these problems as challenge problems)

Week 3&4: Solving Equations

Day 9-10: Solving Equations Using Addition or Subtraction

- Introduction to Equations: Define equations and discuss the balance principle. Introduce inverse operations with virtual aids for “balancing the scale.”
- One-Step Equations: Practice solving equations using addition and subtraction.
- Guided Practice: Step-by-step exercises on solving one-step equations.
- Real-World Applications: Apply solving techniques to real-life scenarios.

Day 11-12: Solving Equations Using Multiplication or Division

- Review of Multiplication and Division: Recap basic operations.
- One-Step Equations: Practice solving equations using multiplication and division.
- Guided Practice: Step-by-step exercises on solving one-step equations.
- Real-World Applications: Solve real-life problems using multiplication and division.

Day 13-14: Solving Two-Step Equations

- Introduction to Two-Step Equations: Define and explain two-step equations. Students should

learn/understand the process of doing the reverse order of operations.

- Guided Practice: Step-by-step exercises on solving two-step equations.
- Combining Operations: Practice combining addition/subtraction with multiplication/division.
- Problem-Solving: Apply techniques to solve word problems involving two-step equations.

Week 5: Solving Multi-Step Equations

Day 15-16: Solving Multi-Step Equations

- Introduction to Multi-Step Equations: Define multi-step equations and the order of operations.
- Guided Practice: Step-by-step exercises on solving multi-step equations.
- Combining Like Terms and Distribution: Practice solving equations that require combining like terms and using the distributive property.
- Problem-Solving: Apply techniques to solve complex word problems.

*Advanced Math 7 may cover solving equations with variables on both sides of the equation if time permits.

Week 6&7: Solving Inequalities

Day 17-19: Writing and Graphing Inequalities

- Introduction to Inequalities: Define inequalities and discuss the inequality symbols.
- Writing Inequalities: Translate verbal descriptions into inequalities.
- Graphing on a Number Line: Practice graphing inequalities on a number line and identifying inequalities that match a given graph.
- Guided Practice: Step-by-step exercises on writing and graphing inequalities.
- Real-World Applications: Apply techniques to model real-life situations.

Day 20-21: Solving Inequalities Using Addition or Subtraction

- One-Step Inequalities: Practice solving inequalities using addition and subtraction.
- Guided Practice: Step-by-step exercises on solving one-step inequalities.
- Graphing Solutions: Practice graphing solutions of inequalities on a number line.
- Real-World Applications: Solve real-life problems using addition and subtraction.

Day 22-23: Solving Inequalities Using Multiplication or Division

- One-Step Inequalities: Practice solving inequalities using multiplication and division.

- Guided Practice: Step-by-step exercises on solving one-step inequalities.
- Special Cases: Discuss special cases such as multiplying or dividing by a negative number.
- Real-World Applications: Solve real-life problems using multiplication and division.

Day 24-26: Solving Two-Step Inequalities

- Introduction to Two-Step Inequalities: Define and explain two-step inequalities.
- Guided Practice: Step-by-step exercises on solving two-step inequalities.
- Combining Operations: Practice combining addition/subtraction with multiplication/division.
- Problem-Solving: Apply techniques to solve word problems involving two-step inequalities.

Week 8: Solving Multi-Step Inequalities

Day 27-28: Solving Multi-Step Inequalities

- Introduction to Multi-Step Inequalities: Define multi-step inequalities and the order of operations.
- Guided Practice: Step-by-step exercises on solving multi-step inequalities.
- Combining Like Terms and Distribution: Practice solving inequalities that require combining like terms and using the distributive property.
- Problem-Solving: Apply techniques to solve complex word problems.

Materials

Core instructional materials: Core Book List

Supplemental materials: Khan Academy, Edia, Delta Math, & iReady,

Additional Materials: Visual aids such as algebra tiles.

- Calculators/Math Tools
- District approved textbook
- Manipulatives
- Teacher created activiites
- Teacher created notes
- Websites, such as Khan Academy

Suggested Strategies for Modifications

Possible accommodations/modifications for Grade 7