Unit 2: Expressions, Equations, and Inequalities

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 6**
Length: **7 weeks**
Status: **Published**

Unit Overview

In this unit, students will learn the process of simplifying expressions and solving equations. The unit will begin with students learning how to simplify an expression using the distributive property. This will include utilizing the distributive property with all types of rational numbers. Next, students will be introduced to the concept of factoring. This will be presented to the students as "undoing" the distributive property. The next part of the unit will focus solely on expressions. Students will learn the different parts to an expressions followed by simplifying all types of expressions by combining like terms. During this part of the unit, students will learn how to set up expressions based on real world problems. The next half of the unit will be dedicated to students solving equations. Students will learn how to solve any type of equation ranging from a one-step up through a multi-step equation involving the distributive property. Students will then learn how to solve and graph inequalities. Students will see that the process for solving an inequality is the same as that for solving an equation. The culmination of this unit will have students solving real world problems involving the process of creating an equation or inequality to represent a given situation.

Standards

MA.7.NS.A.2a	Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
MA.7.NS.A.2c	Apply properties of operations as strategies to multiply and divide rational numbers.
MA.7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
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.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.

Essential Questions

- Why are equations and inequalities useful?
- Why is it important to have a strong foundation in the use of inverse operations?
- How can thinking algebraically help you approach real world problems?

Application of Knowledge: Students will know that...

- An equation is a mathematical sentence formed by placing an equal sign between two expressions
- An expression is a mathematical statement that does not contain an equal sign
- Factoring is the process of "undoing" the distributive property
- Inequalities are a mathematical statement created by placing an inequality statement (less than, greater than, etc) between two expressions
- Inverse operations are opposite operations that undo each other
- Like terms in an equation must be on the same side of the equal sign
- Like terms must have the same variable raised to the same power
- The "coefficients" of an expression are the numbers that appear before a variable
- The "constants" of an expression are the numbers that are by themselves (not attached to a variable)
- The "terms" of an expression are each individual part of an expression
- The area of a rectangle is obtained by multiplying numeric and variable expressions
- The parts to an algebraic expression are: terms, constants, coefficients, and like terms
- The perimeter of a geometric figure is obtained by adding numeric and variable expressions
- Using the Distributive Property allows you to multiply two addends by the same number: x(y +z)= xy +xz
- When solving a multi-step equation you must always distribute first (if necessary)

Application of Skills: Students will be able to...

- Apply the concept of "inverse" operations to solving mathematical equations
- Apply the concept of solving equations to geometric problems (area/perimeter)
- Determine the difference between expressions and equations
- Factor an algebraic expression by removing the greatest common factor
- Identify the different parts to an algebraic expression
- Solve and graph an inequality
- Use the distributive property to simplify algebraic expressions

Assessments

- Do Now's: Will be used to check for prior knowledge and to determine mastery of particular topics. If needed the teacher will remediate the previous lesson before continuing.
- Tickets to leave: Will be used to measure student understanding of the lesson and assist in determining whether remediation is needed for the topic.
- Communicator Practice: Will be used as a quick whole-class assessment tool to check for complete comprehension.
- Unit Quiz: focusing only on expressions and factoring
- Unit Test: focusing on expressions and equations
- Unit Quiz: focusing only on inequalities
- Word Problem Project: students will work cooperatively with a partner to create a real life word problem that can be modeled by a two-step equation. Students will write their final copy on poster paper and these will be posted around the room for students to solve.
- Information from this unit will be included on a locally developed, mid-year or end of year benchmark assessment that may take the form of a test, performance based project, or other summative assessment. From this unit, students will be asked to solve equations of varying difficulty and within other contexts (such as proportions, percentages, and geometry).

Suggested Activities

- Digits launch activities (Topics 7 - 9).
- Review games using communicators.
- Student centered SMART Board lessons: interactive word problem practice and notebook-like page with drag and reveal steps for solving multi-step equations.
- Real Life Word Problem: (from assessments).
- Clue "walk-around" activity to review the concepts from the unit: focus will be on solving equations/inequalities, simplifying expressions, geometric problems for expressions, and real world problem solving for equations and inequalities. Students will complete review problems that are posted around the room on topics from this unit. The theme of the gallery walk is based off of the board game "Clue". Each problem will rule out possibilities for the suspect, weapon, and location. Once all of the problems are completed correctly, students will be left with the suspect, weapon, and location for the fictional crime.
- "4 Square" communicator activity. Students are given a square with a problem to complete. Once all 4 "squares" from the group are completed, the group adds all 4 answers together and writes it in the center of the page. This is used only when solving equations in this unit.

Activities to Differentiate Instruction

Differentiation for special education:

- General modifications may include:
    - Modifications & accommodations as listed in the student's IEP
    - Assign a peer to help keep student on task

    - Modified or reduced assignments
    - Reduce length of assignment for different mode of delivery
    - Increase one-to-one time
    - Working contract between you and student at risk
    - Position student near helping peer or have quick access to teacher
    - Break tests down in smaller increments
- **Content specific modifications may include:**
    - Personal handout for remembering integer rules (can be taped to desk).
    - Graphic organizer for remembering integer rules.
    - Provide completed examples for practice work and homework.
    - Algebra tiles to assist students with the process of solving equations.

Differentiation for ELL's:

- General modifications may include:
    - Strategy groups
    - Teacher conferences
    - Graphic organizers
    - Modification plan
- **Content specific vocabulary important for ELL students to understand include:**
    - Expression, equation, inverse, constant, coefficient, like terms, inequality, shading, distribute, number line.

Differentiation to extend learning for gifted students may include:

- Multi-step equations containing variables on both sides of the equal sign.
- Multi-step equations containing only fractions.
- When completing the project have students try to come up with a word problem based around a multi-step equation.

Technology Integration

- iPads or Chromebooks as appropriate to the activity.
- Online learning components including use of the Digits digital textbook and resources.
- Teacher integration of the SMART board to facilitate active student engagement throughout the course of the lesson.
- Software or online programs that teachers may use to create students materials or generate problems such as Kuta software.
- Additional practice provided through the use of IXL.

Integrated/Cross-Disciplinary Instruction

ELA: Practice formulating complete and grammatically correct responses to open-ended questions.

Economics: Show students the concept of equations in the form of word problems. Present varying types of questions in which students must figure out how much money they will have after a given period of time or how much they will have to sell in order to make a profit.

Resources

Digits teacher materials and support: www.pearsonrealize.com

Digits student access and support: www.mymathuniverse.com

IXL practice: www.ixl.com

SMART Board lessons

Kuta software generated worksheets

21st Century Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP6	Demonstrate creativity and innovation.