Unit 2: Equations and Expressions

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 5**
Length: **4 weeks**
Status: **Published**

Unit Overview

Students will begin this unit by simplifying expressions by combining like terms. Students will also be responsible for utilizing the distributive property and then simplifying the remaining expression. From there, students will be exposed to equations. Students will do everything from solving two-step equations to solving multi-step equations containing variables on both sides. Students will also be exposed to the "special cases" of no solution and all real numbers. Once students are comfortable with solving equations, students will learn how to set up an equation based upon a word problem. Students will then apply this concept of equations to solving "real world" examples. Finally, students will be able to solve equations containing rational coefficients and constants.

Standards

MA.8.EE.C.7	Solve linear equations in one variable.
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.

Essential Questions

- How can we relate the integer rules to the process of solving linear equations?
- Why is it important to follow specific steps to arrive at a solution to an equation?
- How can we determine by looking at an equation that there is no solution? Infinite solutions?
- How can we construct equations in order to solve real world problems?

Application of Knowledge: Students will know that...

- a simplified expression contains no like terms.
- an equation with infinite solutions (all real numbers) will have equal expressions on each side of the equation.
- an equation with no solution will have equal variable terms and unequal constant terms on each side

of the equation.

- clearing the denominator consists of finding a common multiple of all the denominators of the fractions and multiplying each term by that number.
- in order to solve equations, one must use inverse (opposite) operations.
- key words such as "each", "every", and "per" help identify the coefficient when writing an equation to represent a real-life situation.
- like terms are terms that have the same variable(s) raised to the same power.
- the distributive property states that each term in a set of parentheses can be multiplied by a factor outside of the parentheses.
- there are five steps to solve multi-step equations: utilize the distributive property if necessary, combine like terms, get the variable on one side of the equation, get the constant on one side of the equation, and multiply or divide to get the variable by itself.

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

- apply their knowledge of the order of operations and check their solution to a linear equation.
- simplify expressions by combining like terms.
- simplify expressions by utilizing the distributive property.
- solve and identify when an equation has no solutions or an infinite number of solutions.
- solve one-variable equations by utilizing inverse operations.
- solve one-variable equations containing rational numbers by clearing the denominators.
- write and solve one-variable equations to represent real-world situations.
- write expressions for the area and perimeter of figures by combining like terms.

Assessments

- Do-Nows: These daily assessments will be used to check for prior knowledge and to determine mastery of particular topics. If needed, remediation will be completed on an as needed basis.
- Communicator practice: This will be used as a quick whole-class assessment tool to check for complete comprehension.
- Exit Tickets: These will be used to measure student understanding of the lesson and assist in determining whether remediation is needed for the topic.
- Word Problem Gallery Walk: An activity that can be used as a formative assessment (see description in activity section).
- Practice using IXL
- Mid-Unit Quiz
- Unit Test
- 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.

Suggested Activities

- Grade 8 Digits Topic 2 Launches
- Student-centered SMART Board lessons: including interactive balance scale for solving equations, utilizing various highlighters and colors when identifying like terms, and using highlighters when identifying key words when writing equations for word problems
- Review games using Communicators
- Four Corners Equations: Students will work in groups of four students and complete this teacher-generated activity. Each group will receive a paper divided into four sections with a oval in the center. Each of the four sections has an equation in it that one student will solve. After all four students have solved their equations, they will add their solutions together and put the answer in the center circle.
- Word Problem Gallery Walk: Students will work in partners in creating a word problem that can be solved be solving a one-variable equation. They will write their problem on a piece of construction paper or poster board. Then they will write the equation and solution to their problem on the back of their poster. Each group's poster will be hung up around the room. During a future class, students will complete a gallery walk using the word problems created by their peers. They will rotate around the room and complete each problem. This can be used as a formative assessment.
- Clue Review Activity (Gallery Walk): Students will complete review problems that are posted around the room on topics from this unit including simplifying expressions, solving equations, solving problems involving perimeter, and solving word problems. 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.

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
    - Prioritize tasks
    - Think in concrete terms and provide hands-on-tasks
    - Position student near helping peer or have quick access to teacher
    - Anticipate where needs will be
    - Break tests down in smaller increments

- Content specific modifications may include:
    - Provide personal handout for integer rules
    - Draw a large vertical line through the equal sign in a multi-step equation to represent a"wall" that students must use inverse operations in order to move a term to the other side of the "wall"
    - Create and provide list of key vocabulary words to assist in creating expressions and equations
    - Provide completed problems for practice work and homework

Differentiation for ELL's:

- General modifications may include:
  - Strategy groups
  - Teacher conferences
  - Graphic organizers
  - Modification plan
  - Collaboration with ELL Teacher

- Content specific vocabulary important for ELL students to understand include: expression, equation, coefficient, constant, inverse, opposite, combine, distribute, solution, infinite, each, every, per, altogether, fractions, numerator, denominator, least common denominator (LCD), cross simplify

Differentiation to extend learning for gifted students may include:

- Simplify expressions containing multiple sets of parentheses
- Write equations for word problems that require variables to be on both sides of the equal sign
- Solve multi-step equations containing rational numbers
- Solve equations containing decimals

Technology Integration

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 would have after a given period of time or how much they would have to sell in order to make a profit.

Resources

- Digits student access and support: www.MyMathUniverse.com
- Digits teacher materials and support: www.pearsonrealize.com
- IXL: www.ixl.com
- SMART Exchange: http://exchange.smarttech.com/index.html#tab=0
- SMART Board lessons
- Online "scale balance" to help students visualize that equations need to be balanced at all times
- Punchline/Pizzazz worksheets (self-correcting)

- Kuta software generated worksheets

21st Century Skills

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.