Unit 3 - Expressions, Equations, and Inequalities

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

Unit Summary

In this unit, students will use properties to determine equivalent expressions and balance equations. Students will be able to manipulate expressions. Students will evaluate and/or solve real-life and mathematical problems using expressions and equations, and will use rational numbers, rounding, and estimation when appropriate. Students solve one- and two-step equations and inequalities with rational numbers including negatives. Students will determine the value of variables in equations, use properties and combining like terms to simplify expressions, and determine possible values to solve and graph inequalities. Students will expand, factor, add and subtract expressions. Throughout the unit, students encounter word problems and real-world situations, covering the full range of rational numbers, that can be modeled and solved using equations and inequalities. As they work with equations and inequalities, they build on their abilities to abstract information with symbols and to interpret those symbols in context. Students practice solving equations throughout the unit, ensuring they are working towards fluency which is an expectation in 7th grade.

Standards

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.8.EE.C	Analyze and solve linear equations and pairs of simultaneous linear equations.
MA.8.EE.C.7	Solve linear equations in one variable.
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.
MA.6.EE.A	Apply and extend previous understandings of arithmetic to algebraic expressions.
MA.6.EE.A.2	Write, read, and evaluate expressions in which letters stand for numbers.
MA.6.EE.A.3	Apply the properties of operations to generate equivalent expressions.
MA.6.EE.A.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
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.D.CS2	Demonstrate personal responsibility for lifelong learning.

Student Learning Objectives

- Students will learn to complete short constructed response questions involving real life and mathematical problems.
- Students will learn to solve one step equations by adding, subtracting, multiplying, and/or dividing, (including with integers, decimals, fractions).
- Students will learn to classify a number as natural.
- Students will learn to identify and simplify expressions by combining like terms.
- Students will learn to solve one step equations using decimal operations.
- Students will learn to solve equations with a negative variable.
- Students will learn to solve multi-step equations.
- Students will learn to solve equations based on real life situations.
- Students will learn to rewrite and evaluate expressions using distributive property.
- Students will learn to solve multi-step equations involving integers, fractions, decimals, negative variables, etc.
- Students will learn to identify properties such as commutative, associative, additive identity, multiplicative identity, multiplicative property of zero, multiplicative inverse, zero product property.
- Students will learn to use inequality symbols to write inequalities.
- Students will learn to solve and graph basic inequalities.

Essential Questions

- How do inverse operations help us to solve equations?
- How is solving an inequality the same as solving an equation? How is it different?
- Why is it useful to represent real-life situations algebraically?

Enduring Understandings

- Students will understand that equations can be used to represent situations and solve real-world problems.
- Students will understand that equations must be balanced by performing inverse operations to both sides of the equation.

Application

- Students will be able to independently use their learning to solve an equation through balance, which means that any action taken on one side of the equation must also occur on the other side.
- Students will be able to independently use their learning to graph an inequality on a number line using an open dot to show that the specific number is not included and a closed dot to show it is included.
- Students will be able to independently use their learning to multiply or divide by a negative number when solving an inequality necessitates reversing the inequality sign.
- Students will be able to independently use their learning to use variables as symbols that take the place of numbers or ranges of numbers. They have different meanings depending on how they are being used.
- Students will be able to independently use their learning to properly use mathematical vocabulary such as evaluate, solve, simplify, variable, expression, linear expression, equation, inequality, like terms, and key words for translating words into operations.

Skills

Students will be skilled at:

- Solving one-step equations by adding, subtracting, multiplying, and dividing.
- Identifying, simplifying, and evaluating expressions and equations with like terms using whole numbers, fractions, and decimals.
- Writiing, evaluating, and simplifying algebraic expressions.
- Assessing the reasonableness of answers (use estimation and substitution strategies).
- Graphing and writing inequalities.
- Solving one and multi-step inequalities.
- Utilizing formulas to solve problems, including real life word problems.
- Utilizing properties, including commutative, associative, distributive, and identity properties to evaluate expressions or solve equations/inequalities.
- Utilizing the distributive property to combine like terms to simplify an expression/equation.
- Solving multi-step equations (variables on both sides, proportions, fractional equations, distributive property).
- Solving equations or give examples where there is one solution (x = 3), infinitely many solutions (x = x) - identity, or no solutions (5 = 2).
- Utilizing equations and inequalities to solve real life word problems (define variables, use inverse operations to solve).