South Amherst Middle School Grade 7 Mathematics

Unit 4: Expressions & Equations

Time: Approximate time frame 6-8 weeks

Standard(s):

Use properties of operations to generate equivalent expressions

7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

7.EE.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. For example, a +0.05a = 1.05a means that "increase by 5% is the same as multiply by 1.05."

7.EE.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. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50 for a new salary of $27.50. If you want to place a towel bar 9 ¾ inches long in the center of a door that is 27 ½ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

7.EE.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.

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 fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example,the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

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. For example, As a

salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.

Big Ideas: *Students will understand that …*

- Variables can be used to represent numbers in any type of mathematical problem.
- Understand the difference between an expression and an equation.
- Expressions you simplify and equations you solve for the variable's value.
- Write and solve multi-step equations including all rational numbers.
- Some equations may have more than one solution and understand inequalities.
- Properties of operations allow us to add, subtract, factor, and expand linear expressions.
- Expressions can be manipulated to suit a particular purpose to solve problems efficiently.
- Mathematical expressions, equations, inequalities and graphs are used to represent and solve real-world and mathematical problems.
- Properties, order of operations, and inverse operations are used to simplify expressions and solve equations efficiently.

Essential Questions:

- When and how are expressions, equations, inequalities and graphs applied to real world situations?
- How can the order of operations be applied to evaluating expressions, and solving from one-step to multi-step equations?
- When and how are expressions, equations, inequalities and graphs applied to real world situations?
- What are some possible real-life situations to which there may be more than one solution?
- How does the ongoing use of fractions and decimals apply to real-life situations?

Prerequisite Skills:

Students should already be able to:

• Apply and extend previous understandings of arithmetic to algebraic expressions. (6.EE.1-4)

• Add, subtract multiply and divide positive and negative numbers.(7.NS.1-2)

• Computation with all positive and negative rational numbers(7.NS.1-2)

• Solve real-world and mathematical problems with rationalnumbers (7.NS.3)

• Apply properties of operations to add, subtract, factor and expandlinear expressions (7.EE.1)

Skills: Students will be able to …

• Use Commutative, Associative, Distributive, Identity, and Inverse Properties toadd and subtract linear expressions with rational coefficients. (7.EE.1)
• Use Commutative, Associative, Distributive, Identity, and Inverse Properties tofactor and expand linear expressions with rational coefficients. (7.EE.1)
• Rewrite an expression in a different form. (7.EE.2)
• Choose the form of an expression that works best to solve a problem. (7.EE.2)
• Explain your reasoning for the choice of expression used to solve a problem.
(7.EE.2)
• Use commutative, associative, distributive, identity, and inverse properties tocalculate with numbers in any form (whole numbers, fractions and decimals).(7.EE.3)
• Convert between rational number forms (whole numbers, fractions anddecimals) to solve problems as appropriate. (7.EE.3)

• Solve multi-step mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. (7.EE.3)
• Solve multi-step real-life problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. (7.EE.3)
• Use mental computation and estimation strategies to assess the reasonableness of the answer. (7.EE.3)
• Translate words or real-life situations into variable equations. (7.EE.4)
• Translate words or real-life situations into variable inequalities. (7.EE.4)
• Solve one- or two-step equations with rational numbers fluently. (7.EE.4)
• Solve word problems leading to one- or two-step equations with rational numbers. (7.EE.4)
• Construct simple equations and inequalities with rational numbers to solve problems. (7.EE.4)
• Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. (7.EE.4)
• Solve word problems leading to one- or two-step inequalities with rational numbers. (7.EE.4)
• Graph the solution set of inequalities and interpret it in the context of the problem. (7.EE.4)

Vocabulary: Distributive Property, Commutative Property, Associative Property, Multiplicative Property of Zero, Variable, Numerical expression, Algebraic expression, Term, Coefficient, Constant, Equation, Inequality, Algebra, Property, Order of operations, Evaluate, Simplest form, Linear, Coefficient, Factored form, Combining like terms, Inverse operation, Rate of change, Evaluate, Expression, Equivalent, Rational number, Commutative property, Associative property, Distributive property, Identity properties, Expanded form, Equation, Inequality, Term

Resources:

Textbook, ODE, Online Programs, Collaboration with Colleagues

Assessments:

- **Formative:** Exit cards, bell ringers, homework practice, observations, in-class practice, student self-reflection.
- **Summative:** Assessments, Quizzes, Projects