Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Mathematics	Course:	Intermediate PreAlgebra	Unit 4 Title:	Order of Operations, Expressions, and Equations	Grade Level(s):	7
Assessed Trimester:	Trimester 2	Pacing:	15-20 Days	Date Created:	5/31/2014	Last Revision Date:	6/18/2014

Course Understandings: *Students will understand that:*

A. There are multiple strategies and representations that can be used to solve real world problems involving rational numbers.

G. There are appropriate uses for various technologies and that limitations may exist with them.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals

Minnesota State/Local/Technology Standard(s) addressed (2007):

- **Standard (7.1.2.#):** Calculate with positive and negative rational numbers, and rational numbers with whole number exponents, to solve real-world and mathematical problems.
  Benchmark:
  7.1.2.4 Solve Problems with Rational Numbers Including Positive Integer Exponents. Solve problems in various contexts involving calculations with positive and negative rational numbers and positive integer exponents, including computing simple and compound interest.

- **Standard (7.2.2.#):** Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions, symbols and graphs; solve problems involving proportional relationships and explain results in the original context.
  Benchmark:
  7.2.2.4 Represent real-world or mathematical situations using equations and inequalities involving variables and positive and negative rational numbers.

- **Standard (7.2.3.#):** Apply understanding of order of operations and algebraic properties to generate equivalent numerical and algebraic expressions containing positive and negative rational numbers and grouping symbols; evaluate such expressions.
  Benchmark:
  7.2.3.1 Use properties of algebra to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents. Properties of algebra include associative, commutative and distributive laws.
  7.2.3.2 Evaluate algebraic expressions containing rational numbers and whole number exponents at specified values of their variables.
  7.2.3.3 Apply understanding of order of operations and grouping symbols when using calculators and other technologies.

- **Standard (7.2.4.#):** Represent real-world and mathematical situations using equations with variables. Solve equations symbolically, using the properties of equality. Also solve equations graphically and numerically. Interpret solutions in the original context.
  Benchmark:
  7.2.4.1 Represent relationships in various contexts with equations involving variables and positive and negative rational numbers. Use the properties of equality to solve for the value of a variable. Interpret the solution in the original context.

Transfer

Students will be able to independently use their learning to: (product, high order reasoning)

- Understand how using a procedure can lead you to an accurate solution.

Meaning

Unit Understanding(s):	Essential Question(s):
Students will understand that: ● there are standard mathematical procedures. ● a different procedure is used when solving equations and evaluating expressions. ● the equal sign means that the two expressions are the same. ● algebraic expressions can be simplified ● mathematical formulas represent real-world situations.	**Students will keep considering:** ● How does changing the order of operations affect the outcome when simplifying an expression? ● What is the correct order for performing mathematical operations? ● What is the difference between solving an equation and evaluating an expression? ● How can solving equations be useful in real life? ● When solving equations, what type of operations must you use to get the variable alone on one side of the equal sign? ● How do you know for sure that an equation is "solved"? ● How do you know when an expression is simplified?

Acquisition

Knowledge - Students will:	Skills - Students will:
● Recognize exponents and bases. ● Read and understand inequality symbols (<, >, ≤, ≥, =). ● Understand how exponents fit in the order of operations ● Recognize that the unknown is the variable ● Understand associative, commutative, and distributive laws of algebra ● Knows properties of equality and how to use it. ● Define and understand simple and compound interest. ● Understand that algebraic expressions can be simplified ● Understand how to evaluate algebraic expressions and equations with positive and negative rational numbers. ● Understand how to translate between verbal expressions and algebraic expressions and equations	● Demonstrates property of equality when solving an algebraic equation. ● Evaluate algebraic expressions and equations. ● Demonstrate the use of simple and compound interest in real-world applications ● Demonstrate the use of formulas and expressions in real-world situations ● Construct an equation or inequality based on a real-world application ● Simplify an algebraic expression ● Carry out “the plan” (follow order of operations) and use computational skills to evaluate algebraic expressions with rational numbers and expressions ● Given a real-world situation, be able to write, solve, and interpret the solution of an algebraic equation. ● Translate key words to algebraic symbols ● Use real-world problems to model inverse relationships with addition and subtraction. ● Combine like terms ● Generate equivalent algebraic expressions containing rational numbers, grouping symbols and whole number exponents.
Reasoning - Students will: ● Explain how the property of equality is used to solve equations. ● Explain how inverse operations affect negative rational numbers. ● Compare and contrast simple and compound interest. ● Identify associative, commutative and distributive laws of algebra ● Sort like-terms in order to combine ● Estimate a reasonable answer given the real-world situation ● Justify the translating of key words to algebraic symbols. ● Identify and plan the order in which to solve a problem.	

Common Misunderstandings	Essential new vocabulary
● Students compute all addition before subtraction and/or all multiplication before division (when following order of operations). ● Students sometimes use the operation that appears in an equation rather than using the inverse operation. For example, a student may try to solve $x - 3 = 9$ and get $x = 6$, which is incorrect. Have students practice naming the operation in the equation first and then identifying the inverse operation. ● When solving equations with multiplication or division some students might multiply or divide by the opposite of the number. Remind them to multiply or divide by the *same* number. For these equations, the opposite operation is used, so the number stays the same. ● Students may forget to write percent as a decimal before using it in the simple interest formula.	● Compound Interest ● Simple Interest ● Substitute

• Students may confuse how to write variables in their equations. *For example,* if they want to represent $5 per cap, some may write 5pc (5 per cap), which could be read as "5 x p x c." • Students get confused with the difference between simple and compound interest. • Students often forget to verify that their answer makes sense in the original context of the problem. • When translating words into mathematical symbols, "less than" sometimes causes confusion because "less than" construction is essentially backwards. *For example,* "3 less than x" could be read as "x - 3" and students are tempted to write "3-x." • Students may not completely distribute a number through a whole problem. *For example,* in the problem 4(3 + x), students simplify it to 4(3) + x, forgetting to multiply the 4 by the x. • Students may not recognize brackets as a form of parentheses. • Up to this point, many problems students have encountered have had integers for answers, so students will think they have the incorrect answer if they produce a non-integer answer. • Students sometimes do not understand how to input exponents into a calculator. • Students sometimes fail to realize that the distributive property needs to be applied in situations where the multiplying number is written after the parenthesis, such as (2x - 3)5. • The students may think that they need one single numerical value when simplifying expressions.	