Unit A - *Tools of the Trade*

Overview

This first unit gives students the essential tools they will use throughout their work in math and science including:

- extending the number system to include integers
- the concept of a variable and how it can be manipulated
- solving algebraic equations and inequalities and giving a clear argument to justify a solution.

During this unit, students will review working with fractions and decimals so they are ready to work with rational numbers that include negatives in Unit B.

21st Century Capacities: Product Creation and Analyzing

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS

MP2 Reason abstractly and quantitatively
MP3 Construct viable arguments and critique the reasoning of others
MP4 Model with Mathematics
MP6 Attend to precision
MP7 Look for and make use of structure

7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
7.NS.1a. Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.
7.NS.1b. Understand p + q as the number located a

Transfer:

Students will be able to independently use their learning in new situations to...

1. Present a solution that is supported by an argument that is clear to the audience (product creation)
2. Manipulate equations/expressions or objects to create order and establish relationships.

Meaning:

UNDERSTANDINGS: *Students will understand that:*

1. Mathematicians represent and analyze mathematical situations and structures using algebraic symbols.
2. Mathematicians examine mathematical relationships to discern a pattern or structure.
3. Mathematicians compare the effectiveness of two arguments, and—if

ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:*

A. How do I decide if my answer makes sense, and if not, what do I do?
B. How is thinking algebraically different from thinking arithmetically?
C. What symbols are used to represent the world we live in?
D. What strategies do mathematicians use when solving problems to ensure

distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. **7.NS.1c**. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. **7.NS.1d**. Apply properties of operations as strategies to add and subtract rational numbers. **8.NS.2** Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions **8.EE.2** Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. **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." **8.EE.7b.** Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	there is a flaw in an argument—explain what it is.	consistent answers? E. What is another efficient way that this problem could be solved?
	Acquisition:	
	Students will know… 1. That there is a specific order in which an expression must be simplified 2. That there are various forms of grouping symbols (absolute value bars, fraction bars) 3. Distance is measured as an absolute value 4. The difference between solving an equation and simplifying an expression. 5. Equations remained balanced by using inverse operations 6. That when both sides of an inequality are multiplied or divided by a negative number, the inequality sign must be flipped 7. Vocabulary: origin, quadrant, equality, inequality, coordinates, variable, expression, term, coefficient, constant, absolute value, integer, opposites, inverse, like terms, unlike terms, distribute, literal equations, square root, perfect square, exponents, cube root, power, base	*Students will be skilled at…* 1. Using the order of operations and properties of numbers to simplify expressions 2. Simplifying expressions with absolute values 3. Translating words to algebraic expressions, equations and inequalities and visa versa 4. Applying mathematical properties to solve equations 5. Plotting points including non-integers on the coordinate plane 6. Applying all four operations with integers. 7. Simplify expressions with like and unlike terms with and without distribution 8. Solving one and two step equations 9. In formulas, solve for unknown variable when given all other missing information 10. Writing equations to model a situation 11. Solving literal equations 12. Recognizing, solving and graphing inequalities 13. Solving simple equations with x^2 and x^3 14. Estimating square roots and placing them on a number line