Unit 1 - *"From Concrete to Abstract":* Expressions and Equations, Integers

Overview

In this unit students apply and extend previous understandings of arithmetic to algebraic expressions, equations and inequalities. They will model using algebraic equations and inequalities and solve simple one step algebraic equations. They will represent and analyze quantitative relationships between dependent and independent variables. Finally, they will apply and extend previous understandings of numbers to integers to order to compare and order and gain insight into the magnitude of an integer. Students will use integers to work within all four quadrants of the coordinate plane.

21st Century Capacities: Analyzing

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS

MP 1 Make sense of problems and persevere in solving them
MP2 Reason abstractly and quantitatively
MP4 Model with Mathematics
MP7 Look for and make use of structure

CC.6.EE.1 Write and evaluate numerical expressions involving whole number exponents.
CC.6.EE.2 Write, read, and evaluate expressions in which letters stand for numbers.
CC.6.EE.2a Write expressions that record operations with numbers and with letters standing for numbers, For example, express the calculation "Subtract y from 5" as 5 - y.
CC.6.EE.2b Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2(8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.
CC.6.EE.2c Evaluate expressions by substituting values for their variables. Include expressions that arise from formulas in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in

Transfer:

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

1. Solve real world problems using algebraic equations, expressions or integers. (Analyzing)
2. Demonstrate fluency with the magnitude of integers.

Meaning:

UNDERSTANDINGS: *Students will understand that:*

1. Mathematicians represent and analyze mathematical situations and structures using algebraic symbols to communicate thinking.
2. Effective problem solvers work to make sense of the problem before trying to solve it.

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

A. How is math like a foreign language?
B. How can this be expressed in a different way?
C. How can an equation/inequality tell a story?
D. Why do we have negative numbers?
E. Why is thinking algebraically important?

the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s^3 and A = 6 s^2 to find the volume and surface area of a cube with sides of length s = 1/2. CC.6.EE.3 Apply the properties of operations as strategies to generate equivalent expressions. For example, apply the distributive property to the expression 3(2 + x) to produce the equivalent expression 6 + 3x; apply properties of operations to y + y + y to produce the equivalent expression 3y. CC.6.EE.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). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for. CC.6.EE.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. CC.6.EE.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. CC.6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers. CC.6.EE.8 Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams. CC.6.EE.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time. CC.6.NS.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, debits/credits, positive/negative electric charge); use positive and negative numbers to	***Acquisition:***	
	Students will know… 1. the difference between an equation / inequality and an expression. 2. variables represent unknown numbers in expressions and equations. 3. that inequalities have many solutions 4. that the solution(s) of an equation are the value(s) of the variable(s) that make the equation true. 5. which is the dependent and independent variable in an equation 6. the difference between a positive number, a negative number, and zero 7. that the absolute value of a number is its distance from zero 8. the opposite of a number is on the other side of zero on the number line 9. Vocabulary- expression, equation, variable, dependent variable, constant, independent variable, solution, substitution, greater than, less than, inequality, sum, difference, term, product, factor, quotient, coefficient, absolute value	*Students will be skilled at…* 10. using variables to write expressions for real-world situations 11. using substitution to solve equations or inequalities. 12. creating and solving equations that are based on real world situations 13. writing an inequality in the form x>c or x<c 14. using variables to represent two quantities in a real-world problem 15. analyzing the relationship between dependent and independent variables 16. manipulating the form of the equation to solve the problem (i.e. inverse operation) 17. using multiple strategies to solve equations/inequalities. 18. placing integers on a number line 19. comparing and ordering integers

represent quantities in real-world contexts, explaining the meaning of 0 in each situation. CC.6.NS.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. CC.6.NS.6a Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. CC.6.NS.6b Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. CC.6.NS.6c Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. CC.6.NS.7 Understand the ordering and the absolute value of rational numbers. CC.6.NS.7a Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right. CC.6.NS.7b Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write –3 degrees C > –7 degrees C to express the fact that –3 degrees C is warmer than –7 degrees C. CC.6.NS.7c Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars. CC.6.NS.7d Distinguish comparisons of absolute value from statements about order. CC.6.NS.8 Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.		