Unit B - *Equations*

Overview

This unit is a very important foundation for later math. Students learn how to solve equations and inequalities. It is important for them to be able to justify their solution both to check their reasoning and to allow others to understand their argument. Students will learn how to model using algebraic equations and inequalities. At this point, the problems students are working with can often be solved with arithmetic. Students should be encouraged to build on that understanding to create an algebraic model.

It is helpful to provide students with model examples of each equation type that they can refer back to and match with the particular problem they are given. Listing steps for each equation type and allowing students access to these steps also helps students when solving more complex equations.

21st Century Capacities: Product Creation, Synthesizing

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS

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

Know that there are numbers that are not rational, and approximate them by rational numbers.
CC.8.NS.1 Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.
CC.8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line

Transfer:

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

1. Model relationships among quantities. (Synthesizing)
2. Justify reasoning using clear and appropriate mathematical language. (Product Creation)

Meaning:

UNDERSTANDINGS: *Students will understand that:*

1. Mathematicians support their answer with an argument that is clear to others.
2. Mathematicians model situations with equations and inequalities.
3. Mathematicians use the process of undoing the operations when obtaining a solution to an equation, no matter how complex.

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

A. How can equations and inequalities model situations?
B. How many solutions are there to this problem?
C. What do I need to support my answer?
D. What does the solution tell me?
E. How do I decide if my answer makes sense, and if not, what do I do?

diagram, and estimate the value of expressions (e.g., $\pi 2$). For example, by truncating the decimal expansion of $\sqrt{2}$ (square root of 2), show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations. **CC.8.EE** Work with radicals and integer exponents. **CC.8.EE.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.* **CC.8.EE.2** Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational. **CC.8.EE.7** Solve linear equations in one variable. **CC.8.EE.7a** Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form *x = a*, *a = a*, or *a = b* results (where *a* and *b* are different numbers). **CC.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.	***Acquisition:***	
	Students will know… 1. That equations can have one solution, no solution, or an infinite number of solutions 2. Vocabulary: coefficient, variable, constant, null set, empty set, perfect square, cube, radical, solution	*Students will be skilled at…* 1. Fluently working with all four operations and integers 2. Solving two-step equations that involve distributing, combining like terms, and integers. 3. Solving literal equations 4. Estimating square roots and placing square roots on a number line 5. Calculating square roots with a calculator. 6. Solving equations with an x^2 and x^3 7. Solving equations with a variable on both sides 8. Modeling situations with an equation or proportion 9. Solving proportion equations 10. Solving inequalities 11. Modeling situations with an inequality