Unit B - *Parts of Whole, Factors and Rational Numbers*

Overview

Students will build on their knowledge of rational numbers by extending their work into rational numbers with negative values. The expectation is that students are fluent with positive rational numbers (decimals and fractions) before starting this unit. The theme of moving between different representation s of numbers continues into the second part of the unit as students work with monomials. Their work with scientific notation gives the skill of simplifying monomials an application.

21st Century Capacities: Synthesizing

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS

MP2 Reason abstractly and quantitatively
MP6 Attend to precision
MP7 Look for and make use of structure
MP8 Look for and express regularity in repeated reasoning

7.NS.1d Apply properties of operations as strategies to add and subtract rational numbers.
7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
7.NS.2a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
7.NS.2b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real-world contexts.
7.NS.2c. Apply properties of operations as strategies to multiply and

Transfer:

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

1. Can fluently move between different representations of numbers to make sense of information (Synthesizing)
2. Calculate accurately and efficiently and communicate precisely to others.

Meaning:

UNDERSTANDINGS: *Students will understand that:*

1. regularity and repeated reasoning within numbers enable mathematicians to efficiently solve problems.
2. it is important to attend to precision.
3. math can be used to model real-life situations.

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

A. How do predictable patterns help us navigate number contexts?
B. What is another efficient way that this problem could be solved?
C. What have I seen in the past that might help me now?
D. Is there another way to express this number/expression?

	Acquisition:	
divide rational numbers. **7.NS.2d.** Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. **7.NS.3** Solve real-world and mathematical problems involving the four operations with rational numbers. Computations with rational numbers extend the rules for manipulating fractions to complex fractions **CC.8.NS.1** Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. **CC.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 as strategies to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. **CC.7.EE.1** Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. **CC.8.EE.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. **CC.8.EE.3** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 x 108 and the population of the world as 7 x 109, and determine that the world population is more than 20 times larger. **CC.8.EE.4** Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	*Students will know…* 1. How to classify numbers 2. How to perform all operations with rational numbers 3. How to move flexibly between different representations of the same number 4. How to compare numbers in different formats 5. Vocabulary: complex fraction, rational, irrational, integer, whole number, natural number, monomial, scientific notation, magnitude	*Students will be skilled at…* 1. Converting between fractions, decimals and percents 2. Fluently multiplying and dividing fractions (including complex fractions) 3. Fluently adding and subtracting fractions 4. Solving equations involving fractions and decimals 5. Simplifying algebraic fractions 6. Multiplying and dividing monomials 7. Simplify monomials raised to a power 8. Simplifying monomials with negative exponents 9. Converting between standard form and scientific notation (and between numbers written in close to standard form but not quite and scientific notation like $34 X10^4 = 3.4 X 10^5$) 10. Multiplying and dividing numbers written in scientific notation without a calculator 11. Using and reading a calculator to work with scientific numbers 12. Solving word problems involving scientific notation