**Unit Abstract:**

Students will combine addition and subtraction with multiplication and division of positive and negative numbers. Students will create alternate forms of expressions using the distributive property to help solve problems. Students will represent real world problems with expressions using positive and negative rational numbers.

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| **Overarching Question:**  Why do we need negative numbers in multiplying and dividing? | | | | | | |
|  | | **This Unit:** Multiplying and dividing rational numbers, complex fractions, applying order of operations and distributive property to rational numbers, application of order of operations and distributive property to real-world problems. | | | |  |
| **Questions to Focus Assessment and Instruction:**   * Can you reverse the order of rational numbers when performing any operation and still get the same answer? * What happens when rational numbers are converted to decimals? * What are complex fractions? * How is the order of operations applied to problems dealing with rational numbers? | | | | **Standards for Mathematical Practice**  **1.Make sense of problems and persevere in solving them.**  2.Reason abstractly and quantitatively.  3.Construct viable arguments and critique the reasoning of others.  4.Model with mathematics.  5.Use appropriate tools strategically.  **6.Attend to precision.**  **7.Look for and make use of structure.**  8.Look for and express regularity in repeated reasoning. | | |
| **Academic Vocabulary**  *Rational number*  *Distributive property*  *Terminating and repeating decimals*  *Solve and Simplify with an Equation or Expression*  *Complex vs. Simple fraction* |  | |  | |  | |

| **Standards** | **Learning Targets** *(including relevant practice standards)* | **Explanations and Examples\*** | **Assured Experiences**  *(common assessments and learning activities)* |
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| **7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.**   * 1. **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.**   2. **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.**   3. **Apply properties of operations as strategies to multiply and divide rational numbers.**   4. **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.**   (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.) | Students will multiply and divide positive and negative numbers.  Students will distinguish between rules of addition and subtraction and rules of multiplication and division.  Students will apply integers into the order of operations.  Students will convert a fraction into a decimal using long division.  Students will determine if a number is rational. | Multiplication and division of integers is an extension of multiplication and division of whole numbers.  Examples:  • Examine the family of equations. What patterns do you see? Create a model and context for each of the products. Write and model the family of equations related to  3 x 4 = 12.  Explanation for why negative numbers multiply to a positive product: <http://stern.buffalostate.edu/CSMPProgram/Intermediate%20Disk/IG_VI/IG-VI%20Lesson%20Plans/IGVI_NStrand.PDF> | * common assessments * learning activity: * “Good Things Happen” song: <http://www.songsforteaching.com/guffee/goodthings.htm>   Order of operations video from math antics  <https://www.youtube.com/watch?v=dAgfnK528RA> |

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| 7.NS.3Solve 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.) | Students will  Solve real-world problems involving all operations with rational numbers. | Examples:  • Your cell phone bill is automatically deducting $32 from your bank account every month. How much will the deductions total for the year?  -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 = 12 (-32)  • It took a submarine 20 seconds to drop to 100 feet below sea level from the surface. What was the rate of the descent? | * common assessments * learning activity: |

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| **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 to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.**    *For example: If a woman making $25 an hour gets a 10percent raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.* | Students will….  Solve multi-step and real life mathematical problems with both posivtive and negative numbers.  Explain the thinking used to solve real-world problems. | Estimation strategies for calculations with fractions and decimals extend from students’ work with whole number operations. Estimation strategies include, but are not limited to:  • front-end estimation with adjusting (using the highest place value and estimating from the front end making adjustments to the estimate by taking into account the remaining amounts),  • clustering around an average (when the values are close together an average value is selected and multiplied by the number of values to determine an estimate),  • rounding and adjusting (students round down or round up and then adjust their estimate depending on how much the rounding affected the original values),  • using friendly or compatible numbers such as factors (students seek to fit numbers together - i.e., rounding to factors and grouping numbers together that have round sums like 100 or 1000), and  • using benchmark numbers that are easy to compute (students select close whole numbers for fractions or decimals to determine an estimate).  Example:  • The youth group is going on a trip to the state fair. The trip costs $52. Included in that price is $11 for a concert ticket and the cost of 2 passes, one for the rides and one for the game booths. Each of the passes cost the same price. Write an equation representing the cost of the trip and determine the price of one pass. | * common assessments * learning activity: |

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| 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 percent” is the same as “multiply by 1.05.”* | Students will….  Apply the distributive property to expressions in problem solving | Examples:  • Jamie and Ted both get paid an equal hourly wage of $9 per hour. This week, Ted made an additional $27 dollars in overtime. Write an expression that represents the weekly wages of both if J = the number of hours that Jamie worked this week and T = the number of hours Ted worked this week? Can you write the expression in another way?  Students may create several different expressions depending upon how they group the quantities in the problem.  One student might say: To find the total wage, I would first multiply the number of hours Jamie worked by 9. Then I would multiply the number of hours Ted worked by 9. I would add these two values with the $27 overtime to find the total wages for the week. The student would write the expression. 9*J* + 9*T* + 27. | * common assessments * learning activity: |

**Instructional resources** (including manipulatives, literature connections, professional resources)

7.NS.2

7.NS.3

* Sharing Prize Money: <https://www.illustrativemathematics.org/content-standards/7/NS/A/3/tasks/298>

7.EE.3 <http://www.mathworksheetsland.com/7/>

7.EE.2