

## 7-2: Accentuate the Negative

Unit Goals, Focus Questions, and Mathematical Reflections

### Unit Goals

**Rational Numbers** Develop an understanding that rational numbers consist of positive numbers, negative numbers, and zero

- Explore relationships between positive and negative numbers by modeling them on a number line
- Use appropriate notation to indicate positive and negative numbers
- Compare and order positive and negative rational numbers (integers, fractions, decimals, and zero) and locate them on a number line
- Recognize and use the relationship between a number and its opposite (additive inverse) to solve problems
- Relate direction and distance to the number line
- Use models and rational numbers to represent and solve problems

**Operations With Rational Numbers** Develop understanding of operations with rational numbers and their properties

- Develop and use different models (number line, chip model) for representing addition, subtraction, multiplication, and division
- Develop algorithms for adding, subtracting, multiplying, and dividing integers
- Recognize situations in which one or more operations of rational numbers are needed
- Interpret and write mathematical sentences to show relationships and solve problems
- Write and use related fact families for addition/subtraction and multiplication/division to solve simple equations
- Use parentheses and the Order of Operations in computations
- Understand and use the Commutative Property for addition and multiplication
- Apply the Distributive Property to simplify expressions and solve problems

## 7-2 Accentuate the Negative: Focus Questions (FQ) and Mathematical Reflections

Investigation 1 Extending the Number System	Investigation 2 Adding and Subtracting Rational Numbers	Investigation 3 Multiplying and Dividing Rational Numbers	Investigation 4 Properties of Operations
<p><b>Problem 1.1</b> <b>Playing Math Fever: Using Positive and Negative Numbers</b> FQ: How can you find the total value of a combination of positive and negative integers?</p> <p><b>Problem 1.2</b> <b>Extending the Number Line</b> FQ: How can you use a number line to compare two numbers?</p> <p><b>Problem 1.3</b> <b>From Sauna to Snowbank: Using a Number Line</b> FQ: How can you write a number sentence to represent a change on a number line, and how can you use a number line to represent a number sentence?</p> <p><b>Problem 1.4</b> <b>In the Chips: Using a Chip Model</b> FQ: How can you use a chip model to represent addition and subtraction?</p>	<p><b>Problem 2.1</b> <b>Extending Addition to Rational Numbers</b> FQ: How can you predict whether the result of addition of two numbers will be positive, negative, or zero?</p> <p><b>Problem 2.2</b> <b>Extending Subtraction to Rational Numbers</b> FQ: How is a chip model or number line useful in determining an algorithm for subtraction?</p> <p><b>Problem 2.3</b> <b>The “+/-” Connection</b> FQ: How are the algorithms for addition and subtraction of integers related?</p> <p><b>Problem 2.4</b> <b>Fact Families</b> FQ: What related sentence is equivalent to <math>4 + n = 43</math> and makes it easier to find the value of <math>n</math>?</p>	<p><b>Problem 3.1</b> <b>Multiplication Patterns With Integers</b> FQ: How is multiplication of two integers represented on a number line and chip board?</p> <p><b>Problem 3.2</b> <b>Multiplication of Rational Integers</b> FQ: What algorithm can you use for multiplying integers?</p> <p><b>Problem 3.3</b> <b>Division of Rational Numbers</b> FQ: What algorithm can you use for dividing integers? How are multiplication and division related?</p> <p><b>Problem 3.4</b> <b>Playing the Integer Product Game: Applying Multiplication and Division of Integers</b> FQ: What patterns do you notice on the game board for the Integer Product Game that can help you?</p>	<p><b>Problem 4.1</b> <b>Order of Operations</b> FQ: Does the Order of Operations work for integers? Explain.</p> <p><b>Problem 4.2</b> <b>The Distributive Property</b> FQ: How can you use the Distributive Property to expand an expression or factor an expression that involves integers?</p> <p><b>Problem 4.3</b> <b>What Operations are Needed?</b> FQ: What information in a problem is useful to help you decide which operation to use to solve the problem?</p>
<p><b>Mathematical Reflections</b></p> <ol style="list-style-type: none"> <li>How do you decide which of two numbers is greater when             <ol style="list-style-type: none"> <li>both numbers are positive?</li> <li>both numbers are negative?</li> <li>one number is positive and one number is negative?</li> </ol> </li> <li>How does a number line help you compare numbers?</li> <li>When you add a positive number and a negative number, how do you determine the sign of the answer?</li> <li>If you are doing a subtraction problem on a chip board, and the board does not have enough chips of the color you wish to subtract, what can you do to make the subtraction possible?</li> </ol>	<p><b>Mathematical Reflections</b></p> <ol style="list-style-type: none"> <li>What algorithm(s) will produce the correct result for the sum “<math>a + b</math>,” where <math>a</math> and <math>b</math> each represent any rational number? Show, using a number line or chip board, why your algorithm works.</li> <li>What algorithm(s) will produce the correct result for the difference “<math>a - b</math>,” where <math>a</math> and <math>b</math> each represent any rational number? Show, using a number line or chip board, why your algorithm works.</li> </ol> <ol style="list-style-type: none"> <li>How can any difference “<math>a - b</math>” be restated as an equivalent addition statement, where <math>a</math> and <math>b</math> each represent any rational number?</li> <li>What does it mean to say that an operation is <i>commutative</i>?</li> <li>Describe some ways that the additive inverse of a number is important.</li> </ol>	<p><b>Mathematical Reflections</b></p> <ol style="list-style-type: none"> <li>Give an example of a multiplication problem, involving two integers, in which the product is             <ol style="list-style-type: none"> <li>less than 0.</li> <li>greater than 0.</li> <li>equal to 0.</li> <li>In general, describe the signs of the factors for each product in parts (a)–(c).</li> </ol> </li> <li>Give an example of a division problem, involving two integers, in which the quotient is             <ol style="list-style-type: none"> <li>less than 0.</li> <li>Greater than 0.</li> <li>Equal to 0.</li> <li>In general, describe the signs of the dividend and divisor for each quotient in parts (a)–(c).</li> </ol> </li> <li>Suppose three numbers are related by an equation of the form <math>a \cdot b = c</math>, where <math>a</math>, <math>b</math>, and <math>c</math> are not equal to 0. Write two related number sentences using multiplication.</li> <li>Suppose three numbers are related by an equation of the form <math>a \div b = c</math>, where <math>a</math>, <math>b</math>, and <math>c</math> are not equal to 0. Write two related number sentences using multiplication.</li> <li>Which operations on integers are commutative? Give numerical examples to support your answer.</li> </ol>	<p><b>Mathematical Reflections</b></p> <ol style="list-style-type: none"> <li>What is the Order of Operations? Why is the Order of Operations important?</li> <li>Give an example of a numerical expression in which the use of parentheses changes the result of the computation.</li> </ol> <ol style="list-style-type: none"> <li>Describe how the Distributive Property relates addition and multiplication. Give numerical examples.</li> </ol>