Unit Goals

**Numeric Estimation** Understand that estimation can be used as a tool in a variety of situations including checking answers and making decisions, and develop strategies for estimating results of arithmetic operations
- Use benchmarks and other strategies to estimate results of operations with fractions
- Use estimates to check the reasonableness of exact computations
- Give various reasons to estimate and identify when a situation calls for an overestimate or an underestimate
- Use estimates and exact solutions to make decisions

**Fraction Operations** Revisit and continue to develop meanings for the four arithmetic operations and skill at using algorithms for each
- Determine when addition, subtraction, multiplication, or division is the appropriate operation to solve a problem
- Develop ways to model sums, differences, products, and quotients with areas, fraction strips, and number lines
- Use knowledge of fractions and equivalence of fractions to develop algorithms for adding, subtracting, multiplying, and dividing fractions
- Write fact families with fractions to show the inverse relationship between addition and subtraction, and between multiplication and division
- Compare and contrast dividing a whole number by a fraction to dividing a fraction by a whole number
- Recognize that when you multiply or divide a fraction, your answer might be less than or more than the numbers you started with
- Solve real-world problems using arithmetic operations on fractions

**Variables and Equations** Use variables to represent unknown values and equations to represent relationships
- Represent unknown real-world and abstract values with variables
- Write equations (or number sentences) to represent relationships among real-world and abstract values
- Use fact families to solve for unknown values

Unit Goals, Focus Questions, and Mathematical Reflections
## 6-3 Let’s Be Rational: Focus Questions (FQ) and Mathematical Reflections

<table>
<thead>
<tr>
<th>Investigation 1</th>
<th>Investigation 2</th>
<th>Investigation 3</th>
<th>Investigation 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem 1.1</strong></td>
<td><strong>Problem 2.1</strong></td>
<td><strong>Problem 3.1</strong></td>
<td><strong>Problem 4.1</strong></td>
</tr>
<tr>
<td>Getting Close: Estimating Sums</td>
<td>How Much of the Pan Have We Sold?</td>
<td>Preparing Food: Dividing a Fraction by a Fraction</td>
<td>Just the facts: Fact Families for Addition and Subtraction</td>
</tr>
<tr>
<td>FQ: What are some strategies for estimating the sums of fractions?</td>
<td>Finding Parts of Parts</td>
<td>FQ: What does it mean to divide a fraction by a fraction? What strategies help you divide a fraction by a fraction?</td>
<td>FQ: How do fact families help you solve equations such as ( \frac{1}{5} - N = \frac{3}{8} )?</td>
</tr>
<tr>
<td><strong>Problem 1.2</strong></td>
<td><strong>Problem 2.2</strong></td>
<td><strong>Problem 3.2</strong></td>
<td><strong>Problem 4.2</strong></td>
</tr>
<tr>
<td>Estimating Sums and Differences</td>
<td>Modeling Multiplicative Situations</td>
<td>Into Pieces: Whole Numbers or Mixed Numbers Divided by Fractions</td>
<td>Multiplication and Division Fact Families</td>
</tr>
<tr>
<td>FQ: How do you know if your estimate is an underestimate or overestimate? What information does an underestimate or overestimate tell you?</td>
<td>FQ: What strategies can you use to multiply all combinations of factors including whole numbers, fractions, and mixed numbers?</td>
<td>FQ: What does it mean to divide a whole number or mixed number by a fraction? What strategies help you divide a whole number or mixed number by a fraction?</td>
<td>FQ: How do fact families help you solve equations such as ( \frac{2}{9} + N = \frac{2}{3} )?</td>
</tr>
<tr>
<td><strong>Problem 1.3</strong></td>
<td><strong>Problem 2.3</strong></td>
<td><strong>Problem 3.3</strong></td>
<td><strong>Problem 4.3</strong></td>
</tr>
<tr>
<td>Land Sections: Adding and Subtracting Fractions</td>
<td>Changing Forms: Multiplication With Mixed Numbers</td>
<td>Sharing a Prize: Dividing a Fraction by a Whole Number</td>
<td>Becoming an Operations Sleuth</td>
</tr>
<tr>
<td>FQ: What are some strategies for adding and subtracting fractions?</td>
<td>FQ: How can you use number properties and equivalent fractions to multiply rational numbers?</td>
<td>FQ: What strategies help you divide a fraction by a whole number?</td>
<td>FQ: How do you know when a particular operation is called for to solve a problem? How do you represent the problem with a number sentence?</td>
</tr>
<tr>
<td><strong>Problem 1.4</strong></td>
<td><strong>Problem 2.4</strong></td>
<td><strong>Problem 3.4</strong></td>
<td><strong>Problem 4.5</strong></td>
</tr>
<tr>
<td>Visiting the Spice Shop: Adding and Subtracting Mixed Numbers</td>
<td>Examining Algorithms for Dividing Fractions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FQ: What are some strategies for adding and subtracting mixed numbers?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Mathematical Reflections

1. What are some situations in which estimating a sum or difference is useful? Why is estimation useful in these situations?
   1b. When is it useful to underestimate? When is it useful to overestimate?

2. When should you use addition to solve a problem involving fractions? When should you use subtraction?

3. Suppose you are helping a student who has not studied fractions. Explain to him or her how to add and subtract fractions. Give an example of the type you think is easiest to explain. Give an example of the type you think is hardest to explain.

### Mathematical Reflections

1. When solving a problem, how do you recognize when division is the operation you need to use?
2a. How is dividing a whole number by a fraction similar to or different from dividing a fraction by a whole number?
2b. Explain your strategy for dividing one fraction by another fraction. Does your strategy also work for divisions where the dividend or divisor is a whole number or a mixed number? Explain.
3. When dividing a whole number by a whole number greater than 1, the quotient is always less than the dividend. For example, \( 15 \div 3 = 5 \), and 5 is less than 15 (the dividend). Use examples to explain the following statement:
   “When you divide a fraction by another fraction, your answer might be greater than the dividend or less than the dividend.”
3a. What does it mean to decompose a number?
3b. How do fact families help you figure out the value for \( N \) in a sentence such as \( N \div 2 \frac{1}{2} = 1 \frac{1}{2} \)?