### Math Background

Addition and Subtraction of Fractions and Mixed Numbers

Students in Levels 3 through 5 work primarily with familiar fractions, such as halves, thirds, fourths, sixths, eighths, tenths, and twelfths, as they try to develop meaning for fractions. They should be well acquainted with set models, area models, and measurement models for illustrating fraction concepts. These models indicate the relationship between the part (or parts) and the whole, which a fraction represents. Return frequently to these models—they’ll strengthen student understanding of fractional symbolism.

**When Students Ask, Why Learn This?**

Fractions grew out of a need in everyday life to describe parts of wholes. Whole numbers fall short of describing mathematical situations like sharing and measuring. Point out these reasons for using fractions: to describe part of a whole, to identify part of a group, to note a location on a number line, and to express division. Ask students for real-world situations involving fractions and mixed numbers.

**A Positive Start**

Establish a firm foundation in equivalent fractions before moving on to operations with fractions. Addition and subtraction often require “renaming” of fractions to obtain a common denominator. Students who have a good command of the basic facts of multiplication and who are able to name the multiples of a given number will have an easier time finding equivalent fractions. Whenever possible, the meanings given to operations with whole numbers (such as joining two groups for addition or taking away a group for subtraction) should be extended to fractions and mixed numbers.

### Linking Past and Future Learning

Students’ prior knowledge of addition and subtraction of whole numbers can be applied to the addition and subtraction of fractions and mixed numbers at this level—and for next year? Use the chart as you focus your instruction.

<table>
<thead>
<tr>
<th>Concept/Skills</th>
<th>Last Year</th>
<th>This Year</th>
<th>Next Year</th>
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<tr>
<td>Equivalent Fractions</td>
<td>Find equivalent fractions and simplest form</td>
<td>Use multiples, multiplication, and division to find equivalent fractions and simplest form</td>
<td>Write fractions and mixed numbers in simplest form</td>
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<tr>
<td>Mixed Numbers</td>
<td>Add and subtract mixed numbers with like denominators</td>
<td>Add and subtract mixed numbers with regrouping; changing mixed numbers to improper fractions and vice versa</td>
<td>Add and subtract mixed numbers, having unlike denominators, with regrouping;</td>
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<tr>
<td>Adding and Subtracting Fractions</td>
<td>Add unlike fractions</td>
<td>Add fractions and mixed numbers with unlike denominators</td>
<td>Add and subtract fractions and mixed numbers, having unlike denominators, with regrouping; express answers in simplest form</td>
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Teaching Strategies

Methods and Management

Have an activity prepared—either shown with the overhead or written on the board—that students can start work on immediately. Choose a puzzle or problem related to the current topic or one that reviews a previous concept, or simply ask a quick quiz question. Engaging students in completing the task allows you time for taking attendance, checking homework, or setting up for the lesson.

Teaching Strategy: Equivalent Fractions

Equivalent fractions are fractions that represent the same part of a whole.

- Students can fold paper to investigate equivalent fractions.

**Show This:**

```
3 4
6 8
9 12
```

**Ask:** What happened to the fourths when the paper was folded? What happened to the number of shaded parts when the paper was folded? What equivalent fraction could represent the shaded sections now? Is the same part of the whole shaded?

- Show symbolically how one fraction is based on the other.

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3 x 2 = 6
4 x 2 = 8
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Help students generalize that the numerator and denominator can both be multiplied or divided by the same number to obtain an equivalent fraction.

**Vocabulary Development** Simplest form is sometimes referred to as lowest terms. Students should become familiar with both expressions. The term reducing has often been used to describe the process of obtaining simplest form. However, this term can be misleading since the fractions are not actually not reduced in size.

Teaching Strategy: Mixed Numbers

Fraction models and other area models are useful in illustrating mixed numbers.

**Show This:**

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**Ask:** How many halves are shaded? How would you express this as a fraction? What other number could also represent the shaded part?

- Central to writing mixed numbers as fractions, and vice versa, is the concept that a whole can be expressed in many ways: \( \frac{2}{2} \), \( \frac{6}{6} \), \( \frac{13}{13} \), and so on.

- Students need practice in both directions—changing a mixed number to an improper fraction and changing an improper fraction to a mixed number.

**Ask:** Between what two whole numbers does \( \frac{5}{3} \) fall? How do you know?

Connections Musical notes are based on fractions of a whole note. Ask, if a whole note lasts 4 beats, how long would a quarter note last? An eighth note? How many sixteenth notes would last as long as a whole note?

Class Discussion Bring out this important point: Fractions cannot be ordered by just comparing the numerator and denominator unless the fractions have like denominators.

Visual Aid Use a set model with beans, buttons, or paper clips as counters.

Extra Practice Give your students a simple fraction and then have them generate as many equivalent fractions as they can in one minute.

Good Routine Ask students if a fraction is nearer to one of the following benchmarks: 0, \( \frac{1}{2} \), or 1. This skill will help them check the reasonableness of their answers.

Journals Have students write to explain how they can tell whether two fractions are equivalent and what procedure they would use to simplify a fraction.