

## Unit 3 - Full of Wholes

### Overview

In this unit, students use concrete manipulatives and visual models to explore unit fractions, common fractions, mixed numbers, equivalent fractions, and decimals as well as addition and subtraction of fractions. Students begin to understand how two fractions with unlike numerators and unlike denominators can be equal and they develop methods for generating and recognizing equivalent fractions. The connection between unit fractions and common fractions leads toward multiplying fractions by whole numbers. Fraction work extends into decimals by considering the equivalence of tenths and hundredths. Students must understand that comparisons of fractions or decimals are valid only when the two fractions or decimals refer to the same whole.

### 21st Century Capacities: Analyzing

### Stage 1 - Desired Results

#### ESTABLISHED GOALS/ STANDARDS

MP 2 Reason abstractly and quantitatively  
MP 4 Model with Mathematics

CCSS.MATH.CONTENT.4.NF.A.1 Explain why a fraction  $a/b$  is equivalent to a fraction  $(n \times a)/(n \times b)$  by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

CCSS.MATH.CONTENT.4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as  $1/2$ . Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols  $>$ ,  $=$ , or  $<$ , and justify the conclusions, e.g., by using a visual fraction model.

CCSS.MATH.CONTENT.4.NF.B.3 Understand a fraction  $a/b$  with  $a > 1$  as a sum of fractions  $1/b$ .

CCSS.MATH.CONTENT.4.NF.B.3.A Understand addition

#### *Transfer:*

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

1. Apply knowledge of fractional quantities to solve problems in novel situations (analyzing)
2. Build models in order to visualize, compose or decompose fractional quantities.

#### *Meaning:*

**UNDERSTANDINGS:** *Students will understand that:*

1. Fractions must be of the same size whole to compare and perform operations
2. Mathematicians create or use models to examine, describe, solve and or make predictions
3. There are flexible ways of representing and recognizing fractional quantities.
4. Mathematicians use number sense to compute fluently with fractions and

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

- A. What math tools/models/strategies can I use to solve this problem?
- B. How can I visualize equivalent amounts?
- C. How can benchmark numbers help me understand the size of a fraction (decimal)?
- D. How can I develop strategies to add, subtract and multiply with fractions?
- E. Why is it necessary to have the same

## Grade 4 Math Curriculum

<p>and subtraction of fractions as joining and separating parts referring to the same whole.            CCSS.MATH.CONTENT.4.NF.B.3.B Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model.            CCSS.MATH.CONTENT.4.NF.B.3.C Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.            CCSS.MATH.CONTENT.4.NF.B.3.D Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.            CCSS.MATH.CONTENT.4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.            CCSS.MATH.CONTENT.4.NF.B.4.A Understand a fraction <math>a/b</math> as a multiple of <math>1/b</math>.            CCSS.MATH.CONTENT.4.NF.B.4.B Understand a multiple of <math>a/b</math> as a multiple of <math>1/b</math>, and use this understanding to multiply a fraction by a whole number. (<i>In general, <math>n \times (a/b) = (n \times a)/b</math>.</i>)            CCSS.MATH.CONTENT.4.NF.C.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.            CCSS.MATH.CONTENT.4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100.            CCSS.MATH.CONTENT.4.NF.C.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols <math>&gt;</math>, <math>=</math>, or <math>&lt;</math>, and justify the conclusions, e.g., by using a visual model.</p>	<p>decimals and make reasonable estimates.</p>	<p>size whole?            F. How do I decide if my answer makes sense and if not what do I do?            G. How are fractions and decimals related?</p>
<b>Acquisition:</b>		
	<p><i>Students will know...</i></p> <ol style="list-style-type: none"> <li>1. Visual models can help generate and recognize equivalent fractions</li> <li>2. Decimals are another way to represent a fractional quantity</li> <li>3. The place value of tenths and hundredths</li> <li>4. Addition of fractions as joining parts, referring to the same size whole</li> <li>5. Subtraction of fractions as removing parts, referring to the same size whole</li> <li>6. How to reason proportionally</li> <li>7. Multiplying a fraction by a whole number is similar to repeated addition</li> <li>8. Vocabulary: numerator, denominator, equivalent, equal, mixed number, benchmark, decimal, tenths, hundredths, unit fraction, common fraction, equivalent fraction</li> </ol>	<p><i>Students will be skilled at...</i></p> <ol style="list-style-type: none"> <li>1. Finding equivalent fractions and decimals</li> <li>2. Comparing two fractions using same numerator, same denominator or benchmark numbers</li> <li>3. Decomposing fractions with the same denominator in multiple ways</li> <li>4. Adding and subtracting fractions and mixed numbers with like denominators</li> <li>5. Writing fractions with denominators 10 and 100 in decimal notation</li> <li>6. Comparing decimal numbers with digits to the hundredths place</li> <li>7. Solving story problems involving addition and subtraction of fractions with like denominators</li> <li>8. Solving problems involving multiplying a fraction by a whole number</li> </ol>