Grade 4 - Unit 3 - Full of Wholes

Unit Focus

In this unit, students use concrete manipulatives and visual models to explore unit fractions, common fractions, mixed numbers, improper fractions, 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 works 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.

Stage 1: Desired Results - Key Understandings

Standard(s)

Standards
- Common Core
  - *Mathematics: 4*
    - Extend understanding of fraction equivalence and ordering.
    - Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × 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.1)*
    - 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.A.2)*
    - Understand a fraction a/b with a > 1 as a sum of fractions 1/b. *(CCSS.MATH.CONTENT.4.NF.B.3)*
    - Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. *(CCSS.MATH.CONTENT.4.NF.B.3A)*
    - 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. Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8. *(CCSS.MATH.CONTENT.4.NF.B.3B)*
    - 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.3C)*
    - 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.3D)*

Transfer

Students will be able to independently use their learning to...
T1 Represent situations using mathematical reasoning and symbols.
T2 Apply models to solve problems.

Meaning

Understanding(s)	Essential Question(s)
Students will understand that... **U1** Mathematicians make sense of quantities to represent situations mathematically. **U2** Mathematicians create or use models to generalize, represent, and solve problems.	*Students will keep considering...* **Q1** How can the relationship between quantities be represented? **Q2** What do the quantities mean? **Q3** What model best represents this problem? **Q4** What is another way to represent this number?

Acquisition of Knowledge and Skill

Knowledge	Skill(s)
Students will know... **K1** visual models can help generate and recognize equivalent fractions **K2** decimals are another way to represent a fractional quantity	*Students will be skilled at...* **S1** finding equivalent fractions and decimals **S2** comparing two fractions using same numerator, same denominator or benchmark numbers

Stage 1: Desired Results - Key Understandings

- Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. *(CCSS.MATH.CONTENT.4.NF.B.4)*
- Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4). *(CCSS.MATH.CONTENT.4.NF.B.4A)*
- Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.) *(CCSS.MATH.CONTENT.4.NF.B.4B)*
- Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie? *(CCSS.MATH.CONTENT.4.NF.4C)*
- Understand decimal notation for fractions, and compare decimal fractions.
- 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 100.2 For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100. *(CCSS.MATH.CONTENT.4.NF.C.5)*
- Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram. *(CCSS.MATH.CONTENT.4.NF.C.6)*
- 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 >, =, or <, and justify the conclusions, e.g., by using a visual model. *(CCSS.MATH.CONTENT.4.NF.C.7)*
- Mathematical Practices
- Reason abstractly and quantitatively. *(CCSS.MATH.MP.2)*
- Model with mathematics. *(CCSS.MATH.MP.4)*

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- Analyzing: Examining information/data/evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. *(POG.1.2)*
- Product Creation: Effectively use a medium to communicate important information. *(POG.3.2)*

K3 tenths and hundredths are specific place value units just as ones, tens, hundreds are
K4 adding fractions is joining parts, referring to the same size whole
K5 subtracting fractions is removing parts, referring to the same size whole
K6 multiplying a fraction by a whole number is similar to repeated addition
K7 Vocabulary: numerator, denominator, equivalent, equal, mixed number, benchmark, decimal, tenths, hundredths, unit fraction, common fraction, equivalent fraction
K8 fractions must be of the same size whole to compare or compute the fractions.

S3 decomposing fractions with the same denominator in multiple ways
S4 adding and subtracting fractions and mixed numbers with like denominators
S5 writing fractions with denominators 10 and 100 in decimal notation
S6 comparing decimal numbers with digits to the hundredths place
S7 solving story problems involving addition and subtraction of fractions with like denominators
S8 solving problems involving multiplying a fraction by a whole number