

## Core Content

**Cluster Title: Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.**

**Standard 3:** Understand a fraction  $a/b$  with  $a > 1$  as a sum of fractions  $1/b$ .

- a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
- 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.  
Examples:  $3/8 = 1/8 + 1/8 + 1/8$  ;  $3/8 = 1/8 + 2/8$  ;  $2 \frac{1}{8} = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$ .
- 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.
- 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.

**MASTERY Patterns of Reasoning:**

**Note: Expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.**

**Conceptual:**

Students will understand that addition and subtraction of fractions is joining and separating parts referring to the same whole.

Students will understand that a fraction can be decomposed into a sum of fractions with the same denominator.

Students will understand that a mixed number is a whole number and a fraction, e.g.,  $2\frac{1}{4}$ .

Students will understand the definition of unit fraction.

**Procedural:**

Students can use varied strategies, including algorithms, for adding and subtracting fractions with like denominators.

Students can describe various ways to decompose (break apart) a fraction.

Students can decompose a fraction and whole numbers into unit fractions.

Students can 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.

Students can 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.

**Representational:**

- Students can model the joining and separating of fractions with like denominators referring to the same whole.
- Students can illustrate decompositions of fractions using various models (set, area, measurement, etc.).
- Students can represent unit fractions with models.

**Supports for Teachers**

**Critical Background Knowledge**

**Conceptual:**

- Students will understand that addition and subtraction are the joining and separating of parts.
- Students will understand that  $1 = n/n$ .
- Students will understand the definition of a unit (a unit is one of what we are counting).
- Students will understand how to add and subtract fractions with like denominators.
- Students will understand relationship of equivalent forms.

**Procedural:**

- Students can place fractions on a number line.
- Students can compare fractions.
- Students can identify parts of the whole, numerator, and denominator.
- Students can determine equivalent fractions.

**Representational:**

- Students can understand that whole numbers can be expressed in a variety of ways (e.g.,  $8 = 5 + 3 = 4 + 4 = 2 + 6$ ).
- Students can represent fractions using area, set, number line, and measurement models.
- Students can model addition and subtraction of fractions using various models (set, area, measurement, etc.).

**Academic Vocabulary and Notation**

decompose (decomposition), mixed numbers, fractional form, unit fraction  
 (Note: We have intentionally excluded the term “improper fraction” and instead use the term “fractional form.”)

Instructional Strategies Used	Resources Used												
<p>Illustrate adding and subtracting of fractions and mixed numbers using number lines, fraction strips, area models, set models, rulers, etc. Illustrate decomposing of fractions and mixed numbers with number lines, fraction strips, area models, set models, rulers, etc.</p>	<p><a href="http://studyjams.scholastic.com/studyjams/jams/math/fractions/add-sub-common-denom.htm">http://studyjams.scholastic.com/studyjams/jams/math/fractions/add-sub-common-denom.htm</a></p> <p><a href="http://www.ncpublicschools.org/docs/acre/standards/support-tools/unpacking/math/4th.pdf">http://www.ncpublicschools.org/docs/acre/standards/support-tools/unpacking/math/4th.pdf</a></p>												
Assessment Tasks Used													
<p><b>Skill-Based Task:</b></p> <p>Missing addend:</p> <p><math>1/6 + \underline{\quad} = 5/6</math></p> <p><math>5/5 + \underline{\quad} + 2/5 = 2 \ 2/5</math></p> <p><math>2/3 - 1/3 = \underline{\quad}</math></p> <p><math>3/10 + 2/10 + 4/10 = \underline{\quad}</math></p> <p><math>4/4 - 3/4 = \underline{\quad}</math></p> <p>A cake recipe calls for <math>3/4</math> cup of milk, <math>1/4</math> cup of oil, and <math>2/4</math> cup of water. How much liquid was needed to make the cake?</p> <p><math>3 \ 2/5 + 4/5 = \underline{\quad}</math></p> <p><math>5 \ 1/4 - 2 \ 3/4 = \underline{\quad}</math></p>	<p><b>Problem Task:</b></p> <ul style="list-style-type: none"> <li>Draw a picture to show why these equations are true, and explain your reasoning:                      <math>7/8 = 4/8 + 3/8</math>  <math>2 \frac{1}{4} = \frac{3}{4} + \frac{6}{4}</math> </li> <li>Sally said that <math>1/10 + 7/10 + 4/10</math> is the same as <math>1 \frac{2}{10}</math>. Is she correct? Explain and use a model to illustrate your explanation. (This is for Standard 4.c.)</li> <li>Draw a model of the garden plot according to the data table below. The plot is divided into 15 sections. What fraction of the plot will be potatoes?                     <table border="1" data-bbox="1052 1094 1906 1318"> <thead> <tr> <th>Crop</th> <th>Number of sections</th> </tr> </thead> <tbody> <tr> <td>Corn</td> <td>4</td> </tr> <tr> <td>Peas</td> <td>2</td> </tr> <tr> <td>Strawberries</td> <td>2</td> </tr> <tr> <td>Tomatoes</td> <td>3</td> </tr> <tr> <td>Potatoes</td> <td>The rest</td> </tr> </tbody> </table> </li> </ul>	Crop	Number of sections	Corn	4	Peas	2	Strawberries	2	Tomatoes	3	Potatoes	The rest
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