

Core Content

Cluster Title: Extend understanding of fraction equivalence and ordering.

Standard 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.

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 a fractional quantity can be subdivided into an infinite number of equal pieces while maintaining the original fractional quantity, e.g., $1/2$ can be subdivided into $2/4$, $4/8$ and so on. Those subdivisions are called equivalent fractions.

Students will understand the identity property of multiplication and its relationship to fractions ($1/1$, $2/2$, $3/3$, $4/4$, ... $n/n = 1$)

Students will understand how the identity property of multiplication is employed to create equivalent fractions $[(n \times a)/(n \times b) = na/nb]$

Procedural:

Students can identify differences in two equivalent fractions, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size.

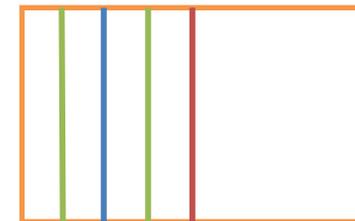
Students can identify how the identity property of multiplication transforms a fraction into its equivalent fraction.

Representational:

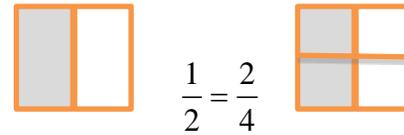
Students can represent equivalency of fractions pictorially (a/b is equivalent to $(n \times a)/(n \times b)$).

Students can construct models of equivalent fractions using manipulatives such as paper, color tiles, fraction bars, and fraction circles. The visual model, with subdivisions, might look like this:

The red line represents $1/2$ of the box. When $1/2$ is subdivided into two pieces with the blue line, the fraction becomes $2/4$ because each piece represents $1/4$ of the box. When each fourth is subdivided into two pieces by the green lines, the fraction becomes $4/8$ because each piece represents $1/8$ of the box.



Using a fraction model, students can subdivide both numerator and denominator by multiplying with the same factor (a/b is equivalent to $(n \times a)/(n \times b)$, because both a and b were changed by the same factor n), e.g. $1/2 = 2/4$ because $(2 \times 1)/(2 \times 2) = 2/4$, or, pictorially:



Supports for Teachers

Critical Background Knowledge	
<p>Conceptual: Students will understand fractions as equal parts of a whole. Students will understand that the larger the denominator, the smaller the size of the unit. Students will understand that a numerator tells the number of pieces being considered out of the whole. Students will understand that two fractions are equivalent if they represent the same amount or quantity. Students will understand the identity property of multiplication ($n \times 1 = n$).</p>	
<p>Procedural: Students can visually identify equivalent fractions that are created from the same whole.</p>	
<p>Representational: Students can model equivalent fractions using area models, set models, picture models and number lines.</p>	
Academic Vocabulary and Notation	
fraction, equivalent fraction, numerator, denominator, equivalent, number line model, area model, identity property of multiplication, $n \times 1 = n$	
Instructional Strategies Used	Resources Used
Using a sheet of paper, fold end to end and color one side. Continue folding paper and document changes in the fraction of the colored side ($1/2, 2/4, 4/8, 8/16$) as you proceed to fold	

<p>the paper.</p> <p>Using the area model, change a given fraction into an equivalent fraction by drawing additional vertical and/or horizontal lines that result in equal parts of the whole.</p> <p>Using paper strips (3" x 18" construction paper), subdivide by successive folding to create several equivalent fractions. Label the fractions.</p> <p>Use fraction tiles and circles to create equivalent fractions.</p> <p>Use number line fraction bars to compare fractions.</p>	<p><i>Elementary and Middle School Mathematics: Teaching Developmentally</i> by John A. Van de Walle, p. 304</p> <p>Virtual manipulatives (National Library of Virtual Manipulatives, grades 3-5; Number and operations; Number line bar): http://nlvm.usu.edu/en/nav/frames_asid_265_g_2_t_1.html?open=activities&from=category_g_2_t_1.html</p>
<p>Assessment Tasks Used</p>	
<p>Skill-Based Task: Look at the model. Name three equivalent fractions for the part that is shaded.</p> <div data-bbox="323 922 516 1117" data-label="Image"> </div>	<p>Problem Task: My mom left $\frac{1}{2}$ of a cake on the counter. The doorbell rang and one of my friends came over. If we cut what's left into equal parts, what fraction of the whole cake did we each eat? If 3 of my friends came over and we cut $\frac{1}{2}$ cake that's left into equal parts, what fraction of the whole cake did we each eat? (Ask the child to extend this reasoning as far as he/she is able.)</p>