Number and Operations — Fractions

The focus in this section is the development of strategies to compare and order proper and/or improper fractions. Mixed numbers are also included in the lessons, but are converted to improper fractions to help make comparisons. Success with comparing, and later addition and subtraction of fractions, depends on students' confidence with finding equivalent fractions.

Denominators can be classified as *like* and *unlike*, but using only those terms is problematic. Like denominators are clear-cut. Unlike denominators have two types: those where one denominator is a multiple of another (*related*), and those where this relationship does not occur (*unrelated*). Encouraging students to consider the relationship between denominators avoids unnecessary complication. For example, take the addition of $\frac{7}{8}$ and $\frac{15}{24}$. If the students fail to recognize that 8 and 24 are related denominators, they may apply the generic rule for unlike denominators. That is, they might multiply the denominators to create a common multiple of 192. The easier approach, of course, is to simply change $\frac{15}{24}$ to $\frac{5}{8}$. This is why a distinction in terminology is made between *same*, r*elated*, and *unrelated denominators*, rather than only *like* and *unlike*.

The module begins by reviewing strategies to compare two fractions that have the same numerator or same denominator. A fraction chart, then a number line are used to make comparisons and to order sets of fractions. Decisions are made simply by sight. The discussions related to these lessons should reinforce the need for a written method to make decisions without using a visual model.

In Module 4, students explored the idea of equivalent fractions. In Lesson 4 of this module, they learn to use a rule to calculate equivalent fractions. The rule is reinforced in problem-solving situations involving fractions with related denominators, so it is only necessary to change *one* of the fractions. Before students compare any pair of fractions, they learn how to find common denominators. This work focuses on methods to find a number that is a common multiple of both denominators of the original fractions. They then use these methods to compare fractions with any combination of denominators — same, related, or unrelated denominators.

Measurement

Students work with pounds before being introduced to ounces and exploring the relationship between these units of mass. Units of capacity — gallons, quarts, pints, and cups — are reviewed. Students are introduced to fluid ounces and the connection to other units of capacity. They solve problems involving customary units of mass and capacity.

For professional learning in relation to this content, select the following videos from the support resources tab.

DCF1 *Comparing Common Fractions*

Coherence — Prerequisite skills from prior Grade Levels

This table identifies the Grade 3 prerequisite standards and learning targets needed for Grade 4, Module 9.

STEPPING STONES GRADE 3 LESSON	STANDARD	LEARNING TARGET
8.6	3.NF.A.1	Identify common fractions less than and greater than 1 (area model)
8.7	3.NF.A.2, 3.NF.A.2b	Identify common fractions less than and greater than 1 (number line model)
8.8	3.NF.A.3, 3.NF.A.3a, 3.NF.A.3b	Identify equivalent fractions less than 1 (area model)
8.9	3.NF.A.3, 3.NF.A.3a, 3.NF.A.3b, 3.NF.A.3c	Identify equivalent fractions less than and greater than 1 (number line model)
8.10	3.MD.A.2	Estimate and measure capacity using liters and parts of a liter
8.11	3.MD.A.2	Estimate and measure mass using kilograms and grams
8.12	3.MD.A.2	Solve mass word problems
11.10	DA	Estimate and measure capacity using quarts, pints, and cups
11.11	DA	Estimate and measure capacity using gallons
11.12	DA	Solve capacity word problems

Common errors and misconceptions

Common fractions

Students who struggle with equivalent fractions may not realize that the whole is the same and is divided into a different number of parts. Encourage students to stack drawings on top of each other to show that the whole and the selected area are equivalent and then count how many total parts there are (the denominator) and how many parts are shaded (the numerator).

Remember that students are finding a common denominator, not the least common denominator. It is acceptable for students to multiply the denominators to find the common denominator if that is the strategy most accessible to them right now.

Measurement

If students are struggling with units of measure, provide objects and experiences (pouring water, stacking mass pieces in a pan balance) which will give them concrete experiences with benchmark measurements, and ask questions such as, "How long does it take to fill a 1 quart container at the water fountain?" and "How much does a baseball weigh?" This enables number sense about measurements which will help students solve problems accurately.