

Topic A

Fraction Decomposition and Equivalence

In topic A, students decompose whole numbers and fractions into sums of fractions. They also develop an understanding that a mixed number is the sum of a whole number and a fraction less than 1, which helps them as they rename fractions greater than 1 and rename mixed numbers.

Students use paper strips, tape diagrams, number bonds, and number lines to represent the decomposition of whole numbers and fractions into unit fractions. They use the familiar models to help them record the decomposition as a sum of unit fractions (e.g., $1 = \frac{1}{3} + \frac{1}{3} + \frac{1}{3}$ or $\frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$). They recognize that decomposing whole numbers and fractions into unit fractions is similar to decomposing whole numbers into ones (e.g., $3 = 1 + 1 + 1$). Students also realize that, like whole numbers, fractions can be decomposed in multiple ways (e.g., $\frac{4}{5} = \frac{3}{5} + \frac{1}{5}$ and $\frac{4}{5} = \frac{2}{5} + \frac{2}{5}$). Recording with an abstract equation extends the work of grade 3, where students decompose whole numbers and fractions by using number bonds and other models to represent their work.

Students also represent fractions by partitioning and shading an area model. The area model becomes particularly useful in topic B, when students generate equivalent fractions. With a variety of models to select from to represent fractions, students can choose an appropriate representation depending on the context and the fractional unit.

Students are introduced to mixed numbers in grade 3, primarily with line plots and measurement contexts. In this topic, they formalize the definition of a mixed number as the sum of a whole number and a fraction less than 1. Students use number bonds and number lines to decompose fractions greater than 1 and rename the fractions as a mixed number. They use these same types of models to rename a mixed number as a fraction greater than 1. To rename a mixed number, students express the mixed number as a sum of a whole number and a fraction less than 1. Then students use fractions equivalent to whole numbers to rename the whole number as a fraction. Students compose the whole number fraction and the fraction less than 1 to rename the mixed number as a fraction greater than 1.

In topic B, students use area models to generate equivalent fractions.