# Learning About Fractions

Many students come to this unit with an understanding that *half* indicates a *part* of an object or set. However, as the word *half* is used in common language, it does not necessarily imply the precision of the mathematical definition. The new idea for many students is that half indicates two *equal* parts.

One half is an example of a new kind of number—the fraction—and this new kind of number brings with it new conceptual challenges. Up until now, numbers have been associated with the action of counting to designate quantity. Fractions fall *in between* the counting numbers.

A fractional quantity is designated by *two* counting numbers in relation to each other and in relation to a given whole. For example, the quantity $\frac{3}{4}$ *of a rectangle* is designated by the two counting numbers 3 and 4, in relation to each other and in relation to one whole rectangle. The denominator (the bottom number of the fraction) indicates the number of equal parts that make up the whole; the numerator (the top number of the fraction) indicates the number of those parts that make up the quantity. In the figure below, $\frac{3}{4}$ of the rectangle is shaded. The whole is divided into four equal parts (the denominator), and three of these parts (the numerator) make up the shaded quantity.
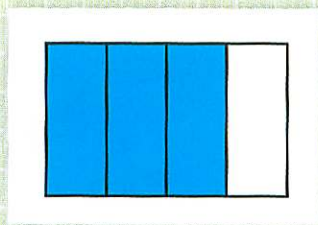
In this example, the whole (the rectangle) is a single object. However, the whole can also be a set of objects. The example of $\frac{3}{4}$ of a bag of 8 marbles is shown below.
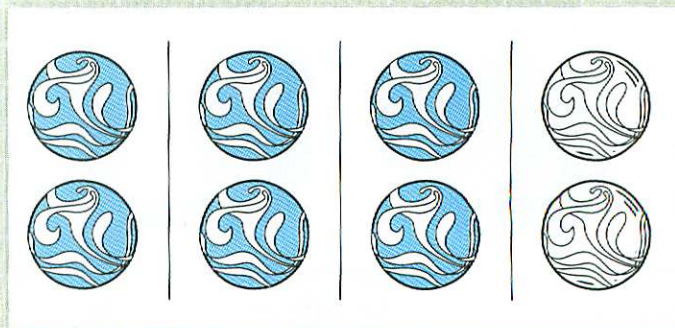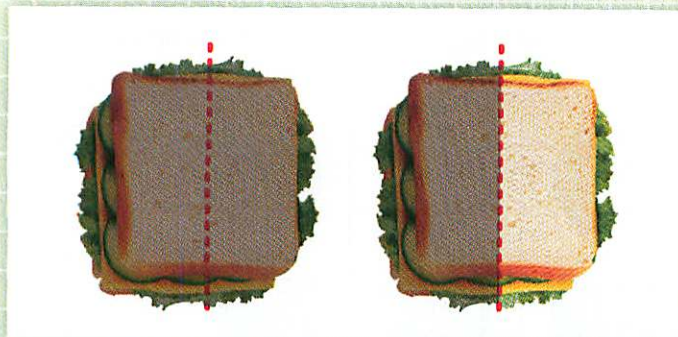
As students move beyond $\frac{1}{2}$ to consider other fractional amounts, they must keep in mind that fractions always involve *equal* parts. Throughout the unit, look for opportunities to pose questions to students that draw their attention to this idea.
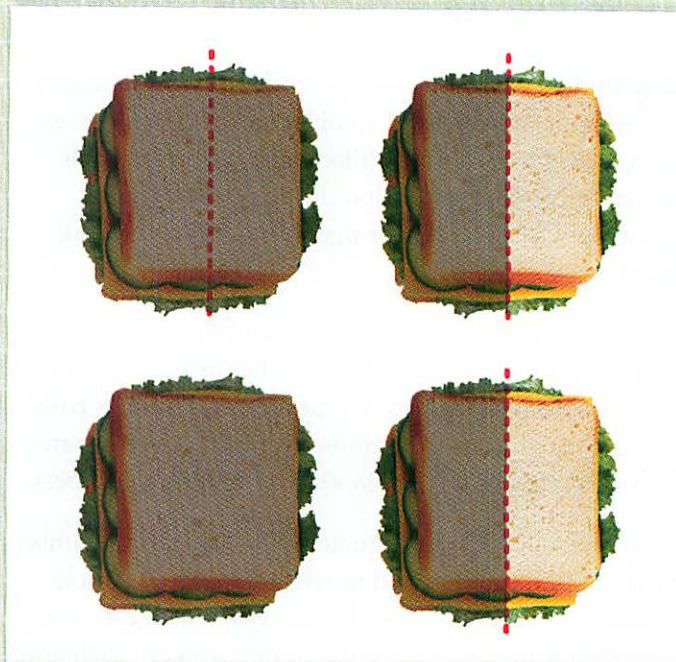
In this unit, students work with unit fractions, or fractions such as $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ that have a numerator of 1. They also work with fractions whose numerator is greater than 1, such as $\frac{2}{3}$, $\frac{2}{4}$, and $\frac{3}{4}$. As students engage in the activities, they may begin to think about other types of fractions. For example, some students may realize that $\frac{4}{4}$ is a whole that is expressed as a fraction.
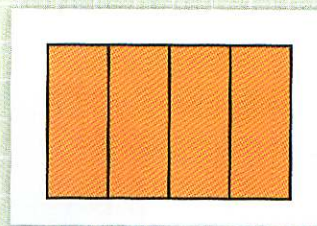
Some students may also realize that fractions can represent quantities greater than 1. For example, if two sandwiches are cut in half and one person takes three pieces, that person has three half sandwiches, or $\frac{3}{2}$ of a sandwich.

Students may also notice that different fractions can represent the same quantity. For example, $\frac{2}{4}$ of a sandwich is the same as $\frac{1}{2}$ of a sandwich.

$\frac{4}{4}$ of a sandwich is the same as 1 whole sandwich.

$\frac{3}{2}$ of a sandwich is the same as $1\frac{1}{2}$ sandwiches.
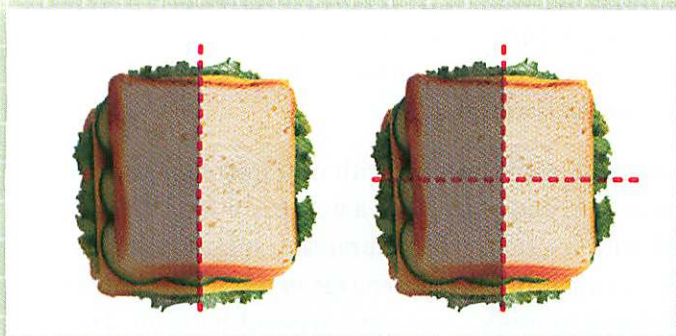
Students continue to develop their knowledge and understanding about fractions as they work with fractions of a single whole and fractions of a set of objects in later grades.