Understanding Fractions

We will be taking a lot of our content on fractions this semester from the Rational Number Project, a teaching and learning project for rational numbers in grades 3-5 (based largely at the University of Minnesota). This observation in from the Rational Number Project explains some of the challenges (and implies some of the goals) for teaching and learning fractions:

> Children have difficulty internalizing that the symbol for a fraction represents a single entity. When asked if 2/3 was one or two numbers, many children would say that the symbol represented two numbers. When students consider 2/3 as two numbers then it makes sense to treat them like whole numbers. For example, when students add two fractions by adding the numerators and then denominators, they are interpreting the symbols as four numbers, not two. Many errors with fractions can be traced to students' lack of mental images for the quantity the symbol represents.

Our first goal is to explore the meaning of fractions.

We'll also be referring to this goal for fraction understanding from the 3rd grade Common Core Standards:

> CCSS.MATH.CONTENT.3.NF.A.1
> Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.

Some key ideas are:

1. The visual representation of a fraction depends on the chosen whole.
    a. The whole and the part are related so strongly that if you know the size of the whole unit, you can find the size of a unit-fraction part (a unit fraction is one whose numerator is 1) by splitting the whole into equal sized parts.
    b. If you know the size of a unit-fraction part, you can find the size of the whole unit by repeating the part.
2. The parts in a visual representation of a fraction must all be the same size.
3. The denominator names the size of a fraction piece: 3/4 means 3 **fourths** (or three **1/4s**) and the numerator tells how many pieces there are.
4. A fraction tells a single number.

In this first lesson, you'll be writing out fraction names in words, like "3 fourths". We're practicing this to help us remember and appreciate a teaching lesson that comes from the Rational Number Project:

> Students initially record fractions in words like: 1-fourth; 1-sixth. Research suggests that students make fewer reversals with the symbols (for example, writing 3/2 for 2/3) when they first write fractions in words.

Quotes from the Rational Number Project on this page come from the Teacher's Guide and Lesson 1-3 from the 2009 version of RNP-1.