

## Building on Unit Fractions: Understanding fractions as numbers (grades 3-5)

The most important idea for basic fraction knowledge in the common core standards is how to present fractions in terms of unit fractions, as described below:

A **unit fraction** is a fraction whose numerator is 1. To show the unit fraction  $1/b$  in any of our models, we start with a representation of 1 whole, and divide it into  $b$  equal parts. Each of those parts represents the fraction  $1/b$ . This is always the way that these fractions are defined and presented, so only the name *unit fraction* should be new to you.

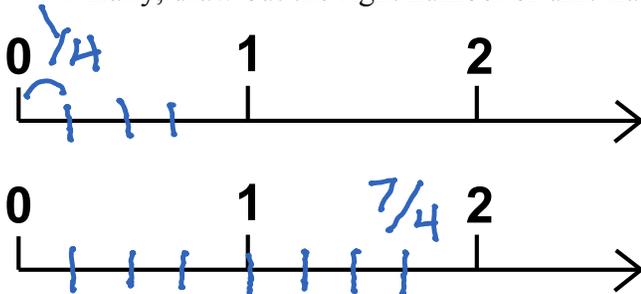
Fractions with a numerator greater than 1 are represented and explained as a sum of unit fractions, so  $2/3$  is 2 units of size  $1/3$ , and  $9/4$  is 9 units of size  $1/4$ . This is slightly different from the most common way of presenting such fractions. The most common way of explaining  $2/3$  is to say that it is two out of 3 equal parts of a whole. That explanation works OK for fractions that are less than 1 (proper fractions), but it leads to misunderstandings when children encounter fractions that are greater than 1 (improper fractions). This is the most fundamental change suggested for teaching and understanding fractions in the Common Core Standards compared to the way things have usually been done in the past, and it is a topic of emphasis in grade 3.

### Key concepts and steps:

1. Draw, show or define the whole first
2. Split the whole into equal parts to show how big a unit fraction is
3. Show the fraction by making more parts the same size as the unit fraction until your fraction is complete.

### Example (show $7/4$ on a number line):

- Start with a number line that's marked to show how long 1 whole is.
- Next, split the whole unit into 4 equal parts to show the size of the unit fraction ( $1/4$ )
- Finally, draw out the right number of unit fractions to make the fraction you want to show ( $7/4$ )



Mark the unit length 1 on the number line, and partition it into 4 equal parts ( $1/4$ )

Draw 7 parts that are each  $1/4$  long and label the end  $7/4$

CCSS: Understanding fractions as repeated unit fractions is an explicit standard at third grade, and is again reiterated at fourth grade:

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  $1/b$ .

CCSS.Math.Content.4.NF.B.3 Understand a fraction  $a/b$  with  $a > 1$  as a sum of fractions  $1/b$ .