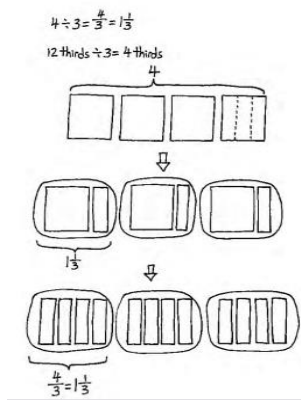


Multiplication and Division of Fractions and Decimal Fractions

In this 38-day module, students learn to multiply fractions and decimal fractions and start work with fraction division. Students will begin by measuring fractional parts on a number line as a concrete way of understanding fractional parts of a whole, and eventually move to more abstract fraction operations.

A diagram of $4 \div 3$ showing fractional division:



New Terms in this Module:

Decimal divisor - the number that divides the whole and that has units of tenths, hundredths, thousandths, e.g. $1/100$

Simplify - using the largest fractional unit possible to express an equivalent fraction, e.g. $4/6$ simplifies to $2/3$, with the denominator 3 being a larger fractional unit than 6

Familiar Terms with Some Definitions:

- Denominator
- Decimal Fraction
- Equation
- Equivalent Fraction
- Factors - numbers that are multiplied to obtain a product
- Line Plot
- Mixed Number
- Numerator
- Tape Diagram
- Unit - one segment of a partitioned tape diagram
- Unknown - the missing factor or quantity in multiplication or division
- Whole Unit - any unit that is partitioned into smaller, equally sized fractional units

$4 \div 3$, shown as a traditional algorithm division problem:

$$\begin{array}{r} 1\frac{1}{3} \\ 3 \overline{)4} \\ \underline{-3} \\ 1 \end{array}$$

Check: $3 \times 1\frac{1}{3}$
 $= 1\frac{1}{3} + 1\frac{1}{3} + 1\frac{1}{3}$
 $= 3 + \frac{3}{3}$
 $= 4$

Each bag of cats weighs $1\frac{1}{3}$ Kilograms.

What Came Before this Module: We learned to add and subtract fractions with unlike denominators, moving from concrete to abstract examples.

What Comes After this Module: In Module 5, we will work with the area and volume of two- and three-dimensional figures.

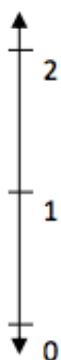
+ How you can help at home:

- Continue to practice and review multiplication and division math facts - this greatly supports work with fractions!
- Look for opportunities in daily life to discuss both fractional parts of a whole and of other fractions, e.g. What is $\frac{1}{4}$ of 20? $\frac{1}{4}$ of $\frac{1}{2}$?

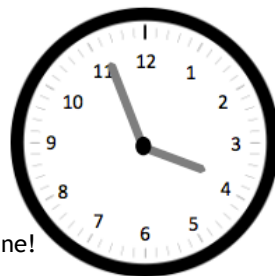
Key Common Core Standards:

- Write and interpret numerical expressions.
- Perform operations with multi-digit whole numbers and with decimals to hundredths.
- Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
- Convert like measurement units within a given measurement system.
- Represent and interpret data.

Various types of number lines:

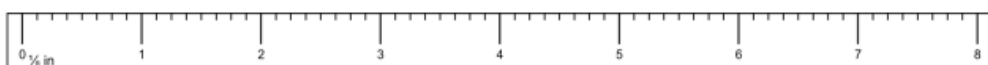


Vertical number line



The clock - a circular number line!

A ruler number line



Spotlight on Math Models:

Number Lines

You will often see this mathematical representation in *A Story of Units*.

A Story of Units has several key mathematical “models” that will be used throughout a student’s elementary years.

The number line is a powerful, flexible model that students can use in many ways. In this particular module, students begin to understand the idea of fractions as division by marking a ruler or line plot with $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ increments.

The number line is used beginning in Kindergarten in *A Story of Units*, and will continue to appear in various forms through 5th grade. It is used to develop a deeper understanding of whole number units, fraction units, measurement units, decimals, and negative numbers. Often, the mathematical concepts in an *ASOU* module move from concrete to more abstract, and the number line is an important concrete conceptual step for students of all ages.

Sample Problem from Module 4:
(Example taken from Lesson 5)

Forty students shared 5 pizzas equally. How much pizza did each student receive?

What fraction of the pizza did each student receive?

Note the use of a tape diagram as well as the drawing showing division of a whole number into fractional parts:

