

Number and Operations—Fractions

Domain Overview

GRADE 3

Students use visual models, including area models, fraction strips, and the number line, to develop conceptual understanding of the meaning of a fraction as a number in relationship to a defined whole. They work with unit fractions to understand the meaning of the numerator and denominator. They build equivalent fractions and use a variety of strategies to compare fractions. In Grade 3, denominators are limited to 2, 3, 4, 6, and 8.

GRADE 4

Fourth graders extend understanding from third grade experiences, composing fractions from unit fractions and decomposing fractions into unit fractions, and apply this understanding to add and subtract fractions with like denominators. They begin with visual models and progress to making generalizations for addition and subtraction fractions with like denominators. They compare fractions that refer to the same whole using a variety of strategies. Using visual models and making connections to whole number multiplication supports students as they begin to explore multiplying a whole number times a fraction. In Grade 4, denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100. Students build equivalent fractions with denominators of 10 and 100 and connect that work to decimal notation for tenths and hundredths.


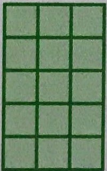
GRADE 5

Fifth graders build on previous experiences with fractions and use a variety of visual models and strategies to add and subtract fractions and mixed numbers with unlike denominators. Problem solving provides contexts for students to use mathematical reasoning to determine whether their answers make sense. They extend their understanding of fractions as parts of a whole to interpret a fraction as a division representation of the numerator divided by the denominator. Students use this understanding in the context of dividing whole numbers with an answer in the form of a fraction or mixed number. They continue to build conceptual understanding of multiplication of fractions using visual models and connecting the meaning to the meaning of multiplication of whole numbers. The meaning of the operation is the same; however, the procedure is different. Students use visual models and problem solving contexts to develop understanding of dividing a unit fraction by a whole number and a whole number by a unit fraction. Once conceptual understanding is established, students generalize efficient procedures for multiplying and dividing fractions.

SUGGESTED MATERIALS FOR THIS DOMAIN

3	4	5	
	✓	✓	Decimal models (base-ten blocks) (Reproducible 4)
✓	✓	✓	Fraction area models (circular) (Reproducible 5)
✓	✓	✓	Fraction area models (rectangular) (Reproducible 6)
✓	✓	✓	Fraction strips/bars (Reproducible 7)
✓	✓	✓	Grid paper (Reproducible 3)
✓	✓	✓	Objects for counting, such as beans, linking cubes, two-color counter chips, coins
✓	✓	✓	Place value chart (Reproducible 8)

KEY VOCABULARY

3	4	5	
✓	✓	✓	<p>area model a concrete model for multiplication or division made up of a rectangle. The length and width represent the factors, and the area represents the product.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>3×5</p> </div> <div style="text-align: center;">  <p>5×3</p> </div> </div>
✓	✓	✓	<p>benchmark a number or numbers that help to estimate or determine the reasonableness of an answer. Sample benchmarks for fractions include 0, $\frac{1}{2}$, 1.</p>
	✓	✓	<p>decimal fraction a fraction whose denominator is a power of 10, written in decimal form (for example, 0.4, 0.67)</p>
✓	✓	✓	<p>denominator the number of equal-sized pieces in a whole, the number of members of a set with an identified attribute. The bottom number in a fraction.</p>
	✓	✓	<p>equivalent fractions fractions that name the same amount or number but look different (Example: $\frac{2}{3}$ and $\frac{6}{9}$ are equivalent fractions)</p>
	✓	✓	<p>hundredth one part when a whole is divided into 100 equal parts</p>
	✓	✓	<p>like denominator (common denominator) having the same denominator</p>
	✓	✓	<p>like numerator (common numerator) having the same numerator</p>

(Continued)

KEY VOCABULARY

3

4

5

✓

✓

✓

measurement division (equal groups model) a division model in which the total number of items and the number of items in each group is known. The number of groups that can be made is the unknown.

Example: I have 3 yards of ribbon. It takes $\frac{1}{6}$ of a yard to make a bow. How many bows can I make? (How many groups of $\frac{1}{6}$ yards can I make from 3 yards?)

✓

✓

mixed number a number that is made up of a whole number and a fraction (for example, $2\frac{3}{4}$)

✓

✓

✓

numerator the number in a fraction that indicates the number of parts of the whole that are being considered. The top number in a fraction.

✓

✓

✓

partitive division (fair share model) a division model in which the total number and the number of groups is known and the number of items in each group is unknown.

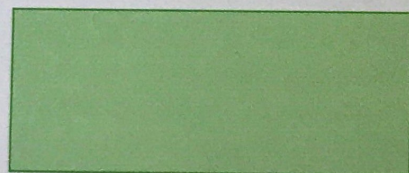
Example: Erik has $\frac{1}{2}$ of a gallon of lemonade. He wants to pour the same amount in 5 glasses. How much lemonade will he pour into each glass if he uses all of the lemonade?

✓

scale (multiplication) compare the size of a product to the size of one factor on the basis of the size of the other factor

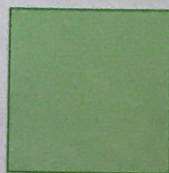
Example: Compare the area of these rectangles. When you double *one* dimension, the area is doubled.

10 in



5 in

5 in



5 in

✓

✓

tenth one part when one whole is divided into 10 equal parts

✓

✓

✓

unit fraction a fraction with a numerator of one, showing one of equal-sized parts in a whole (for example, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$)