



FIFTH GRADE MATHEMATICS – Unit 6

Dear Parents,

During Unit 6, your child will use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

MULTIPLYING AND DIVIDING FRACTIONS

Students need to:

Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)

b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

Interpret multiplication as scaling (resizing), by:

a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.

b. Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for $4 \div (1/5)$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (1/5) = 20$ because $20 \times (1/5) = 4$.

Make a line plot to display a data set of measurements in fractions of a unit ($1/2, 1/4, 1/8$). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.

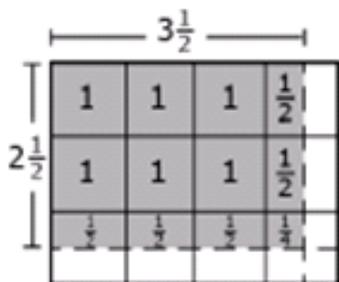
KEY VOCABULARY

Unit Fraction
Numerator
Denominator
Mixed number
Multiple
Factor
Product
Expression
Equation
Benchmark fractions

The reflexive property of equality $a=a$

The identity property (multiplicative identity) $1 * a = a$
If the product of two numbers is one, the numbers are multiplicative inverses. Since $6 * 1/6 = 1$ (the multiplicative identity), the multiplicative inverse of 6 is $1/6$. (Zero does not have a multiplicative inverse, since no matter what you multiply it by, the answer is always 0, not 1.)

BACKGROUND INFORMATION AND EXAMPLES FOR PARENTS



A student proves that

$$2\frac{1}{2} \times 3\frac{1}{2} = 8\frac{3}{4}$$

Dividing a Fraction by a Whole Number

<http://video.carrollk12.org/view/HOUSEALDIVIDINGAFRACTIONBYAWHOLENUMBER>

Dividing a Whole Number by a Fraction

<http://video.carrollk12.org/view/HOUSEALDIVIDINGAWHOLENUMBERBYAFRACTION>

Multiplying Fractions Using an Area Model

<http://video.carrollk12.org/view/HOUSEALMULTFRACTIONSWITHAREAMODEL>

Multiplying Fractions with Whole Numbers and Mixed Numbers

<http://video.carrollk12.org/view/HOUSEALMULTFRACTIONSWITHWHOLEANDMIXEDNUMBERS>

WAYS PARENTS CAN HELP

Help your child to make real world problem connections with multiplication and division of fractions when they come up in your home.

For example:

- cutting a recipe in half would be the same as multiplying each ingredient amount by $\frac{1}{2}$ ($\frac{1}{2}$ of $\frac{1}{4}$ cup would be $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$ cup) or by dividing it by 2 ($\frac{1}{4}$ cup divided by 2 would be $\frac{1}{4} \div 2 = \frac{1}{8}$ cup)
- doubling a recipe would be the same as multiplying each ingredient by 2 ($\frac{1}{4}$ cup doubled is $\frac{1}{4} \times 2 = \frac{2}{4}$ cup).