
Math Mammoth Fractions 2

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Introduction

Math Mammoth Fractions 2 continues the study of fraction topics after *Math Mammoth Fractions 1*. I sincerely recommend that the student study the **Fractions 1** book prior to studying this book, if he has not already done so.

I have made a set of videos to match many of the lessons in this book. You can access them at http://www.mathmammoth.com/videos/fractions_2.php

This book is meant for fifth or sixth grade, and deals in-depth with the following topics:

- simplifying; including simplifying before multiplying
- multiplication of fractions (and of mixed numbers);
- division of fractions (and of mixed numbers);
- converting fractions to decimals.

We start out by simplifying fractions. Since this process is the opposite of making equivalent fractions, studied in *Math Mammoth Fractions 1*, it should be relatively simple for students to understand. We also use the same visual model, just backwards: This time the pie pieces are joined together instead of split apart.

Next comes multiplying a fraction by a whole number. Since this can be solved by repeated addition, it is not a difficult concept at all.

Multiplying a fraction by a fraction is first explained as taking a certain part of a fraction, in order to teach the concept. After that, students are shown the usual shortcut for the multiplication of fractions.

Then, we find the area of a rectangle with fractional side lengths, and show that the area is the same as it would be found by multiplying the side lengths. Students multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

Simplifying before multiplying is a process that is not absolutely necessary for fifth graders. I have included it here because it prepares students for the same process in future algebra studies and because it makes fraction multiplication easier. I have also tried to include explanations of *why* we are allowed to simplify before multiplying. These explanations are actually *proofs*. I feel it is a great advantage for students to get used to mathematical reasoning and proof methods well before they start high school geometry.

Students also multiply mixed numbers, and study how multiplication can be seen as resizing or scaling. This means, for example, that the multiplication $(2/3) \times 18$ km can be thought of as finding two-thirds of 18 km.

Next, we study division of fractions in special cases. The first one is seeing fractions *as* divisions; in other words recognizing that $5/3$ is the same as $5 \div 3$. This of course gives us a means of dividing whole numbers and getting fractional answers (for example, $20 \div 6 = 3 \frac{2}{6}$).

Then students encounter sharing divisions with fractions. For example, if two people equally share $4/5$ of a pizza, how much will each person get? This is represented by the division $(4/5) \div 2 = 2/5$. Another case we study is dividing unit fractions by whole numbers (such as $(1/2) \div 4$). We also divide whole numbers by unit fractions, such as $6 \div (1/3)$. Students will solve these thinking how many times the divisor “fits into” the dividend.

After these types of divisions, students learn the “shortcut” for fraction division, that is, the usual rule for dividing any fraction by any fraction (the rule of “invert and multiply”). We also study dividing mixed numbers.

The lesson on introduction to ratios is optional. Ratios will be studied a lot in 6th and 7th grades, especially in connection with proportions. We are laying the groundwork for that.

The last major topic is converting fractions to decimals. Problems accompanied by a small picture of a calculator are meant to be solved with the help of a calculator. Otherwise, a calculator should not be allowed.

I wish you success in teaching math!

Maria Miller, the author

Helpful Resources and Games on the Internet

Use these free online resources to supplement the “bookwork” as you see fit.

Fraction Videos for Math Mammoth Fractions 2 book

A set of videos by the author that tie in with the lessons in this book.

http://www.mathmammoth.com/videos/fractions_2.php

General

Visual Fractions

Great site for studying all aspects of fractions: identifying, renaming, comparing, addition, subtraction, multiplication, division. Each topic is illustrated by either a number line or a circle with a Java applet. Also couple of games, for example: make cookies for Grampy.

<http://www.visualfractions.com/>

Conceptua Math

Conceptua Math has free, interactive fraction tools and activities that are very well made. The activities include identifying fractions, adding and subtracting, estimating, finding common denominators and more. Each activity uses several fraction models such as fraction circles, horizontal and vertical bars, number lines, etc. that allow students to develop conceptual understanding of fractions.

www.conceptuamath.com

Fractioncity

Make “fraction streets” and help kids with comparing fractions, equivalent fractions, addition of fractions of like and unlike denominators while they drive toy cars on the streets. This is not an online activity but has instructions of how to do it at home or at school.

<http://www.teachnet.com/lesson/math/fractioncity.html>

Simplifying & Equivalent Fractions

Equivalent Fractions

Draw two other, equivalent fractions to the given fraction. Choose either square or circle for the shape.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=80>

Fraction Frenzy

Click on pairs of equivalent fractions, as fast as you can. See how many levels you can get!

<http://www.learningplanet.com/sam/ff/index.asp>

Fresh Baked Fractions

Practice equivalent fractions by clicking on a fraction that is not equal to others.

<http://www.funbrain.com/fract/index.html>

Fraction Worksheets: Simplifying and Equivalent Fractions

Create custom-made worksheets for fraction simplification and equivalent fractions.

<http://www.homeschoolmath.net/worksheets/fraction.php>

Multiplication and Division

Multiply Fractions Jeopardy

Jeopardy-style game. Choose a question by clicking on the tile that shows the points you will win.

<http://www.quia.com/cb/95583.html>

Multiply and Reduce Fractions Battleship Game

When you hit the enemy's battleship, you need to solve a fraction multiplication problem.

<http://www.quia.com/ba/57713.htm>

Fractions Mystery Picture Game

Solve problems where you find a fractional part of a quantity, and uncover a picture.

<http://www.dositey.com/2008/math/mistery2.html>

Number line bars

Fraction bars that illustrate visually how many times a fraction "fits into" another fraction .

http://nlvm.usu.edu/en/NAV/frames_asid_265_g_2_t_1.html?open=activities&from=category_g_2_t_1.html

Fraction Worksheets: Addition, Subtraction,

Multiplication, and Division

Create custom-made worksheets for fraction addition, subtraction, multiplication, and division.

<http://www.homeschoolmath.net/worksheets/fraction.php>

Free worksheets for order of operations

Generate printable & customizable worksheets for order of operations. Choose from five operations and parentheses. You can choose the number range used, number of problems, and more.

http://www.homeschoolmath.net/worksheets/order_of_operations.php

My Dear Aunt Sally

A fun game you can play online for free, or purchase as an app. Choose whole numbers, integers, fractions, decimals, or rational numbers, and then which of the five operations to use. In the game, you need to place the given numbers into two expressions so that the operations make the two expressions have the same value.

<http://www.mydearauntsally.com>

Fractions vs. Decimals (and Percents)

Fraction Pie

The user selects the numerator and denominator, and the applet shows the fraction as a pie/rectangle/set model, as a decimal and as a percent.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=45>

Compare Fractions and Percentages Game

Drag numbers to the blackboard to make percentages and fractions, and the program then colors that part of a quantity so you can compare them. You can choose between many different models to do this (pizza, group of people, pitcher, chocolate bar).

<http://www.bbc.co.uk/skillswise/game/ma18comp-game-percentages-and-fractions-side-by-side>

Fraction Decimal Conversion

Practice fractions vs. decimal numbers online with a matching game, concentration, or flash cards.

www.quia.com/jg/65724.html

Fraction/Decimal Worksheets

Change fractions to decimal numbers or decimal numbers to fractions.

<http://www.homeschoolmath.net/worksheets/fraction-decimal.php>

Fractions Vs. Decimals Calculator

www.counton.org/explorer/fractions/

Fraction Model

Adjust the the numerator and the denominator, and the applet shows the fraction as a pie/rectangle/set model, as a decimal and as a percent.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=44>