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# 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 the student study *Fractions 1* book prior to studying this book, if he hasn't already.

The book at hand is meant for 5th or 6th 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.

The topics of simplification, multiplication, and division of fractions are, again, first studied with the help of visual models. Students also complete various exercises using these visual models, before embarking on the more abstract exercises. This helps ensure that the student understands the underlying concepts, instead of merely following a rule.

The study of fractions involves a lot of “rules” or shortcuts. Shortcuts in themselves are not bad; it certainly is easier and quicker to multiply or divide fractions using them. Therefore, it is needful to study and know the shortcuts, but students should not learn them only. With each topic, the students study the visual models and mental math problems first, before practicing the mechanical application of the shortcuts.

The topic of *simplifying fractions* is presented as joining or merging slices together. This is the opposite process of splitting the pieces (equivalent fractions in *Math Mammoth Fractions 1*). Working with the visual model leads us to the “shortcut” of dividing the numerator and the denominator by some same number.

Multiplication of fractions is studied in several steps. First, we study multiplying fractions by a whole number, which can be solved with repeated addition. The next lesson studies the connection between  $(fraction) \times (whole\ number)$  and  $(whole\ number) \times (fraction)$  (for example,  $1/4 \times 20$  and  $20 \times 1/4$ ), and explains how  $(a\ fraction)$  times  $(a\ whole\ number)$  means a fractional part of that number. This is all leading towards the full understanding of fraction multiplication being a fractional part of another fraction, and using the shortcut to solve such problems.

The mental idea of finding  $2/3$  of  $4/5$ , say, is developed through several steps. First, students learn to find a fractional part of another fraction that is in the form  $1/n$  ( $n$  being a whole number). For example,  $1/3$  of  $1/5$  is  $1/15$  (this is justified visually). Then they learn that  $2/3$  of  $1/5$  is just double the answer to  $1/3 \times 1/5$ , so it is  $2/15$ . Then, the shortcut (the rule) for fraction multiplication is introduced, and it is justified by a “roundabout way” of solving fraction multiplications, which just means figuring it out in several steps.

Students also study simplifying before multiplying, multiplication and area, multiplying mixed numbers, and compare fraction vs. decimal multiplication.

After this, we turn our study to division. Again, there are several lessons that start out with easy, mental division problems, and gradually work towards the general case and the shortcut or rule for fraction division. This way students can truly learn fraction division conceptually.

The last major topic is converting fractions to decimals. Students learn to use first long division, and then the calculator for the conversion. They learn about repeating decimals. In this context, we also study converting measurements in the customary system into a decimal form, such as writing 2.34 miles as 2

miles 1,795 feet, or changing 4 ft 5 in to 5.42 ft.

The last lesson in the book compares ratios and fractions, and shows how both concepts can be used in solving word problems.

The answers are in the end of the book. After the answers, I have included printable fraction cutouts, with which you can make your own fraction manipulatives. Most children probably don't need the physical manipulatives anymore, if they have a solid foundation with the pie pictures from earlier fraction studies, but they are included here for the sake of completeness.

*I wish you success in your math teaching!*

*Maria Miller, the author*

## **Helpful Resources and Games on the Internet**

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

*You can access an up-to-date online version of this list at*

[www.mathmammoth.com/weblinks/fractions\\_2.htm](http://www.mathmammoth.com/weblinks/fractions_2.htm)

### ***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](http://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>