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# Math Mammoth Division 1

## Divide, And Conquer the Concepts

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# Introduction

*Math Mammoth Division 1* is a worktext about basic single-digit division, remainder, and divisibility. It is most suitable for third grade, after the student knows the multiplication tables.

The division concept in itself is not very difficult - after all, it is like backwards multiplication. However, children can have difficulties in related concepts, such as the remainder, divisibility, and later in factoring and long division (the latter two are not dealt with in this book).

The aim of *Math Mammoth Division 1* is to lay a good foundation in basic division, cementing the link between multiplication and division, and then to solidly study the concepts of the remainder and divisibility. Understanding these is required when (later) studying factoring and long division.

There are basically two ways of illustrating division with concrete objects. The first method has to do with dividing objects between a certain number of persons. For example, the problem  $12:3$  would be, "If you have 12 bananas and 3 people, how many bananas does each one get?"

The second method has to do with grouping. The problem  $12:3$  would be: "If you have 12 people, how many groups of 3 people can you make?" These two interpretations of division are important to understand so that your child can solve problems of everyday life.

This book provides plenty of practice and stresses understanding the concepts. I don't wish the student to memorize procedures without understanding the "why" (rote memorization).

For example, when studying the remainder, the student first finds the remainder with the help of pictures - which is equivalent to using manipulatives. Then he explores the pattern found in dividing sequential numbers by the same number, such as  $25 \div 3$ ,  $26 \div 3$ ,  $27 \div 3$ ,  $28 \div 3$ , etc. After that, it is explained that you can find the remainder by looking at a certain difference, and finally the typical schoolbook method is presented.

The prerequisite for this book is knowing the times tables fairly well. The child can start studying division even if he still needs some practice with the multiplication tables, but he should finish mastering the tables before advancing very much with the lessons of this book.

## The Lessons

The lesson **Division as Making Groups** deals with the basic concept of division as making certain size groups.

**Division and Multiplication** shows the fundamental connection between these two operations, with pictures. Both operations can be illustrated with several certain size groups. Solving division problems by thinking through multiplication is of course the goal.

**Division and Multiplication Facts** deals with the fact families where you form four facts with the same numbers.

**Sharing and Dividing Evenly Into Groups** are lessons about the other meaning of division. In the first lesson, the child was separating certain size groups, and finding how many groups. Now, the child is dividing the objects into a certain number of groups, and finding how many in each group. This latter task is more difficult, as one practically has to know beforehand what size the groups are in order to make the groups. This meaning of division is needed very often in solving word problems.

**Zero in Division** explains why one can't divide by zero. Often children forget that or confuse it with other facts about zero and one. Try to emphasize the thought presented there: that dividing something between zero persons doesn't make sense. Other more mathematical explanations exist but are not explained in the lesson. One such explanation is that if indeed  $a \div 0$  was possible and gave the result  $b$ , or if indeed  $a \div 0 = b$ , then it follows that  $b \times 0 = a$ , which is not true unless  $a$  was 0.  $0 \div 0$  is also termed undefined in standard mathematics.

**Division as Repeated Subtraction** reminds the student how multiplication is repeated addition, and then shows how division can be seen as repeated subtraction. Number line illustrations with jumps are also used. Solving division problems with repeated subtraction is not the main focus of this book - instead the main goal is of course to use memorized multiplication facts in order to find the answer to a division problem. Repeated subtraction as a concept can help in strengthening the division concept, and is useful later, in understanding long division.

**Number Rules** is practice in recognizing or following simple number rules, such as: first divide a number by 5, then add 2. These exercises develop algebraic thinking.

**When Division Is Not Exact** introduces the concept of the remainder. The first exercises are solved with pictures. In exercise 2, patterns emerge that help develop the understanding that the remainder is always less than the divisor. The remainder is found by looking at the difference, and writing problems horizontally is done on purpose. This way the child is more likely to think and understand the idea, without resorting to rote memorization without understanding.

**Divisibility** concentrates on the concept of exact division and divisibility. There are several exercises pointing out how numbers divisible by a certain number are exactly those in that multiplication table. They also show the patterns in the remainders.

**Divisibility by 2, 5, 10, 3, and 4** defines even and odd numbers, and lets the student explore and find numbers that are divisible by 2, 5, 10, 3, or 4. Divisibility rules are not spelled out in this lesson.

*Answers are at the end of the book.*

*I wish you success in teaching math!*

*Maria Miller, the author*

## Helpful Resources on the Internet

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

### Free worksheets for grade 3

These worksheets are randomly generated each time you click on the link. You can also get a different one just by pushing “refresh” in your browser (or F5 from your keyboard). Includes many kinds of worksheets for division.

[http://www.homeschoolmath.net/worksheets/grade\\_3.php](http://www.homeschoolmath.net/worksheets/grade_3.php)

### Rectangle Division

Practice division with remainders using a rectangle model.

[http://nlvm.usu.edu/en/nav/frames\\_asid\\_193\\_g\\_2\\_t\\_1.html](http://nlvm.usu.edu/en/nav/frames_asid_193_g_2_t_1.html)

### Mr. Martini's Classroom: Multiplication and Division Inequalities

Compare expressions involving basic multiplication and division.

<http://www.thegreatmartinicompany.com/inequalities/multiplicationdivinequality.html>

### Mystery Picture Game

Using division and addition.

<http://www.dositey.com/2008/math/m/mystery2AD.htm>

### Exuberant Eye games

Practice your basic facts with these kid-appealing simple games.

<http://www.games.exuberanteye.com/>

### Math Magician games

Flashcard problems in all 4 operations. Answer 20 questions in 1 minute.

<http://www.oswego.org/ocsd-web/games/Mathmagician/cathymath.html>

### ArithmeTiles

Use the four operations and numbers on neighboring tiles to make target numbers.

<http://www.primarygames.com/math/arithmetiles/>

### MathCar Racing

Keep ahead of the computer car by thinking logically, and practice any of the four operations at the same time.

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

### Math Mountain

Climb to the top of the mountain by answering simple math questions faster than your opponent (computer or human).

[http://www.pompuzzle.com/Math\\_Mountain](http://www.pompuzzle.com/Math_Mountain)