
Math Mammoth Division 1
Divide, And Conquer the Concepts

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Introduction

Division concept in itself is not very difficult - after all, it is like backwards multiplication. But, children can have difficulties in related concepts, such as remainder, divisibility, and later (not topics in this book) factoring and long division.

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

Math Mammoth Division 1 book provides plenty of practice and stresses understanding of concepts. I don't wish the student to memorize procedures without understanding the 'why' (rote memorization).

For example, when studying remainder, the student first finds the remainder with help of pictures - which is equivalent to using manipulatives. Then he explores the pattern found in dividing subsequent numbers by the same number, such as $25 \div 3$, $26 \div 3$, $27 \div 3$, $28 \div 3$, etc. After that, the method for finding remainder is given as, "Look at the difference", and finally the typical school-book method with subtraction is presented.

The pre-requirement for this book is knowing the times tables fairly well. You can still start here even if your child is still needing some practice with the tables, but she should finish mastering the tables fairly soon before you do a lot of division practice.

There are basically two ways of illustrating division with concrete objects. First one can be explained by having some objects that you divide between certain number of persons. For example, problem 12:3 can be asked, "If you have 12 bananas and 3 people, how many bananas does each one get?" The second one is in terms of grouping. The problem 12:3 would be: "If you have 12 people, how many groups of 3 people can you make?" These are important to understand so that your child can solve problems of everyday life where we use division. Therefore we need to do lots of word problems while studying division.

The Lessons

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.

Dividing Evenly Into Groups is a lesson about the other meaning of division. In the earlier lesson, the child was separating certain size groups, and finding how many groups. Now, the child is dividing the objects into 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 groups to make, in order to make the groups. But this meaning of division is also very commonly needed in solving word problems.

Zero and One in Division explains why one can't divide by zero. Often kids 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 some 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 repeated subtraction. Number line illustrations with jumps are also used. Solving division problems with repeated subtraction is not the main focus of this ebook - instead the main goal is of course to use memorized multiplication facts in order to find answer to division problem. But repeated subtraction as a concept can help in strengthening the division concept, and is useful later, in understanding the 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 remainder. The first exercises are solved with pictures. In exercise 2, patterns emerge that help develop the understanding that remainder is always less than 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 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 5, 10, 3, or 4. Divisibility rules are not spelled out in this lesson.

Checking Division with Remainder points out that when checking $20 \div 3 = 6, R 2$ with multiplication, you need to add the remainder to the product. Number line jumps help illustrate the concept.

Answers are in the end of the book.

I wish you success in your math teaching!

Maria Miller, the author