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Introduction

Math Mammoth The Four Operations (with a Touch of Algebra) is a mathematics worktext meant primarily for fifth and sixth grades. Some of the lessons can also be used in seventh grade.

A worktext means that the book is a textbook and workbook together: the lessons include both the explanations of the concepts, as well as practice exercises.

The lessons in this worktext have been taken from the Math Mammoth complete curriculum for fifth and sixth grades. For this reason, they may not always flow smoothly from one lesson to the next with a perfect continuity, though I have tried to present them here in the most logical order. For example, there are two lessons for the order of operations: one is from the fifth grade curriculum, and the other is from sixth grade. There is certainly some overlap between them, and the teacher can choose to omit some exercises in one or the other.

The main topics studied in this book are simple equations, expressions that involve a variable, the order of operations, long multiplication, long division, and graphing simple linear functions.

Students encounter the exact definition of an *equation* and an *expression*. They practice the order of operations with problems that also reinforce the idea of the equal sign (“=”) as denoting equality of the right and left sides of an equation. These kind of exercises are needed because children may think that an equal sign signifies *the act of finding the answer* to a problem (as in $134 + 23 = ?$, for example), which is not so.

Students solve addition and subtraction equations both with the help of diagrams (a.k.a. bar models) and also without. Diagrams are also used for simple multiplication and division equations and for mixture equations, such as $4x + 38 = 128$.

We also present lessons on multi-digit multiplication (multiplying in columns). These lessons go farther than just reviewing the well-known algorithm. We study in detail: multiplying in parts (partial products), how those partial products can be seen in the algorithm itself, and how multi-digit multiplication can be visualized geometrically. Students also practice long division, including two-digit divisors, as a review from fourth grade.

Although the book is named, “The Four Operations,” please notice that the idea is not to practice each of the four operations separately, but rather to see how they are used together in solving problems and in simple equations. We are trying to develop student's *algebraic thinking*, including the abilities to: translate problems into mathematical operations, comprehend the many operations needed to yield an answer to a problem, “undo” operations, and so on. Many of the ideas in this chapter are preparing them for algebra in advance.

I wish you success in math teaching!

Maria Miller, the author