

math  
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# BLUE SERIES BOOKS

*Math Mammoth Blue Series books* are worktexts or units on specific topics. "Worktext" means that the books contain both explanations of the concepts and lots of varied problems. It is like a textbook and workbook combined.

Each of the Blue Series units concentrates on a few topics only, such as addition & subtraction, place value, clock, measuring, money, multiplication, division, geometry, fractions, decimals, ratios, percent, integers, and so on. This topical arrangement makes the books suitable for many kinds of situations, such as:

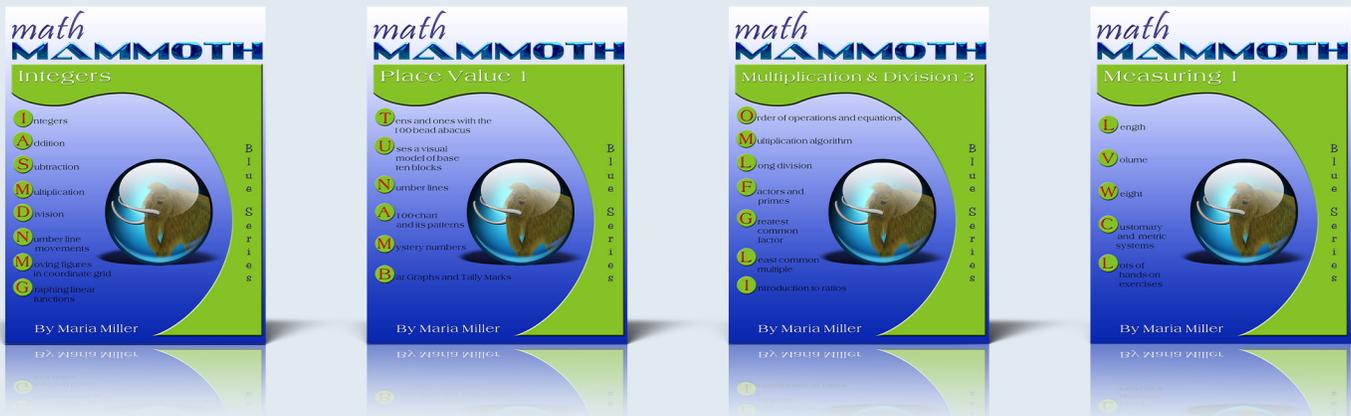
- To supplement any other math curriculum;
- As a remedial material for students who are behind;
- As a review material on specific topics.

It is even possible to use the Blue Series books to piece together a complete curriculum; however, I would advise you to consider Light Blue series instead, since it IS designed to be exactly that.

The Blue Series books are very affordable as downloads: the prices vary from \$2.20 to \$7.50. The prices for printed versions are similar to educational printed workbooks.

The books in the Blue Series currently cover all necessary topics for grades 1-6 and most for grade 7.

The downloadable version PDFs are enabled for annotating. This means that the student can actually complete the PDF file on the computer, using the typewriter and drawing tools available in Acrobat Reader version 9 or higher, or on a tablet device such as an iPad, using a PDF app that has annotating tools.



## Package deals - Blue Series

1. Get ALL 44 Blue Series books for a package price of \$120 at <http://www.mathmammoth.com/packages.php> or \$125 (CD). This gives you over 2,200 (unique) lesson and practice pages.

2. Or, you can get the Blue Series books for grades 1-3 only (21 books) for \$45 (download). Learn more at <http://www.mathmammoth.com/packages.php#blueseries1-3>

3. Or, you can get the Blue Series books for grades 4-7 only (24 books) for \$75 (download). Learn more at <http://www.mathmammoth.com/packages.php#blueseries4-7>

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# BLUE SERIES FAQ

## IS THE BLUE SERIES A COMPLETE CURRICULUM?

It is complete in its coverage of topics for grades 1-6, and covers most topics for grade 7.

Please keep in mind that several of the books in the Blue Series cover material for several grade levels in one book. It is NOT organized exactly by grade levels.

## DO ALL THE WORKBOOKS COME WITH ANSWER KEYS?

Yes. All of the Blue Series books have answers appended in the worktext.

## CAN I BUY THE BOOKS AS HARDCOPIES (PRINT VERSIONS)?

Yes. The Blue series books are available as printed black-and-white softcopies through Lulu.com.

## IN WHICH ORDER SHOULD I STUDY THE BLUE SERIES BOOKS?

Most people who buy my Blue Series books use them for many different purposes: as a supplement to a main curriculum, for review, or for initial teaching, even to teach adults. They are self-teaching worktexts that concentrate on one or a few topics per book, which makes them suitable for various teaching scenarios.

I have not originally written the Blue Series books to be a complete curriculum, but you can use them as such. The books are complete for grades 1-6.

People have frequently asked me in what order the books should be studied. There is an outline suggestion at [http://www.mathmammoth.com/study\\_order.php](http://www.mathmammoth.com/study_order.php)

## WHICH BOOK IS RIGHT FOR MY CHILD?

You can usually find that directly from considering the math topic that your child finds difficult. Check the table of contents of the various books on that topic to find the best match. Or, check this table that lists the approximate study order and grade levels for the Blue Series books.

You can also have your child take a placement test for the Light Blue, email me the results, and I can guide you as to which Blue Series books would be best for your child.

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# BLUE Series

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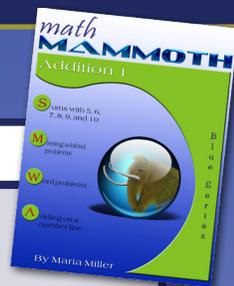
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# ADDITION 1



## ADDITION AND SUBTRACTION BOOKS

65 PAGES (ANSWERS INCLUDED)

PDF DOWNLOAD \$3.95  
PRINTED COPY \$10.15, B&W

THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-SUMS WITH 5,6,7,8,9, AND 10

-MISSING ADDEND PROBLEMS

-WORD PROBLEMS

-ADDING ON A NUMBER LINE



SAMPLE PAGES AND ORDERING INFORMATION:

[HTTP://WWW.MATHMAMMOTH.COM/ADDITION\\_1.PHP](http://www.mathmammoth.com/addition_1.php)

*Math Mammoth Addition 1* is a self-explanatory worktext, dealing with the concept of addition and addition facts within 0-10 (in few occasions numbers between 10 and 20 are used). The book is suitable for kindergarten and first grade.

The book starts out with very easy addition problems within 0-5, using pictures. If the student does not yet know the symbols + and =, you can introduce them first orally. In other words, use blocks or rocks and make addition problems where you use both kinds of wordings: "Three blocks and four blocks makes seven blocks. Three blocks PLUS four blocks EQUALS seven blocks." Play like that until the child can use the words PLUS and EQUALS in his/her own speech. This will make it easier for him/her to use the written symbols.

Soon the lessons start including missing addend problems. We first use pictures, and gradually get to the abstract  $1 + \underline{\quad} = 5$  with symbols only. Keep in mind that children may confuse this problem with  $1 + 5 = \underline{\quad}$ . You can word these problems like this: "1 and how many more makes 5?" You can model this "how many more" addition by drawing: First draw 1 ball. Tell the child that we need to have a total of 5 balls. He is to draw more until there are five balls. In the missing addition problem, however many balls the child has to draw is the number that goes on the empty line. So, first there is one ball, then we need to add (draw) some more to make 5. But how many more were drawn?

After that, the book contains many lessons called *Sums with...* whose goal is to help the child memorize addition facts.

My approach to memorization is many-fold:

1. Structured drill, such as you see in the lessons *Sums with 5*, *Sums with 6*, and so on. This is not random drill, because you will start it by showing the pattern or the structure in the facts. This will help the student to tie the addition facts in with a context and help him understand the facts more on a conceptual level, instead of merely memorizing them at random. In sums with 5, the child learns the number combinations that add up to 5: 0 & 5, 1 & 4, and 2 & 3. This understanding is the basis for the drills.
2. Using addition facts in games, in math problems, everyday life, or anywhere else. Games are especially useful because they help children like mathematics.
3. Random drilling may also be used as a tool among others.
4. Memory helps such as silly mnemonics or writing math facts on a poster and hanging it on the wall. These are not needful for all children.

However, keep in mind that children will need lots of opportunities to add numbers to actually memorize the facts, so the memorization may not totally occur as your child works through this book. These same addition facts are further studied and used in the *Math Mammoth Subtraction 1* book, and in all later math work since they are constantly used. At the latest, your child should memorize addition facts during second grade.

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# SUBTRACTION 1



## ADDITION AND SUBTRACTION BOOKS

89 PAGES (ANSWERS INCLUDED)

PDF DOWNLOAD \$5.10  
PRINTED COPY \$10.50, B&W

THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-THE CONCEPT OF  
SUBTRACTION

-THE CONNECTION WITH ADDITION

-MEMORIZING FACTS WITH THE HELP  
OF FACT FAMILIES

-WORD PROBLEMS



SAMPLE PAGES AND ORDERING INFORMATION:

[HTTP://WWW.MATHMAMMOTH.COM/SUBTRACTION\\_1.PHP](http://www.mathmammoth.com/subtraction_1.php)

*Math Mammoth Subtraction 1* deals with various concepts related to basic subtraction, and with basic addition and subtraction facts within 0-10.

The concept of subtraction is easy to illustrate with the idea of “taking away”. If the child does not yet know the word “minus”, it is a good idea to introduce it first orally. Simply use blocks, rocks, or other concrete objects. For example, show the child eight blocks, and take away three blocks. Then use both kinds of wordings: “Eight blocks, take away three blocks, leaves five blocks. Eight blocks minus three blocks equals five blocks.” Play with the blocks or other concrete objects until the child can use the words “minus” and “equals” in his/her own speech. This will make it much easier to introduce the actual written symbols.

The next step would be to abandon concrete objects and use semi-concrete illustrations or pictures. That is where this book starts with the lesson *Subtraction Is “Taking Away”*. At this stage, the child can still figure out the subtraction problems by simply counting how many objects are left.

So, how does the student learn how to subtract without actually counting concrete objects or pictures? As a transitional strategy, we will study counting down: the student solves  $9 - 3$ , for example, by counting down three steps from nine: eight, seven, six. So the answer is six.

However, the final goal is to learn to use the addition facts to find the answer to subtraction problems. For example, once the student knows that  $5 + 5 = 10$ , then this fact is used to solve  $10 - 5 = 5$ . For this purpose, the student must learn well the connection between addition and subtraction. This is why this book concentrates heavily on the connection between addition and subtraction with several lessons, ending up with the concept of fact families.

Besides “taking away”, subtraction is also used for these two situations:

- **Finding how much more one number is than another.** Note that no one “takes away” anything in this situation. For example, if you have 3 dollars and you need 6 dollars, how many more dollars do you need? The student is instructed to write a “how many more” addition problem for this, which looks like this:  
 $3 + \underline{\quad} = 6$ . We also call these problems “missing addend” problems. It can be solved by remembering the addition fact  $3 + 3 = 6$ , or by subtracting  $6 - 3 = 3$ .
- **Two (or more) parts (of something) make up a whole.** If you know the whole and one of its parts, you can figure out the other part. For example, if there are ten white and red flowers, and seven of them are white, how many are red? We know the “parts” (the red and white flowers) add up to 10, so we write an addition  $7 + \underline{\quad} = 10$ . Again, this can be solved by subtracting, or simply by knowing the addition fact  $7 + 3 = 10$ .

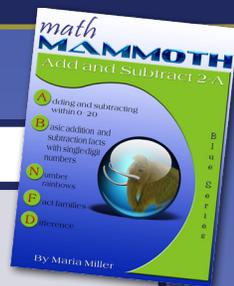
These two situations are dealt with in several lessons in the book and are found in various word problems throughout the book.

In the latter part of the book, we encounter several lessons named *Addition and Subtraction Facts with...* They aim at helping the child to memorize the basic addition and subtraction facts. We are approaching it from the concept of fact families. Besides the written problems, I encourage you to use games that are explained in the book. Children like to play, and using the addition and subtraction facts in a game gives them fun and education in the same “package”.

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# ADD & SUBTRACT 2-A



## ADDITION AND SUBTRACTION BOOKS

72 PAGES (ANSWERS INCLUDED)

PDF DOWNLOAD \$3.95  
PRINTED COPY \$10.95, B&W

THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-ADDING AND SUBTRACTING  
WITHIN 0-20

-BASIC ADDITION AND SUBTRACTION  
FACTS WITH SINGLE-DIGIT NUMBERS

-NUMBER RAINBOWS

-FACT FAMILIES

-DIFFERENCE



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/ADD SUBTRACT 2A.PHP](http://www.mathmammoth.com/add_subtract_2a.php)

*Math Mammoth Add & Subtract 2-A* deals with two main themes:

- strategies for adding and subtracting within 0-20, such as adding just one more, a trick with nine and eight, subtracting using addition; and
- memorizing the basic addition and subtraction facts of single-digit numbers.

In the first several lessons we study basic strategies for adding and subtracting within 0-20. After those, we study the idea of completing ten and going over. For example, the child adds  $8 + 5$  by first adding  $8 + 2$  (which makes 10), and then adding the 3 that was "left over." These lessons prepare the student for the next part of the book.

The next lessons in the book, *Adding with 9*, *Adding with 8*, *Adding with 7*, and *Adding with 6*, provide lots of practice for learning and memorizing the basic addition facts. There are 20 such facts:

- from  $9 + 2$  till  $9 + 9$ : 8 facts (lesson *Adding with 9*)
- from  $8 + 3$  till  $8 + 8$ : 6 facts (lesson *Adding with 8*)
- from  $7 + 4$  till  $7 + 7$ : 4 facts (lesson *Adding with 7*)
- from  $6 + 5$  till  $6 + 6$ : 2 facts (lesson *Adding with 6*)

Some children will accomplish this quicker, needing less practice. Some will need more practice. You can also add in some internet-based games (a list of online games is provided in the book).

After those lessons, we study subtraction. First, the child subtracts to ten. This means subtracting from 14, 15, 16, etc. so that the answer is 10, for example  $16 - \underline{\quad} = 10$ . In the next step, we study subtractions with an answer less than 10, such as  $16 - 7$ . The student practices these by subtracting in two parts: first subtracting to ten, then the rest. For example,  $16 - 7$  becomes  $16 - 6 - 1$ , or  $14 - 6$  becomes  $14 - 4 - 2$ .

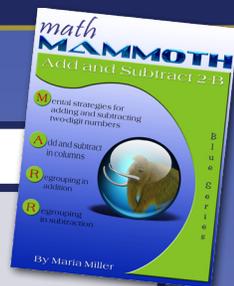
The last part of the book includes various lessons titled *Number Rainbows* and *Fact Families with ...*, which give lots of practice and reinforcement for the basic addition and subtraction facts. These lessons also include many word problems. They emphasize the connection between addition and subtraction to solve basic subtraction facts such as  $13 - 8$  or  $15 - 6$ . Alongside them, you can also use games or flashcards to reinforce the learning of the facts.

Learning and memorizing the basic addition and subtraction facts of single-digit numbers is very important for later study. For example, regrouping (carrying/borrowing) in addition and in subtraction requires that the student be able to recall all the sums of single-digit numbers and corresponding subtraction facts efficiently and fluently. The goal is to memorize these facts, or at least become so fluent with them that an outsider cannot tell if the student remembers the answer or uses some mental math strategy to get the answer.

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# ADD & SUBTRACT 2-B



## ADDITION AND SUBTRACTION BOOKS

95 PAGES (ANSWERS INCLUDED)

PDF DOWNLOAD \$5.65  
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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-MENTAL STRATEGIES FOR  
ADDING AND SUBTRACTING  
TWO DIGIT NUMBERS

-ADD AND SUBTRACT IN COLUMNS

-REGROUPING IN ADDITION

-REGROUPING IN SUBTRACTION



SAMPLE PAGES AND ORDERING INFORMATION:

[HTTP://WWW.MATHMAMMOTH.COM/ADD SUBTRACT 2B.PHP](http://www.mathmammoth.com/add_subtract_2B.php)

*Math Mammoth Add & Subtract 2-B* is a continuation to the book *Math Mammoth Add & Subtract 2-A*. The goal of this book is to study addition and subtraction within 0-100, both mentally and in columns, especially concentrating on regrouping in addition (carrying) and in subtraction (borrowing).

Mental math is important because it builds number sense. This book includes many lessons that practice mental math. For example, the child practices adding and subtracting two-digit numbers when one of the numbers is a whole ten (problems such as  $30 + 14$ , or  $66 - 20$ ).

Also studied are problems such as  $36 + 8$  or  $45 + 9$ . These problems use the idea of going over ten as in problems  $6 + 8$  and  $5 + 9$ . The child knows that  $6 + 8$  fills the first ten and is four more than the ten. He/she will learn to use that fact when adding  $36 + 8$ . The sum  $36 + 8$  fills the next whole ten (40), and is four more than that, or 44.

Simultaneously with this, the child learns adding two-digit numbers in columns, and regrouping with tens, or "carrying," which is illustrated and explained in detail with the help of visual models. These visual models take the place of base-ten blocks or other manipulatives. You are welcome to use manipulatives to get the idea across, if you prefer. The main concept to understand is that 10 ones are regrouped to form a new ten, and this new ten is written using a little "1" in the tens column.

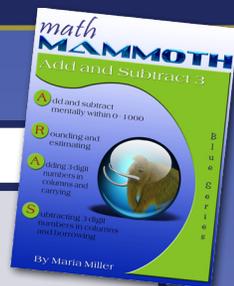
The next lessons teach subtracting in columns. First, we only deal with the easy problems where you do not need to regroup (borrow). Then the following lessons practice in detail the process of regrouping or borrowing. You can use either term with your child, or even choose not to use either if you feel it is confusing. You can alternatively use the phrase "breaking a ten into ten ones."

The lesson *Regrouping* practices breaking down a ten into ten ones because we cannot subtract from the ones. It is crucial that the child understands what happens here. Otherwise, the child might end up only memorizing the procedure, and will probably at some point misremember how it was done. That is why this lesson deals with the regrouping process in detail with plenty of visual exercises.

If you notice that the child does not understand the concept of regrouping, he/she may need more practice with concrete manipulatives or visual exercises before proceeding.

After learning regrouping, we practice mental subtraction in three separate lessons. One of them expounds on several methods for mental subtracting. Another is about Euclid's game—a fun game that also practices subtraction of two-digit numbers.

# ADD & SUBTRACT 3



## ADDITION AND SUBTRACTION BOOKS

115 PAGES (ANSWERS INCLUDED)

PDF DOWNLOAD \$7.10  
PRINTED COPY \$9.95, B&W

THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-ADD AND SUBTRACT  
MENTALLY WITHIN 0-100

-ROUNDING AND ESTIMATING

-ADDING 3-DIGIT NUMBERS IN  
COLUMNS AND CARRYING

-SUBTRACTING 3-DIGIT NUMBERS IN  
COLUMNS AND BORROWING



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/ADD SUBTRACT 3.PHP](http://www.mathmammoth.com/add_subtract_3.php)

*Math Mammoth Add and Subtract 3* has to do with adding and subtracting 3-digit numbers. The book is suitable to study after the student has learned to add and subtract with 2-digit numbers, and has learned numbers till 1,000. The goal is to teach the student to add and subtract both mentally and in columns within 0-1000.

Since students usually learn three-digit numbers in second grade, some of the topics in this book suit second grade, some suit third grade.

The first section of the book explores some mental math with three-digit numbers, and is suitable for second grade. We study adding and subtracting whole hundreds, whole tens, and ones within 0-1000, often comparing to similar problems within 0-100. In most of these lessons, the addition or subtraction is first illustrated with a visual model. You can use manipulatives instead, if you prefer.

The next part (the middle part) deals with adding and subtracting in columns with regrouping. If you want to follow the grade levels, these lessons are intended for both second and third grade this way: the lessons are for second grade, until the topics of regrouping twice in subtraction and regrouping over zero tens in subtraction, which are for third grade.

The processes of regrouping in addition and subtraction are first practiced using visual models, to ensure the student understands the concept (the "why"), and does not only learn the procedure (the "how").

Regrouping in subtraction with three-digit numbers includes three different cases:

1. Regrouping 1 ten as 10 ones, such as is needful for  $546 - 229$ .
2. Regrouping 1 hundred as 10 tens, such as is needful for  $728 - 441$ .
3. Regrouping two times (1 ten as 10 ones, and 1 hundred as 10 tens), such as is needful for  $725 - 448$ .
4. Regrouping with zero tens, such as is needful for  $405 - 278$ . Here, first we regroup 1 hundred as 10 tens, then 1 ten as 10 ones.

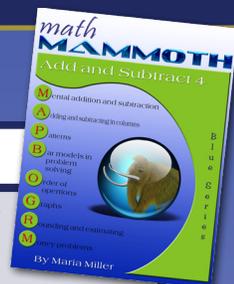
In the last section, the book includes addition and subtraction topics for third grade, starting with mental addition and subtraction. Through it all, students solve lots of word problems and practice some algebra in disguise, where they use a symbol or a ? for the unknown thing in the problem. We also study ordinal numbers, rounding and estimating, and order of operations.

Then we study the connection between addition and subtraction with bigger numbers, which also aims to help children think algebraically. Lastly, students get to practice their adding and subtracting skills in a practical way through reading a mileage chart and other types of graphs.

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# ADD & SUBTRACT 4



## ADDITION AND SUBTRACTION BOOKS

55 PAGES (ANSWERS INCLUDED)

PDF DOWNLOAD \$3.10  
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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-ADDITION AND SUBTRACTION  
STRATEGIES

-ROMAN NUMERALS

-PROBLEM SOLVING USING BAR  
DIAGRAMS

-GRAPHS

-MONEY



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/ADD SUBTRACT 4.PHP](http://www.mathmammoth.com/add_subtract_4.php)

*Math Mammoth Add & Subtract 4* covers the following addition and subtraction related topics in the fourth grade level:

- mental addition and subtraction strategies;
- adding and subtracting in columns;
- some numerical patterns;
- bar models in problem solving;
- order of operations;
- line graphs and bar graphs;
- rounding and estimating;
- money problems and discounts.

The lessons in this book are taken from the first chapter of Math Mammoth Grade 4 Complete Curriculum. Some of the lessons are useful even for 5th grade students, especially if they have not had much exposure to word problems, order of operations, and applications of addition and subtraction.

At first, we review the “technical aspects” of adding and subtracting: mental math techniques and adding and subtracting in columns. We also study some patterns. The lesson on Pascal’s triangle is intended to be fun and fascinating—after all, Pascal’s triangle is full of patterns!

In the next lesson, we study the connection between addition and subtraction and bar models. Bar models help students write addition and subtraction sentences with unknowns, and solve them. This is teaching the students algebraic thinking: how to write and solve simple equations.

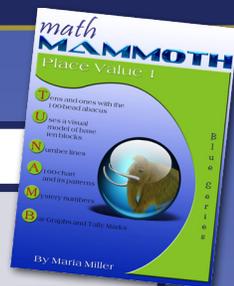
The lesson on the order of operations contains some review, but we also study connecting the topic with real-life situations (such as shopping). Here, the student writes the mathematical expression (number sentence) for word problems, which again, practices algebraic thinking.

Going towards applications of math, the book then contains straightforward lessons on bar graphs, line graphs, rounding, estimating, and money problems.

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# PLACE VALUE 1



## PLACE VALUE BOOKS

63 PAGES (ANSWERS INCLUDED)

PDF DOWNLOAD \$3.30  
PRINTED COPY \$9.70, B&W

THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-TENS AND ONES WITH THE  
11-BEAD ABACUS

-USES A VISUAL MODEL OF BASE TEN  
BLOCKS

-NUMBER LINES

-A 100-CHART AND IT'S PATTERNS

-MYSTERY NUMBERS

-DIMES AND CENTS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/PLACE VALUE 1.PHP](http://www.mathmammoth.com/place_value_1.php)

*Math Mammoth Place Value 1* teaches students two-digit numbers, or place value with tens and ones. This worktext is suitable for kindergarten (partially) or first grade.

The initial lessons that introduce tens and ones use a 100-bead abacus extensively. A 100-bead abacus or school abacus simply contains 10 beads on 10 rods, a total of 100. It is not a special abacus as used by the Chinese or the Russians. In the school abacus, each bead simply represents one. The 100-bead abacus lets children both "see" the numbers and use their touch while making them.

The abacus is used in the first lessons, but it is not the only model used in the book. We also use a visual model of blocks where ten of them "snap" together to a stick. If you already have so-called base-ten blocks, you can use them along with the visual exercises, if you want to.

Then, the book also uses the 100-chart and number lines. Number lines help visualize how the numbers continue indefinitely and also connect with the concept of measuring. The 100-chart helps the child to be familiar with the numbers below 100 and find patterns in the number system.

When children count, they basically just learn numbers as some kind of continuum that continues and continues. With simple counting, your child might not catch on to the inherent structure and how it goes into groups of tens and hundreds and thousands.

For children to understand place value, they first need to know their numbers up to 10, do simple addition with small numbers, and understand about counting in groups. Our whole number system is based on the idea that if you have lots and lots of objects, the efficient way is to count them in groups of tens, hundreds, and thousands - not individually.

The crucial point in understanding the concept of place value is that a certain position represents a certain size group. Then the digit in that position tells you how many that size groups there are. For example, in the number 2,381, we adults already know that 8 represents eight tens, and not just "8". The number 3 represents three hundreds, and not just "3". The placing or positioning of the digit tells us what size groups we mean, and the digit itself tells how many of those groups. In this book, children learn this idea for just two digits, or two place values.

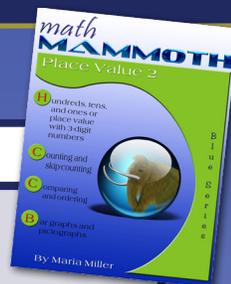
For that matter, we could use a different system of writing numbers where the font size tells you the place value: for example  $78_2$  could be 7 tens, 8 hundreds, and 2 ones = 872. Please note that this idea is NOT developed in this book. It is just an example to let you see that the place value concept has to do with something abstract (certain positioning) representing a certain size group.

The two lessons in the end, about graphs and money, are included as real-life applications of two-digit numbers. The last lesson about regrouping is optional.

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# PLACE VALUE 2



## PLACE VALUE BOOKS

43 PAGES (ANSWERS INCLUDED)

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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-HUNDREDS, TENS, AND ONES  
OR PLACE VALUE WITH  
3-DIGIT NUMBERS

-COUNTING AND SKIP-COUNTING

-COMPARING AND ORDERING

-BAR GRAPHS AND PICTOGRAPHS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/PLACE VALUE 2.PHP](http://www.mathmammoth.com/place_value_2.php)

*Math Mammoth Place Value 2* is a worktext dealing with three-digit numbers, or with the place values ones, tens, and hundreds.

The first lesson presents three-digit numbers with hundred-flats, ten-pillars, and one-cubes. Next we study three-digit numbers on a number line. In the lesson *Forming Numbers—and Breaking Them Apart* the child practices separating three-digit numbers into the different “parts”: hundreds, tens, and ones. These first three lessons provide the basis for understanding three-digit numbers and place value.

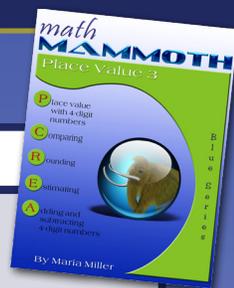
Next we study *Skip-Counting by Tens*, and soon also by twos and fives. Then we compare and order three-digit numbers.

After this, we study rounding numbers. This concept helps in quickly adding numbers mentally. We also touch on reading bar graphs and pictographs, which provide a nice application for now learned three-digit numbers.

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# PLACE VALUE 3



## PLACE VALUE BOOKS

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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-PLACE VALUE WITH 4-DIGIT  
NUMBERS

-COMPARING

-ROUNDING

-ESTIMATING

-ADDING AND SUBTRACTING 4-DIGIT  
NUMBERS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/PLACE VALUE 3.PHP](http://www.mathmammoth.com/place_value_3.php)

*Math Mammoth Place Value 3* covers 4-digit numbers (numbers with thousands), and adding and subtracting them. We also study rounding and estimating, which are very important skills for everyday life.

First, students learn 4-digit numbers, place value—breaking numbers such as 3,498 into thousands, hundreds, tens, and ones—and comparing 4-digit numbers. Next, they practice some mental addition and subtraction with 4-digit numbers. The lesson stresses the similarities between adding and subtracting 4-digit numbers and adding and subtracting smaller numbers. Practicing mental math also helps to build number sense.

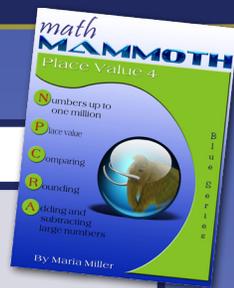
We also study regrouping in addition and subtraction, using 4-digit numbers.

The last major topics in this chapter are rounding numbers to the nearest hundred and estimating. Students also get to do some more word problems.

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# PLACE VALUE 4



## PLACE VALUE BOOKS

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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-PLACE VALUE WITH  
THOUSANDS AND MILLIONS

-COMPARING

-ROUNDING

-ADDING AND SUBTRACTING



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/PLACE VALUE 4.PHP](http://www.mathmammoth.com/place_value_4.php)

In *Math Mammoth Place Value 4*, the focus is on place value with thousands, ten thousands, and hundred thousands. We also study numbers with millions a little. The book is most suitable for third or fourth grade.

The first lessons only deal with thousands or numbers with a maximum of four digits. These are for review and for deepening the student's understanding of place value. It is crucial that the student understands place value with these numbers before moving on to larger numbers. Yet again, these larger numbers can be very easy as long as the student understands the basics of how our place value system works.

The lesson *More Thousands* then introduces numbers beyond 10,000. After learning these larger numbers, we also study addition and subtraction, comparing, and the idea of multiples. In addition to column-form addition and subtraction, the book also contains a lot of mental math problems. In studying mental addition and subtraction, the similarities to adding smaller numbers are stressed, which helps the students to understand how to add/subtract these bigger numbers.

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# PLACE VALUE 5



## PLACE VALUE BOOKS

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ENABLED FOR ANNOTATION.

- EXPONENTS
- PLACE VALUE UP TO TRILLIONS
- COUNTING AND ADDING LARGE NUMBERS
- ROUNDING
- SCIENTIFIC NOTATION
- USING A CALCULATOR



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/PLACE VALUE 5.PHP](http://www.mathmammoth.com/place_value_5.php)

*Math Mammoth Place Value 5* is a short worktext that covers place value up to the billions—that is, numbers up to 12 digits—rounding them, and using a calculator. It is suitable for 5th and 6th grades.

This book uses the “short scale” commonly used in the USA for naming large numbers; that is, 1,000,000,000 is called one billion (and not a thousand million).

The first lesson covers place value up to millions. Then, we study place value up to billions. Next we study exponents and powers. After working with addition, rounding, and scientific notation, there are two lessons about calculator usage.

I have received numerous comments on the harm that indiscriminate calculator usage can cause. If children are allowed to use calculators freely, their minds get lazy, and they will start relying on calculators even for simple things. It is just human nature! As a result, students enter college without even knowing their multiplication tables by heart. Then they have tremendous trouble if they are required to use mental math to solve simple problems.

So we educators need to limit calculator usage until the students are older. Children can not decide this for themselves, and definitely not in fifth grade.

However, I realize that the calculator is extremely useful, and students do need to learn to use it. In this book, I try to show the students not only how to use a calculator, but also when to use it and when not to use it.

This book includes problems where calculator usage is appropriate. We also practice estimating the result before calculating it with a calculator. In the last lesson, students need to choose whether mental math or a calculator is the best tool for the calculation.

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# CLOCK



## CLOCK & MONEY BOOKS

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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-TELLING THE TIME...  
...TO THE HALF HOUR  
...TO FIVE-MINUTE INTERVALS  
...TO THE MINUTE

-ELAPSED TIME

-CALENDAR

-CHANGING TIME UNITS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/CLOCK.PHP](http://www.mathmammoth.com/clock.php)

*Math Mammoth Clock* is a worktext that covers telling time and reading the clock, telling time intervals, and understanding the calendar. It is suitable for grades 1, 2, and 3.

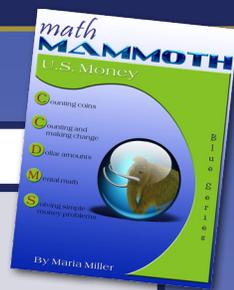
The book contains both textbook explanations and exercises, and is designed to be very easy to teach from, requiring very little teacher preparation.

*Math Mammoth Clock* covers reading the clock, figuring out simple time intervals, and using the calendar, all in one book. The topics progress starting from the first grade level to the third grade level. Therefore, you also can let your child work the pages of this book in different time periods, and not go through it all at once, depending on your child's current level.

The lessons are divided to the grade-levels this way: reading the clock to the half-hour is first grade material; reading the clock to the five-minute intervals is second grade; and reading the clock to the minute is third grade level. I realize this is somewhat arbitrary, and there is no need to follow it exactly but I want to explain it so you can keep it in mind that the material in this book does get more difficult towards the end.

You will need a practice clock, such as an alarm clock, where the child can turn the clock hands. Reading the clock is a skill that will be used in everyday situations, so this topic (fortunately) is one that children also learn by experience, and do not easily forget once learned.

# U.S. MONEY



## CLOCK & MONEY BOOKS

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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

- COUNTING COINS
- COUNTING AND MAKING CHANGE
- DOLLAR AMOUNTS
- MENTAL MATH
- SOLVING SIMPLE MONEY PROBLEMS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/MONEY.PHP](http://www.mathmammoth.com/money.php)

*Math Mammoth Money* is a worktext that covers U.S. money-related topics usually encountered during grades 1-3. The book contains both textbook explanations and exercises, and is designed to be very easy to teach from, requiring very little teacher preparation (you do need to find some practice coins before the lessons).

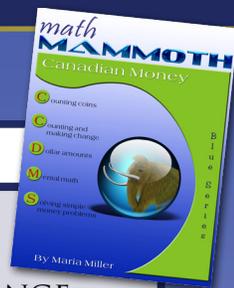
The book starts with first-grade topics such as counting pennies, nickels, dimes, and quarters. While the lessons use pictures for the coins, practicing with real coins is, of course, even better and you should have real money on hand to practice with.

From there, the lessons advance towards second-grade, and finally to third grade topics. Therefore, you can also let your child work the pages of this book in different time periods, and not go through it all at once, depending on your child's current level.

The lesson *Making Change* explains two basic ways of finding the change: counting up, and subtracting (finding the difference). This is all done with mental math. The next lesson also practices money problems using mental math.

In the last lesson we solve money problems by adding and subtracting money amounts vertically (in columns).

# CANADIAN MONEY



## CLOCK & MONEY BOOKS

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- COUNTING COINS
- COUNTING AND MAKING CHANGE
- DOLLAR AMOUNTS
- MENTAL MATH
- SOLVING SIMPLE MONEY PROBLEMS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/CANADIAN MONEY.PHP](http://www.mathmammoth.com/canadian_money.php)

*Math Mammoth Canadian Money* is a worktext that covers money-related topics usually encountered during grades 1-3, using the coins and bills of Canada. The book contains both textbook explanations and exercises, and is designed to be very easy to teach from, requiring very little teacher preparation (you do need to find some practice coins before the lessons).

The book starts with first-grade topics such as counting Canadian pennies, nickels, dimes, and quarters. While the lessons use pictures for the coins, practicing with real coins is, of course, even better and you should have real money on hand to practice with.

From there, the lessons advance towards second-grade, and finally to third grade topics. Therefore, you can also let your child work the pages of this book in different time periods, and not go through it all at once, depending on your child's current level.

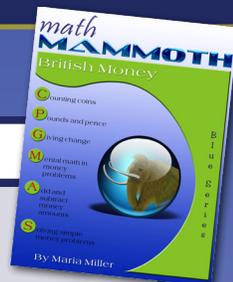
The lesson *Making Change* explains two basic ways of finding the change: counting up, and subtracting (finding the difference). This is all done with mental math. The next lesson also practices money problems using mental math.

In the last lesson we solve money problems by adding and subtracting money amounts vertically (in columns).

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# BRITISH MONEY



## CLOCK & MONEY BOOKS

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- COUNTING COINS
- POUNDS AND PENCE
- GIVING CHANGE
- MENTAL MATH IN MONEY PROBLEMS
- ADD AND SUBTRACT MONEY AMOUNTS
- SOLVING SIMPLE MONEY PROBLEMS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/BRITISH MONEY.PHP](http://www.mathmammoth.com/british_money.php)

*Math Mammoth British Money* is a worktext that covers money-related topics usually encountered during years 2-4. The book contains both textbook explanations and exercises, and is designed to be very easy to teach from, requiring very little teacher preparation (you do need to find practise coins before the lessons).

The book starts with year 2 topics, such as counting coins with pence-amounts and easy problems about change. These lessons use "p" as a symbol for pence. While these initial lessons use pictures for the coins, practising with real coins is, of course, even better, and you should have real money on hand to practise with.

From there, the lessons advance toward year 3, and finally to year 4 topics, such as practising with pound amounts, and working out total amounts and change. Therefore, you can also let your child work the pages of this book in different time periods, and not go through it all at once, depending on your child's current level.

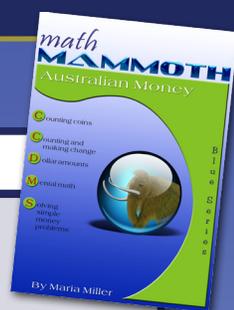
*Working out the Change* explains two basic ways of working out the change: counting up, and subtracting (finding the difference). This is all done with mental maths. The next lesson also practises money problems using mental maths.

In the last lesson we solve money problems by adding and subtracting money amounts vertically (in columns).

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# AUSTRALIAN MONEY



## CLOCK & MONEY BOOKS

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- COUNTING COINS
- COUNTING AND MAKING CHANGE
- DOLLAR-AMOUNTS
- MENTAL MATH
- SOLVING SIMPLE MONEY PROBLEMS



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[HTTP://WWW.MATHMAMMOTH.COM/AUSTRALIAN MONEY.PHP](http://www.mathmammoth.com/australian_money.php)

*Math Mammoth Australian Money* is a worktext that covers money-related topics usually encountered during years 1-3. The book contains both textbook explanations and exercises, and is designed to be very easy to teach from, requiring very little teacher preparation (you do need to find practise coins before the lessons).

The book starts with year-2 topics such as counting coins with cent-amounts and easy problems about change. For the most part, these lessons use "c" as a symbol for cent.

While these initial worksheets use pictures for the coins, practising with real coins is, of course, even better, and you should have real money on hand to practise with.

From there, the lessons advance toward year-2 and finally to year-3 topics, such as practising with dollar amounts, and figuring out total amounts owed and change. Therefore, you can also let your child work the worksheets of this book in different time periods, and not go through it all at once, depending on your child's current level.

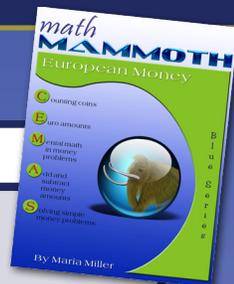
*Making Change* explains two basic ways of working out the change: counting up, and subtracting (working out the difference). This is all done with mental math. The next lesson also practises money problems using mental math.

In the last lesson we solve money problems by adding and subtracting money amounts vertically (in columns). On the next page you will find a list of money activities and games on the Internet.

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# EUROPEAN MONEY



## CLOCK & MONEY BOOKS

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- COUNTING COINS
- EURO AMOUNTS
- MENTAL MATH IN MONEY PROBLEMS
- ADD AND SUBTRACT MONEY AMOUNTS
- SOLVING SIMPLE MONEY PROBLEMS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/EUROPEAN\\_MONEY.PHP](http://www.mathmammoth.com/european_money.php)

*Math Mammoth European Money* is a worktext that covers money-related topics usually encountered during grades 1-3. The book contains both textbook explanations and exercises, and is designed to be very easy to teach from, requiring very little teacher preparation (you do need to find practice coins before the lessons).

The book starts with first-grade topics such as counting coins with cent-amounts and easy problems about change. For the most part, these lessons use "c" as a symbol for cents. I realize there is no official symbol for cents, but when young children are learning to count coins, it is much more natural to count them as cent-amounts, and not use the euro symbol such as in €0.08 to mean 8 cents.

While these initial lessons use pictures for the coins, practicing with real coins is, of course, even better, and you should have real money on hand to practice with.

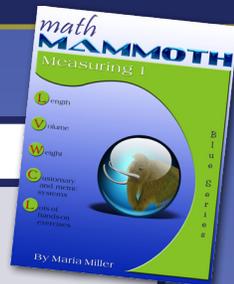
From there, the lessons advance toward second-grade, and finally to third grade topics, such as practicing with euro amounts, and figuring out total bills and change. Therefore, you can also let your child work the pages of this book in different time periods, and not go through it all at once, depending on your child's current level.

*Making Change* explains two basic ways of finding the change: counting up, and subtracting (finding the difference). This is all done with mental math. The next lesson also practices money problems using mental math.

In the last lesson we solve money problems by adding and subtracting money amounts vertically (in columns).

The book also contains a list of money activities and games on the Internet.

# MEASURING 1



## MEASURING BOOKS

76 PAGES (ANSWERS INCLUDED)

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-LENGTH  
-VOLUME  
-WEIGHT  
-CUSTOMARY AND METRIC SYSTEMS  
-LOTS OF HANDS-ON EXERCISES



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/MEASURING\\_1.PHP](http://www.mathmammoth.com/measuring_1.php)

*Math Mammoth Measuring 1* is a worktext that covers measuring length, weight, and volume for grades 1-3. The book contains both textbook explanations and exercises, and is designed to be very easy to teach from, requiring fairly little teacher preparation; however in several lessons you need to find beforehand measuring equipment such as a ruler or a scale or measuring cups.

The lessons in this book come from the Math Mammoth complete curriculum (Light Blue Series) for grades 1-3. I have grouped the lessons together this way:

- the first two lessons have to do with exploring the concept of measuring (grade 1),
- then come lessons about measuring in inches and centimeters (grades 1-3),
- then lessons about feet, yards, miles, meters, and kilometers (grades 2-3),
- then there are lessons about measuring weight (grades 2-3),
- and lastly lessons about measuring volume (grade 3).

The lessons concentrate on hands-on exercises where the student actually measures things. I have only included a few problems about conversion between measuring units; students will study those more in later grades.

The lessons on measuring weight have several activities to do at home using a bathroom scales. The goal is to let students become familiar with pounds and kilograms, and have an idea of how many pounds or kilograms some common things weigh. In order to estimate weight, a child has to know the approximate weights of some objects, and then compare the weight of the unknown object to some known weight. This knowledge is gained through experience.

Similarly, in studying volume, the lessons include many hands-on activities so that the student gets first-hand experience in measuring, and has a basic knowledge of how "big" the units cup, pint, quart, gallon, milliliter, and liter are.

When it comes to measuring, experience is the best teacher. We all use various measuring units in our everyday life, and using them is the key to remembering what they are and what the conversion factors are. Naturally, people in the United States often do not use the metric system a lot, while people elsewhere do not use the customary system. The units your child is not using are likely to be forgotten easily. So, encourage the student(s) to have free play time with measuring devices such as a scale, measuring cups, a measuring tape, and rulers - including equipment that uses metric units. Math Mammoth Blue Series also has another worktext, *Math Mammoth Measuring 2*, which is a sequel to this one. In it, students practice measurement unit conversions and problem solving.

Here is a list of manipulatives that are needed or recommended for Math Mammoth Measuring 1 book.

1. A ruler that measures in inches.
2. A ruler that measures in centimeters.
3. A measuring tape that measures in feet.
4. A measuring tape that measures in meters.
5. A bathroom scales pounds and kilograms.
6. A kitchen scales that measures in ounces.
7. A kitchen scales that measures in grams.
8. A quart jar and a pint jar.
9. Measuring cups that measure 1 cup, 1/2 cup, 1/4 cup of which at least one has markings for ounces.
10. A measuring cup that measures in milliliters.

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# MEASURING 2



## MEASURING BOOKS

115 PAGES (ANSWERS INCLUDED)

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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-TIME CALCULATIONS  
-TEMPERATURE  
-LENGTH, WEIGHT, AND VOLUME  
-CONVERSIONS BETWEEN UNITS  
-COVERS BOTH CUSTOMARY AND  
METRIC SYSTEMS  
-DECIMALS IN MEASURING UNITS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/MEASURING\\_2.PHP](http://www.mathmammoth.com/measuring_2.php)

*Math Mammoth Measuring 2* is a worktext that covers time, temperature, length, weight, and volume related lessons, aimed for 4th-5th grade. The focus in these lessons is no longer on the actual act of measuring (as was the case in earlier grades), but on calculations that involve conversions between different measuring units.

In the lessons about time, the students get to do fairly complex calculations concerning hours and minutes. In lessons about temperature, the students are introduced to negative numbers and even get to do a few simple calculations with them.

Each lesson about measuring units, whether it is for length, volume, or weight, includes a table or a chart that lists the units and the conversion factors. For metric units, those tables always include all of the units, even when they are not in common usage. For example, when studying metric units of volume, the chart looks like this:

10	liter	L	for larger amounts of volume
10	deciliter	dl	(not used much)
10	centiliter	cl	(not used much)
10	milliliter	ml	for small amounts of volume

Only milliliters and liters are dealt with in the lesson, but the chart shows the two other units (deciliters and centiliters) as well, in order to familiarize students with the two basic ideas of metric measuring units:

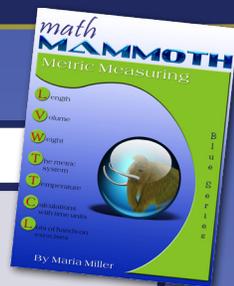
1. The units always differ by a factor of ten;
2. The units are named consistently, with always the same prefixes (milli-, centi-, deci-, deca-, hecto-, and kilo-). These prefixes and their meanings are not commonly studied in detail in fourth or fifth grade; instead they are typically studied in 6th grade or later in conjunction with scientific notation. You may, of course, at your discretion, explain them to the student even at an earlier time.

The last three lessons deal with using decimal numbers with measuring units, such as expressing 0.7 liters in milliliters, or converting 3.4 miles to miles and feet. These lessons are better left for 5th grade. In these lessons, the symbol of a calculator next to a problem means that students are allowed to use a basic calculator to solve the problem.

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# METRIC MEASURING



## MEASURING BOOKS

85 PAGES (ANSWERS INCLUDED)

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THE PDF VERSION OF THIS BOOK IS  
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- LENGTH
- VOLUME
- WEIGHT
- THE METRIC SYSTEM
- TEMPERATURE
- CALCULATIONS WITH TIME UNITS
- LOTS OF HANDS-ON EXERCISES



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/METRIC\\_MEASURING.PHP](http://www.mathmammoth.com/metric_measuring.php)

*Math Mammoth Metric Measuring* covers measuring related topics over the span of five grades (grades 1- 5). The lessons for this book have been compiled from two of my books about measuring (*Measuring 1* and *Measuring 2*), and are presented here as a single book that only deals with metric units.

The lessons cover measuring length, weight, and volume, measuring temperature in the Celsius scale, the 24-hour clock and elapsed time, and using decimals within the metric system in general. The bulk of the lessons are targeted for third and fourth grade.

This book contains both explanations of the material and exercises, and is thus termed a worktext. It is designed to be very easy to teach from, requiring fairly little teacher preparation; however in several lessons the teacher needs to gather measuring equipment beforehand, such as a ruler, a scale, or measuring cups. The book is not organized by grade-levels nor with increasing difficulty. Instead, the lessons are grouped by topic. The first lessons in each section typically have hands-on exercises where the student uses suitable measuring equipment, and the last lessons in each section include problems about conversion between the units.

**Length:** The very first lessons cover measuring length using centimeters and millimeters. Then we study meters and kilometers.

**Weight:** Children use the bathroom scales to weigh objects in kilograms. Other lessons teach grams and estimating weight. The goal is to let students become familiar with kilograms, and have an idea of how many kilograms some common things weigh.

**Volume:** The lessons include many hands-on activities so that the student gets first-hand experience in measuring, and gains a basic knowledge of how "big" the units milliliter and liter are. One lesson also includes deciliters.

**Metric System:** In these lessons, students learn how to use decimal numbers within the metric system and the various prefixes.

**Temperature:** The lessons deal with Celsius degrees, how to read a thermometer, changing temperature, and temperature line graphs.

**Time:** The emphasis is on converting various time units, the 24-hour clock, and calculating elapsed time. The lessons do not cover how to read a clock; the book *Math Mammoth Clock* can be used to teach telling time.

When it comes to measuring, experience is the best teacher. Using the various measuring units is the key to remembering what they are and how to convert from one unit to another. So, encourage the young elementary students to have free "play time" with measuring devices such as scales, measuring cups, measuring tapes, rulers, and thermometers.

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# MULTIPLICATION 1



## MULTIPLICATION & DIVISION BOOKS

104 PAGES (ANSWERS INCLUDED)

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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

- MULTIPLICATION CONCEPT
- MULTIPLICATION ON A NUMBER LINE
- ORDER OF OPERATIONS
- WORD PROBLEMS
- GUIDE FOR EFFECTIVE ORAL DRILLING
- STRUCTURED STUDY OF THE MULTIPLICATION TABLES



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/MULTIPLICATION\\_1.PHP](http://www.mathmammoth.com/multiplication_1.php)

*Math Mammoth Multiplication 1* is a fairly self-explanatory worktext to learn the concept of multiplication and the multiplication tables. It has two parts: The first part concentrates on the concept of multiplication, the order of operations, and word problems. The second part is all about memorizing the times tables. After that, the student can continue on to division.

I have created a systematic approach to memorizing times tables. In this method, one table is studied at a time to mastery. The individual tables are NOT studied in the order of 2, 3, 4, etc. but instead the "easy" tables of 2, 5, 10, and 11 are studied first. The study order also includes studying the table of 4 right after the table of 2, and studying the table of 6 right after the table of 3, because the skip-counting patterns of those tables share some similarities. The lessons emphasize the fact that one multiplication fact is always in two different tables. This way, when the student gets to the hardest tables, the tables of 7, 8, and 12, there are only a few totally new facts to learn.

We always start the study of each table by memorizing the skip-counting pattern 7, 14, 21, 28, etc. first. Then we work on memorizing which fact is associated with which answer. This way your child not only knows what is  $8 \times 7$  but also knows all of it "backwards" - that 56 is in the tables of 8 and 7. That knowledge will be an enormous help later, when the student learns division, factorizing, and finding LCM's or GCF's.

The book also includes a 12x12 grid at the end of almost every lesson in part 2. The boxes for those answers that have not been studied yet are shaded and are not to be filled. Little by little, the shaded areas become fewer and fewer, and the progress is very visible to the student.

I encourage you also to use games for motivation and for practice. I have included a list of online multiplication games for that purpose. Of course, board and card games are perfect as well. However, games are not enough in themselves. The memorization also requires a mental effort from the student: sitting down with the skip-counting list, then with the facts, reading them, and then trying to remember them. The basic age-old technique of covering the list and trying to remember it is still very effective!

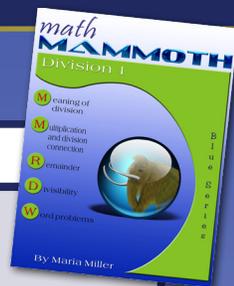
I do not want to discount the value of songs or mnemonic devices, but they tend to isolate the facts in the child's mind as separate "odd trivia". This book shows the patterns found in the multiplication tables in order to keep the facts in a structured context, and emphasizes learning the tables "backwards" in order to facilitate learning division.

If the student studies the multiplication tables well at one time, he does not need to come back to them in the fourth, fifth, and sixth grade. One time will be enough, and he can move on to division and other topics.

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# DIVISION 1



## MULTIPLICATION & DIVISION BOOKS

66 PAGES (ANSWERS INCLUDED)

PDF DOWNLOAD \$3.70  
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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

- MEANING OF DIVISION
- MULTIPLICATION AND  
DIVISION CONNECTION
- REMAINDER
- DIVISIBILITY
- WORD PROBLEMS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/DIVISION\\_1.PHP](http://www.mathmammoth.com/division_1.php)

*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 studying (later) 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  $12 \div 3$  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  $12 \div 3$  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.

The book at hand provides plenty of practice and stresses understanding of concepts. I do not wish the student to memorize procedures without understanding the "why" (rote memorization).

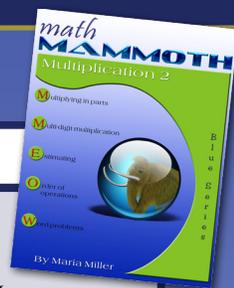
For example, when studying the remainder, the student first finds the remainder with the help of pictures - which is equivalent to using manipulatives. Then he explores the pattern found in dividing sequential numbers by the same number, such as  $25 \div 3$ ,  $26 \div 3$ ,  $27 \div 3$ ,  $28 \div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

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# MULTIPLICATION 2



## MULTIPLICATION & DIVISION BOOKS

85 PAGES (ANSWERS INCLUDED)

PDF DOWNLOAD \$5.10  
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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

- MULTIPLYING IN PARTS
- MULTI-DIGIT MULTIPLICATION
- ESTIMATING
- ORDER OF OPERATIONS
- WORD PROBLEMS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/MULTIPLICATION\\_2.PHP](http://www.mathmammoth.com/multiplication_2.php)

*Math Mammoth Multiplication 2* is a continuation from *Math Mammoth Multiplication 1*. It covers multi-digit multiplication and related topics, and suits best fourth grade mathematics.

The first lessons briefly review the multiplication concept and the times tables. The next lesson, where students solve scales or pan balance problems, is intended to be somewhat fun and motivational. The balance problems are actually equations in disguise.

Then, the focus is on multi-digit multiplication (also called algorithm of multiplication, or multiplying in columns). We start out by multiplying by whole tens and hundreds (such as  $20 \times 4$  or  $500 \times 6$ ). After this is mastered, we study a very important concept of multiplying in parts (also called partial products algorithm). It means that  $4 \times 63$  is done in two parts:  $4 \times 60$  and  $4 \times 3$ , and the results are added.

This principle underlies all other multiplication algorithms, so it is important to master it. We do not want children to learn the multiplication algorithm “blindly”, without understanding what is going on with it. Multiplying in parts is also tied in with an area model, which, again, is very important to understand.

Before showing the traditional form of multiplication, the lesson *Multiply in Columns—the Easy Way* shows a simplified form of the same, which is essentially just multiplying in parts. You may skip that lesson at your discretion or skim through it quickly if your child is ready to understand the standard form of the algorithm, which is taught next.

Students also study estimation, the order of operations, and multiplying with money. Many kinds of word problems abound in all of the lessons. Students are supposed to practice writing a number sentence for the word problems—essentially writing down the calculating they are doing.

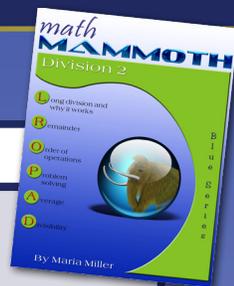
The lesson *So Many of the Same Thing* could be titled *Proportional Reasoning* but I wanted to avoid scaring parents and children with such a high-sounding phrase. The idea in that lesson is really simple, but it does prepare for proportions as they are taught in 7th grade and in algebra.

After that, we multiply two-digit numbers by two-digit numbers. Again, we first study partial products and tie that in with an area model. The lesson *Multiplying in Parts: Another Way* is optional. After that, the standard algorithm for multiplying a two-digit number by a two-digit number is taught, and the chapter ends.

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# DIVISION 2



## MULTIPLICATION & DIVISION BOOKS

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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-LONG DIVISION AND WHY IT  
WORKS

-REMAINDER

-ORDER OF OPERATIONS

-PROBLEM SOLVING

-AVERAGE

-DIVISIBILITY



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/DIVISION\\_2.PHP](http://www.mathmammoth.com/division_2.php)

*Math Mammoth Division 2* is a continuation from the *Math Mammoth Division 1* book. It includes lessons on division, long division, remainder, problem solving, average, divisibility, and factors. The book is most suitable for fourth grade.

We start out by reviewing basic division with single-digit numbers. Then students study division terms and dividing by whole tens and hundreds.

The lesson *Finding Fractional Parts with Division* shows an important relationship between fractions and division. For example, we can find  $\frac{3}{4}$  of a number by first finding  $\frac{1}{4}$  (divide by 4), then multiplying that result by 3. Next we briefly study the order of operations, this time including divisions in the problems.

In the lesson *The Remainder, Part 1*, we study the concept of remainder, first using pictures and small numbers. In the second lesson on remainder, we still use small numbers, but students work the problems using the long division symbol or "corner," as I like to call it. That is of course preparing them for long division.

Next, long division is taught in several small steps over many lessons. We start with the situation where each of the thousands, hundreds, tens, and ones can be divided evenly by the divisor. Then is introduced the remainder in the ones. Next comes the situation where we have a remainder in the tens. Finally, we have a remainder in the hundreds, and so on. We also have lots of word problems to solve.

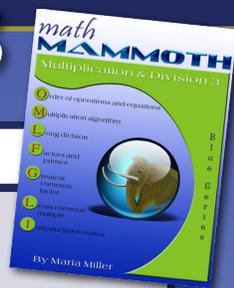
After long division is mastered, we study the concept of average and problem solving involving a fractional part of a whole. I have included many bar diagrams and pictorial representations of these problems to help the students.

The last section deals with elementary number theory topics. We study some basic divisibility rules (though not all of them), prime numbers, and find all factors of a given two-digit number.

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# MULTIPLICATION DIVISION 3



## MULTIPLICATION & DIVISION BOOKS

129 PAGES (ANSWERS INCLUDED)

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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

- ORDER OF OPERATIONS AND EQUATIONS
- MULTIPLICATION ALGORITHM
- LONG DIVISION
- FACTORS AND PRIMES
- GREATEST COMMON FACTOR
- LEAST COMMON MULTIPLE
- INTRODUCTION TO RATIOS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/MULTIPLICATION\\_DIVISION\\_3.PHP](http://www.mathmammoth.com/multiplication_division_3.php)

*Math Mammoth Multiplication Division 3* covers multiplication and division related topics, such as the multiplication algorithm, long division, estimation, divisibility, factoring, and ratios. This book also contains many lessons that aim to develop students' algebraic thinking, and get them used to simple equations. The book is aimed for 5th grade but can probably easily be used in 6th grade as well.

One important line of thought throughout this book is that of equations. 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.

Simple diagrams are used to illustrate simple multiplication and division equations and mixture equations, such as  $4x + 38 = 128$ . The idea is see how the four operations are used together in solving problems and in simple equations. We are trying to develop students' 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 here are preparing them for algebra in advance.

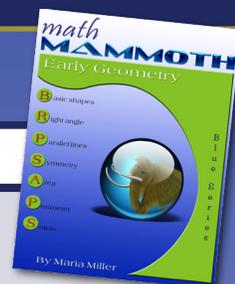
In the middle of the book are lessons on multi-digit multiplication (multiplying in columns). These lessons go farther than just reviewing the well-known algorithm. We study in detail: multiplying in parts (partial products), how those partial products can be seen in the algorithm itself, and how multi-digit multiplication can be visualized geometrically.

Students also practice long division, including two-digit divisors. Then we study divisibility, prime numbers, and factoring, including the sieve of Eratosthenes.

The *Introduction to Ratios* is an important lesson, showing the connection between fractional parts, ratios, and bar models.

You can make additional worksheets for long multiplication and long division on this web page. Scroll down to the multiplication and division sections.

# EARLY GEOMETRY



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THE PDF VERSION OF THIS BOOK IS  
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- BASIC SHAPES
- RIGHT ANGLES
- PARALLEL LINES
- SYMMETRY
- AREA
- PERIMETER
- SOLIDS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/EARLY\\_GEOMETRY.PHP](http://www.mathmammoth.com/early_geometry.php)

*Math Mammoth Early Geometry* covers geometry topics for grades 1-3. These lessons are taken out from Math Mammoth Complete Curriculum (Light Blue Series).

The first lessons in this book have to do with basic shapes—that is where geometry starts. Children learn to recognize and draw basic shapes, and identify triangles, rectangles, squares, quadrilaterals, pentagons, hexagons, and cubes. They also put several shapes together to form new ones, or divide an existing shape into new ones.

We also study some geometric patterns, right angles, have surprises with pentagons and hexagons, and make shapes in a tangram-like game. These topics are to provide some fun while also letting children explore geometry and helping them to memorize the terminology for basic shapes. The students also learn a little about symmetry and mirror points—two hopefully easy and fun topics that tie together.

In the latter part of the book, the emphasis is on two 3rd grade concepts: area and perimeter. Students find perimeters of polygons, including finding the perimeter when the side lengths are given, and finding an unknown side length when the perimeter is given.

They learn about area, and how to measure it in either square inches, square feet, square centimeters, square meters, or just square units if no unit of length is specified. Students also relate area to the operations of multiplication and addition. They learn to find the area of a rectangle by multiplying the side lengths, and to find the area of rectilinear figures by dividing them into rectangles and adding the areas.

We also study the distributive property “in disguise.” This means using an area model to represent  $a \times (b + c)$  as being equal to  $a \times b$  plus  $a \times c$ . The expression  $a \times (b + c)$  is the area of a rectangle with side lengths  $a$  and  $(b + c)$ , which is equal to the areas of two rectangles, one with sides  $a$  and  $b$ , and the other with sides  $a$  and  $c$ .

*Multiplying by Whole Tens* is a lesson about multiplication such as  $3 \times 40$  or  $90 \times 7$ . It is put here so that students can then use their multiplication skills to calculate areas of bigger rectangles. Then we solve many area and perimeter problems. That is necessary so that students learn to distinguish between these two concepts. They also get to see rectangles with the same perimeter and different areas or with the same area and different perimeters.

Lastly we touch on solids, such as cube, rectangular prism, pyramids, cone, and cylinder, and study their faces, edges, and vertices. You can make paper models for them from the printouts provided after the answer key. Just print them out, cut out the shapes, fold the sides, and glue or tape the figures together. Alternatively you can buy them, usually made in plastic. Search on the internet for “geometric solids.”

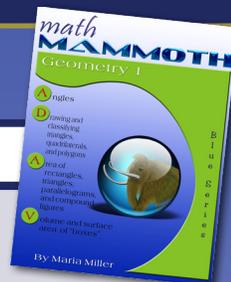
This book is also suitable for a geometry notebook or journal project. This simply means that for each new TERM in the book, the student explains that term and draws the corresponding figure, using 1-2 blank pages. In the end, the student will have his/her very own geometry book to keep and show around!

After studying these early geometry lessons, you can continue the study of geometry with *Math Mammoth Geometry 1* book.

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# GEOMETRY 1



## GEOMETRY & STATISTICS BOOKS

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THE PDF VERSION OF THIS BOOK IS  
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- ANGLES
- DRAWING AND CLASSIFYING TRIANGLES, QUADRILATERALS, AND POLYGONS
- AREA OF RECTANGLES, TRIANGLES, PARALLELOGRAMS, AND COMPOUND FIGURES
- VOLUME AND SURFACE AREA OF "BOXES"



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/GEOMETRY\\_1.PHP](http://www.mathmammoth.com/geometry_1.php)

*Math Mammoth Geometry 1* covers all the typical geometry topics for grades 4-5: angles, triangles, quadrilaterals, other polygons, area, perimeter and volume.

The problems in this book involve lots of drawing. Geometry is a hands-on subject, and many children like that. Moreover, drawing is an excellent means of achieving the conceptual understanding that geometry requires. Exercises marked with the notebook symbol are meant to be done in the student's notebook or on blank paper.

The study of geometry is also full of new vocabulary. I encourage the usage of a geometry notebook, where students will write every new concept or term, and draw a picture or pictures and text to explain the term. That will help them to remember the terms better, and most children will like creating a book of their own. The students can also do the drawing exercises in this book.

First we review the area and perimeter of rectangles (as taught in third grade). Then the students are introduced to angles, and learn about acute, right, obtuse, and straight angles. Students learn how to measure angles with a protractor, draw angles, and estimate some common angles.

After angles, we study parallelograms and different kinds of triangles (acute, obtuse, right). We also review polygons and then go on to a lesson about circles. Students learn the terms circle, radius, and diameter, and learn to draw circles and circle designs using a compass.

Then we go on to classify quadrilaterals and triangles. There are seven types of quadrilaterals to learn about, and now students classify triangles both by sides and by angles.

The last section of the book deals with area and perimeter of rectangular shapes, and volume of rectangular prisms. I have also included a lesson for problem solving, and two review lessons.

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# GEOMETRY 2



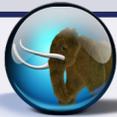
## GEOMETRY & STATISTICS BOOKS

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- ANGLE RELATIONSHIPS
- CLASSIFYING TRIANGLES AND QUADRILATERALS
- CONGRUENT TRANSFORMATIONS
- SIMILAR FIGURES
- AREA OF POLYGONS
- CIRCUMFERENCE AND AREA OF A CIRCLE
- UNITS OF AREA
- VOLUME AND SURFACE AREA OF PRISMS, CYLINDERS, CONES AND PYRAMIDS
- UNITS OF VOLUME



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/GEOMETRY\\_2.PHP](http://www.mathmammoth.com/geometry_2.php)

*Math Mammoth Geometry 2* continues the study of geometry after *Math Mammoth Geometry 1*, and is suitable for grades 6-7. It concentrates on two broad and important topics: area and volume of all common shapes.

In the first section of the book, which is also the longest, students learn to calculate the area of all common shapes: triangles, parallelograms, other polygons, and circles. They also learn about Pi and the circumference of a circle.

Next, we study nets and surface area of common solids. Naturally the student needs to know how to calculate the area of two-dimensional shapes by this point (specifically, the area of rectangles, triangles, and circle). There is one more section about area, in which we learn how to convert between various units of area, both metric and customary.

Lastly, the book teaches about volume of common solids. I assume the students already know how to find the volume of a right rectangular prism (a box). First we expand this topic by calculating volumes of rectangular prisms with fractional edge lengths. Then we go on to calculate volumes of other solids: prisms, cylinders, pyramids, and cones.

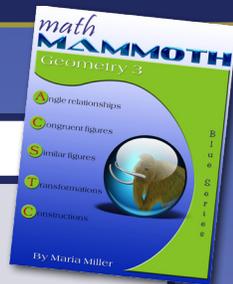
Besides simple calculation exercises, the lessons contain many real-life applications, word problems, and mathematical problems concerning area and volume. I have tried to create a variety of problems to encourage students' problem-solving skills.

These topics (area and volume) involve lots of calculations, and the calculator is allowed in the problems that are marked with a little calculator image.

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# GEOMETRY 3



## GEOMETRY & STATISTICS BOOKS

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- ANGLE RELATIONSHIPS
- CONGRUENT FIGURES
- SIMILAR FIGURES
- TRANSFORMATIONS
- CONSTRUCTIONS



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[HTTP://WWW.MATHMAMMOTH.COM/GEOMETRY 3.PHP](http://www.mathmammoth.com/geometry3.php)

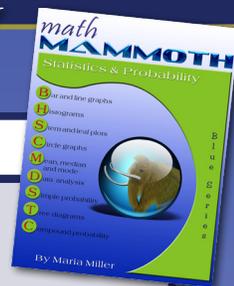
*Math Mammoth Geometry 3* can be used after the student has finished *Math Mammoth Geometry 1*, and is suitable for grades 5-7. This book does not require the students to calculate area or volume, and that is why it is not necessary to study *Math Mammoth Geometry 2* (which deals with those topics in depth) before this book.

We start out with basic angle relationships, such as adjacent angles (angles along a line), vertical angles, and corresponding angles (the last only briefly). Classifying triangles according to both angles and sides and the angle sum of a triangle are our next topics, giving students lots of opportunities for drawing exercises. The lesson Angles in Polygons is a sequel to studying angles in a triangle.

The next set of lessons deals with congruent and similar figures. The first lessons in this section are simple enough to be accessible even to 4th-5th grade students. The lesson Similar Figures and Scale Ratio uses the concepts of ratio and proportion, and is meant for 6th-7th graders.

The last section of this book teaches some basic compass-and-ruler constructions. These constructions were practiced and studied a lot by the ancient Greeks. In fact, the mathematics of ancient Greece centered around geometry. Most students will probably enjoy doing the drawing problems in these lessons on blank paper instead of in the worktext.

# STATISTICS & PROBABILITY



## GEOMETRY & STATISTICS BOOKS

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THE PDF VERSION OF THIS BOOK IS  
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- BAR AND LINE GRAPHS
- HISTOGRAMS
- STEM-AND-LEAF PLOTS
- CIRCLE GRAPHS
- MEAN, MEDIAN, AND MODE
- DATA ANALYSIS
- SIMPLE PROBABILITY
- TREE DIAGRAMS
- COMPOUND PROBABILITY



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/STATISTICS\\_PROBABILITY.PHP](http://www.mathmammoth.com/statistics_probability.php)

*Math Mammoth Statistics & Probability* book is a worktext with instruction and exercises, meant for grades 5-7.

The book starts with the easiest topics, such as reading different graphs. These lessons are meant for 5th grade. Some are useful even in earlier grades. Then we study histograms and various kinds of line graphs, including how to draw them.

The next section deals with mean, median, and mode—the three measures of central tendency—how to use them, and how these concepts relate to line and bar graphs. When calculator use is allowed in the problem, it is marked with a little calculator symbol.

To create circle graphs, the student needs to calculate percentages, and it is assumed here that the student has already mastered how to calculate those. The lesson on data analysis presents various types of graphs for students to read, and reviews some other percent-related topics.

Then students learn how to make stem-and-leaf plots. Stem-and-leaf plots are simple plots that can be used with 15-100 data items. They are not often seen in media because you cannot use them with large amounts of data.

We study range as a simple measure of variance. There exist far better measures of variance, such as the interquartile range, standard deviation, and others, but I feel those are also advanced for middle school. Statistical measures is a vast area of study, and I feel it is not necessary to introduce to students all kinds of measures (such as interquartile range) if all that students could do with it is to calculate it, and not use it in a meaningful way in interpreting data. Interpreting data using statistical measures (such as mean, median, mode, standard deviation, and others) is a skill that requires more in-depth understanding of statistics than what can be covered here.

The book also includes an optional statistics project, in which the student can develop investigative skills.

Probability is a topic that in the past was only taught in high school—for example, I personally encountered it the first time in 12th grade. However, in recent years it has “crept” down the grade levels and many states require probability topics even in elementary school.

We start with the concept of simple (classic) probability, and then expand into probability involving two events. This is all that is needful to master at this point (middle school). The exercises involve tree diagrams, dice, flipping coins, picking marbles, spinning spinners, and probability involving statistics, which are the usual types of situations in the study of probability.

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# INTRODUCTION TO FRACTIONS



## FRACTIONS & DECIMALS BOOKS

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-FRACTIONS  
-MIXED NUMBERS  
-COMPARING FRACTIONS  
-EQUIVALENT FRACTIONS  
-ADDING AND SUBTRACTING LIKE  
FRACTIONS AND MIXED NUMBERS  
-MULTIPLYING FRACTIONS BY WHOLE  
NUMBERS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/INTRODUCTION\\_FRACTIONS.PHP](http://www.mathmammoth.com/introduction_fractions.php)

*Math Mammoth Introduction to Fractions* contains lessons for fraction arithmetic for grades 1-4. This material does not include division or multiplication of fractions, nor adding unlike fractions, which are topics for 5th and 6th grades. Also, most of the material here is for 3rd and 4th grades, and only a few lessons are meant for grades 1-2.

The topics covered are on a simple level, constantly illustrated with visual models, and with small denominators. The presentation avoids spelling out specific rules for manipulating fractions, but instead relies on the usage of pictures on a very concrete level. Children easily confuse the various rules for fraction arithmetic, because there are so many. There is a place for the rules, as shortcuts for ideas that are already understood, but we do not start with them. The goal is to let the big ideas sink in conceptually first, followed by some shortcuts.

The topics covered are

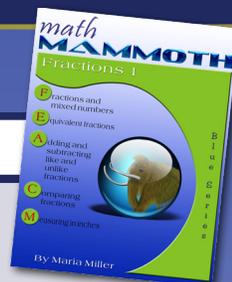
- one half and one fourth
- concept of a fraction
- concept of a mixed number
- comparing fractions
- equivalent fractions
- adding and subtracting like fractions
- adding and subtracting mixed numbers with like fractional parts
- adding one fraction that has tenths and another that has hundredths (such as  $3/10 + 7/100$ )
- multiplying a fraction by a whole number

The lessons are organized by topic, not by increasing difficulty. For reference, in 1st grade, students only study the concept of one half and one fourth. In 2nd grade, they study the concept of a fraction and optionally the easiest (first) lesson on comparing fractions. In 3rd grade, students study the concept of a fraction, fractions on a number line, comparing fractions, and equivalent fractions. And in 4th, they study mixed numbers, comparing fractions, equivalent fractions, adding and subtracting fractions and mixed numbers, and multiplying fractions by whole numbers.

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# FRACTIONS 1



## FRACTIONS & DECIMALS BOOKS

79 PAGES (ANSWERS INCLUDED)

PDF DOWNLOAD \$3.50  
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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

- FRACTIONS AND MIXED NUMBERS
- EQUIVALENT FRACTIONS
- ADDING AND SUBTRACTING LIKE AND UNLIKE FRACTIONS
- COMPARING FRACTIONS
- MEASURING IN INCHES



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/FRACTIONS\\_1.PHP](http://www.mathmammoth.com/fractions_1.php)

*Math Mammoth Fractions 1* is the first book of two that covers all aspects of fraction arithmetic. This book covers the concepts of fraction and mixed numbers, equivalent fractions, adding and subtracting like and unlike fractions, adding and subtracting mixed numbers, and comparing fractions. The book *Math Mammoth Fractions 2* covers simplifying, multiplication, and division of fractions.

Studying fractions involves lots of rules, and many students learn them only mechanically, not really understanding the underlying concepts and principles. Then they end up making lots of mistakes because they confuse the different rules and either apply the wrong one or apply the right rule but don't remember it quite right. All this can make students even fear fractions in math.

To avoid that, this book uses the visual model of a pie divided into slices all the way through the book. It is a very natural model, because it uses a circle that can be divided into any number of circle sectors (slices). When students work with this model from lesson to lesson, they will eventually be able to "see" these pies in their mind. This, in turn, gives them the ability to do many of the easier fraction calculations mentally. It also enables students to really UNDERSTAND these concepts, and not just learn mechanical rules.

You are welcome to use manipulatives alongside the book; however the visual pie model is probably sufficient for most students in 5th grade level. I have also included (in the appendix) printable cutouts for fractions from halves to twelfths. You can use them to make your own fraction manipulatives.

The first lesson, *Fraction Terminology* explains the various parts of a fraction as well as what the different types of fractions are known as. The student can refer back to this information as needed as he does the lessons in this book.

The lesson *Review: Mixed Numbers* needs to be thoroughly understood before progressing further. The next lessons, cover adding and subtracting mixed numbers and are well illustrated with "pies" to help the student visualize the concept of regrouping fractions so they can complete the math.

Then, it is time to study equivalent fractions, as a prerequisite for adding unlike fractions. Equivalent fractions are presented as parts that have been split further. The rule is to multiply both the numerator and the denominator by the same number, but try to emphasize the terminology of "splitting the existing parts into so many pieces" or something similar. That should help students to understand the concept instead of memorizing a mechanical rule.

*Adding and Subtracting Unlike Fractions* is an introductory lesson in the sense that the student is not yet introduced to the rule for finding the common denominator. In this lesson, the common denominator is either given, or the student figures it out using pictures.

*Finding the (Least) Common Denominator* emphasizes the idea that we need to find a common denominator, and then convert the fractions to like fractions before adding.

Next we study *Adding and Subtracting Mixed Numbers* with unlike fractional parts, and add and have some word problems in this lesson to utilize the concept of converting unlike fractions to like fractions. Then we cover the concept of comparing fractions. Once the student has mastered converting two fractions to equivalent, like fractions, this should be fairly easy.

The last lesson in the book, *Measuring in Inches*, uses pictures to illustrate measuring with inches and fractions of inches. This lesson gives the student a chance to see how fractions can become useful in measuring items in everyday life as it also has some word problems to solve using fractions.

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# FRACTIONS 2



## FRACTIONS & DECIMALS BOOKS

119 PAGES (ANSWERS INCLUDED)

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- SIMPLIFYING FRACTIONS
- MULTIPLYING FRACTIONS
- MULTIPLICATION AND AREA
- DIVIDING FRACTIONS
- INTRODUCTION TO RATIOS
- DIVIDE MIXED NUMBERS
- FRACTIONS TO DECIMALS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/FRACTIONS\\_2.PHP](http://www.mathmammoth.com/fractions_2.php)

*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. 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. 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.

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 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.

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# DECIMALS 1



## FRACTIONS & DECIMALS BOOKS

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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

- TENTHS
- HUNDREDTHS
- ADDING AND SUBTRACTING
- MULTIPLYING DECIMALS BY A WHOLE NUMBER
- MULTIPLYING DECIMALS IN COLUMNS
- COMPARING
- ROUNDING AND ESTIMATING



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/DECIMALS\\_1.PHP](http://www.mathmammoth.com/decimals_1.php)

*Math Mammoth Decimals 1* is an introduction to decimal numbers, and is best suited for 4th to 5th grade math.

This book deals with decimal numbers that have tenths and hundredths - numbers with a maximum of two decimal digits. We only deal with some of the basic operations: addition, subtraction, and multiplication by a whole number, with a strong emphasis on mental calculations. The idea is to lay a solid conceptual foundation so that the student does not succumb to rote memorization of rules and procedures without understanding.

The two operations not studied in this book are multiplying a decimal by a decimal and decimal division. Those can be found in *Math Mammoth Decimals 2*.

We use number lines, fraction models, and place value charts to teach the concepts of tenths and hundredths. In studying addition and subtraction, we compare decimal operations with corresponding fraction operations in order to show why they work.

A common student error is to add  $0.4 + 0.8 = 0.12$ . Here, the student may be considering the decimal part of a number as a 'separate whole number', and try to apply whole number arithmetic within the decimal part. To help such a student, read the decimals as fractions and emphasize how fractions are added. Think: four tenths plus eight tenths equals twelve tenths, which is 1.2.

When we add decimals of different "length" (numbers with different amounts of decimal digits), such as  $0.4 + 0.08$ , you can "tag" a zero to the end of 0.4 to make adding easier. The problem becomes  $0.40 + 0.08$ . Now, both addends have hundredths, so the answer is simply 48 hundredths or 0.48. This is the same thing as converting the corresponding fractions (four tenths and eight hundredths) to have the same denominator (forty hundredths and eight hundredths).

Other topics covered are comparing decimals, multiplying a decimal by a whole number, rounding, estimating, and money problems.

Several videos from my Decimal arithmetic playlist can be used in conjunction with this book.

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# DECIMALS 2



## FRACTIONS & DECIMALS BOOKS

109 PAGES (ANSWERS INCLUDED)

PDF DOWNLOAD \$6.25  
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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

- PLACE VALUE WITH DECIMALS
- COMPARING
- ROUNDING
- ADD AND SUBTRACT
- MULTIPLY
- DIVIDE
- DECIMALS IN MEASURING



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/DECIMALS\\_2.PHP](http://www.mathmammoth.com/decimals_2.php)

*Math Mammoth Decimals 2* is a book about decimal place value and the four operations with decimals. It is most suitable for 5th and 6th grade.

The book starts with a short review of previously learned concepts (from *Math Mammoth Decimals 1*): place value with tenths and hundredths, and adding and subtracting decimals that have tenths and hundredths.

The rest of the book is spent learning the four operations of decimals with numbers that have up to three decimal digits, and especially concentrating on decimal multiplication and division. We start by learning place value, comparing, and rounding decimals (tenths, hundredths, and thousandths). After that follow addition and subtraction, and then various multiplication and division topics.

I've strived to emphasize mental calculations based on conceptual understanding of decimals, and for that end the text also often includes little tips or "tricks" that help with mental calculations. Along with all that, the book naturally has lessons on long multiplication and long division with decimals. Problems that show a little calculator picture are meant to be solved with the help of a calculator. Otherwise, a calculator should not be allowed.

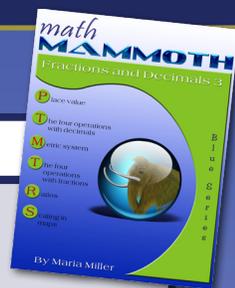
The last lessons deal with problem solving, and as such could be included in some other course of study. They are included here since the problems involve the usage of decimal numbers, and also because the material for this book is taken from the 3rd chapter of *Math Mammoth Grade 5-A Complete Worktext*, which includes those problem solving lessons.

After this book, the student should understand how to perform all of the four operations with decimals. However, please note that this book does not practice these operations with decimals that have more than 3 decimal digits. Students in 6th grader or higher should also practice decimal arithmetic with such longer decimals. For fifth grade, I feel the coverage in this book is sufficient.

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# FRACTIONS & DECIMALS 3



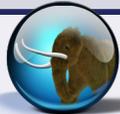
## FRACTIONS & DECIMALS BOOKS

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- PLACE VALUE
- THE FOUR OPERATIONS WITH DECIMALS
- METRIC SYSTEM
- THE FOUR OPERATIONS WITH FRACTIONS
- RATIOS
- SCALING IN MAPS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/FRACTIONS\\_DECIMALS\\_3.PHP](http://www.mathmammoth.com/fractions_decimals_3.php)

*Math Mammoth Fractions & Decimals 3* continues the study of fraction and decimal topics, on the 6th grade level. This book assumes the student already has studied fractions and decimals in the past, for example using *Math Mammoth Fractions 2* and *Math Mammoth Decimals 2*.

The goal of the book is to go through all of the fraction and decimal arithmetic, using up to six decimal digits and larger denominators in fractions than what is commonly encountered in 4th and 5th grade materials. For some students, this may mean a lot of review, but some students need to restudy these topics if they did not quite master them in earlier grades.

The book starts out with the study of decimals, the metric system, and using decimals in measuring units. If the student already has a good grasp of decimals, consider assigning only 1/3 - 1/2 of the problems, and he should be able to go through those lessons quickly.

We start out by studying place value with decimals and comparing decimals, up to six decimal digits. The next several lessons contain mainly review, just using longer decimals than in 5th grade: adding and subtracting decimals, rounding decimals, using mental math for multiplying and dividing decimals, long division with decimals, fractions to decimals, and multiplying and dividing decimals by the powers of ten.

Scientific notation is a new topic. It is also covered by most 7th grade math curricula. After that, we turn our attention one more time to dividing decimals by decimals. I have tried to explain the principle behind the common shortcut or rule ("Move the decimal point in both the divisor and the dividend so many steps that the divisor becomes a whole number"). The principle here has to do with multiplying the divisor and the dividend by a power of ten, and it even ties in with equivalent fractions. Many school books never explain this principle in connection with decimal division.

The last lessons in the section with decimals deal with measuring units and the metric system, and nicely round up our study of decimals.

After decimals, the book covers all fraction arithmetic. The goal is that the student will become "fluent" with basic fraction operations, if he isn't already. I assume the student has already studied the four operations of fractions (in 5th grade), so the coverage of this book is slightly quicker and not so in-depth as in *Math Mammoth Fractions 1* and *Math Mammoth Fractions 2* books.

For example, the lessons don't always delve into the reasons why a certain shortcut works—a lot of that is explained in those two books mentioned. While I consider it very important that the student understands fractions conceptually and understands why certain things are done the way they are done, the material here is building on the material for the earlier grades, where the students have been exposed to those thoughts and ideas.

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# THE FOUR OPERATIONS

(WITH A TOUCH OF ALGEBRA)

## RATIOS, PROPORTIONS & PERCENT BOOKS

125 PAGES (ANSWERS INCLUDED)

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THE PDF VERSION OF THIS BOOK IS  
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- MENTAL MATH REVIEW
- REVIEW OF THE FOUR OPERATIONS
- TERMINOLOGIES
- EXPRESSIONS
- EQUATIONS
- EXPONENTS
- ORDER OF OPERATIONS
- LONG MULTIPLICATION AND DIVISION
- INTRODUCTION TO FUNCTIONS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/FOUR\\_OPERATIONS.PHP](http://www.mathmammoth.com/four_operations.php)

*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 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. These diagrams (the same kind as in Singapore Math) are also used for simple multiplication and division equations and for mixture equations, such as  $4x + 38 = 128$ .

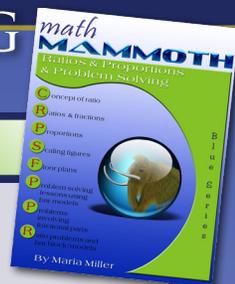
We also present lessons on multi-digit multiplication (multiplying in columns). These lessons go farther than just reviewing the well-known algorithm. We study in detail: multiplying in parts (partial products), how those partial products can be seen in the algorithm itself, and how multi-digit multiplication 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.

This book is suitable for 5th and 6th grades. It includes both the teaching material (lessons) as well as the exercises in the same book. The answer key is appended.

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## RATIOS, PROPORTIONS & PERCENT BOOKS

90 PAGES (ANSWERS INCLUDED)

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THE PDF VERSION OF THIS BOOK IS ENABLED FOR ANNOTATION.

- CONCEPT OF RATIO
- RATIOS & FRACTIONS
- PROPORTIONS
- SCALING FIGURES
- FLOOR PLANS
- PROBLEM SOLVING LESSONS USING BAR MODELS
- PROBLEMS INVOLVING FRACTIONAL PARTS
- RATIO PROBLEMS AND BAR BLOCK/MODELS



SAMPLE PAGES AND ORDERING INFORMATION:

[HTTP://WWW.MATHMAMMOTH.COM/RATIOS\\_PROPORTIONS\\_PROBLEM\\_SOLVING.PHP](http://www.mathmammoth.com/ratios_proportions_problem_solving.php)

*Math Mammoth Ratios & Proportions & Problem Solving* is a worktext that concentrates, first of all, on two important concepts: ratios and proportions, and then on problem solving.

My aim is to provide students with a thorough understanding of ratios and proportions, not only because that is the norm for 6th grade, but also because they are used so much in everyday-life applications, and because they are a natural extension to go to after the student understands the basics of fractions.

First, we study thoroughly the concept of ratio, including how it connects with fractions. Next, we turn our focus on equivalent ratios because those will lead us into proportions just a few lessons later. The lesson *Ratios in Rectangles* has applications about the aspect ratio.

Solving proportions is divided into three separate lessons. In the first one, we solve proportions by thinking through equivalent ratios. In the second one, the usual method of cross-multiplying is introduced.

Then follows a lesson that explains just why cross-multiplying is allowed. Then there is more practice with solving proportions and word problems. We also study scaling geometric figures and floor plans, which are simple applications of proportions.

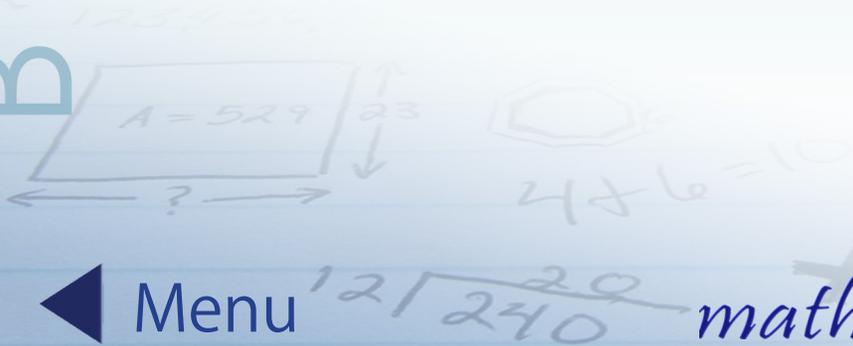
After this, the last lessons concentrate on various kinds of word problems that can be solved with the help of bar or block diagrams (the same kind as in Singapore Math). These involve problems with fractional parts, and then problems involving ratios. The diagrams become a powerful tool to solve such problems without the use of algebra.

This book is suitable for 5th and 6th grades. It includes both the teaching material (lessons) as well as the exercises in the same book. The answer key is appended.

Books Topic



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# PERCENT



## RATIOS, PROPORTIONS & PERCENT BOOKS

62 PAGES (ANSWERS INCLUDED)

PDF DOWNLOAD \$3.20  
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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

- CONCEPT OF PERCENT
- PERCENTAGE OF A NUMBER
- DISCOUNTS
- SALES TAX
- CIRCLE GRAPHS
- PERCENT OF CHANGE
- COMPARISONS WITH PERCENT



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/PERCENT.PHP](http://www.mathmammoth.com/percent.php)

*Math Mammoth Percent* teaches students the concept of percent, percentage of a number, discounts, sales tax, percent of change, circle graphs, and percent of comparison. It is suitable for 6th-8th grade (middle school).

The concept of percent builds on a student's understanding of fractions and decimals. Specifically, students should already be very familiar with the idea of finding a fractional part of a whole (such as finding  $\frac{3}{4}$  of \$240). Students who have used Math Mammoth have been practicing that concept since 4th grade, and one reason why I have emphasized finding a fractional part of a whole so much in the division and fraction materials in the earlier grades is specifically to lay a groundwork for the concept of percent. Assuming the student has mastered how to find a fractional part a whole, and can easily convert fractions to decimals, studying percent in middle school should not be difficult.

The first lesson, *Percent*, practices the concept of percent as  $\frac{1}{100}$ , and how to write fractions and decimals as percentages. Next we study *What Percentage?* in order to cement the basic idea of questions where percentage (or how many percent) is asked: students write the asked part first as a fraction, and then convert that to a percentage.

The lesson that follows, *Percentage of a Number*, teaches how to find a certain percentage of a quantity using mental math techniques. For example, students find 10% of \$400 by dividing \$400 by 10. In the next lesson, students find a percentage of a quantity using decimal multiplication, including using a calculator. For example, to find 17% of 45 km, students multiply  $0.17 \times 45$  km.

Then follow lessons about discounts and sales tax, important applications in everyday life. Next we go on to the lesson *Practice with Percent*, which contrasts the two types of problems: questions that ask for a certain percentage of a number (the percentage is given), and questions that ask for the percentage. For example, the first type of question could be "What is 70% of \$380?", and the second type could be "What percentage is \$70 of \$380?"

I also present one optional lesson titled *Backwards Questions with Percent*, where students need to figure out "the whole" when a partial amount and a percentage are given. For example: "Three-hundred twenty students, which is 40% of all students, take additional PE. How many students are there in total?"

Then follows one lesson concentrating on tenth of a percent. Thus far, all the material has been with whole percents. From this lesson on, we will also use tenth of a percent (such as 13.4%). We go on to compare ratios, fractions, and percent in one lesson. Next, students study how to make a circle graph.

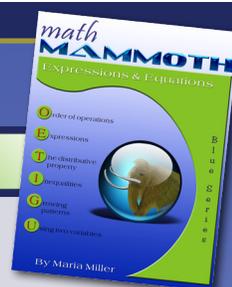
The last major topic is percent of change. This deals of course with decreases and increases in quantities (such as prices). We also study how to find the percent of change when the original and new amount are known.

Tying in with percent of change, there is one lesson on *Comparisons with Percent*. It ties in, because the way to solve comparisons involving percent (such as how many percent less/more is one thing than another) is identical to finding percent of change.

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# EXPRESSIONS & EQUATIONS



## PRE-ALGEBRAIC TOPIC BOOKS

109 PAGES (INCLUDES ANSWERS)

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THE PDF VERSION OF THIS BOOK IS  
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- ORDER OF OPERATIONS
- EXPRESSIONS
- THE DISTRIBUTIVE PROPERTY
- INEQUALITIES
- GROWING PATTERNS
- USING TWO VARIABLES



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/EXPRESSIONS\\_EQUATIONS.PHP](http://www.mathmammoth.com/expressions_equations.php)

*Math Mammoth Expressions & Equations* is a worktext covering the order of operations, equations, expressions, and simplifying expressions in several different ways in 6th-7th grade level.

The main principles are explained and practiced both with visual models and in abstract form, and the lessons contain varying practice problems that approach the concepts from various angles. We also touch on inequalities and graphing on a very introductory level. In order to make the learning of these concepts easier, the expressions and equations in this book do not involve negative numbers (as they typically do when studied in pre-algebra and algebra).

We start out by learning some basic vocabulary used to describe mathematical expressions verbally — terms such as the sum, the difference, the product, the quotient, and the quantity. Next, we study the order of operations. Then, we get into studying expressions in definite terms: students encounter the exact definition of an expression, a variable, and a formula, and practice writing expressions in many different ways.

In the lesson More On Writing and Simplifying Expressions students encounter more terminology: term, coefficient, and constant. In exercise #3, they write an expression for the perimeter of some shapes in two ways. This exercise is once again preparing them to understand the distributive property.

The concepts of equivalent expressions and simplifying expressions are important. If you can simplify an expression in some way, the new expression you get is equivalent to the first. We study these ideas first using lengths — it is a concrete example, and hopefully easy to grasp.

Next, students write and simplify expressions for the area of rectangles and rectangular shapes. After that, the lesson Multiplying and Dividing in Parts leads up to the lessons The Distributive Property 1 and The Distributive Property 2, which concentrate on the symbolic aspect and tying it in with area models.

After studying Properties of the Four Operations, the next topic is equations. Students learn some basics, such as the solutions of an equation are the values of the variables that make the equation true. They use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. I have also included a few two-step equations as an optional topic.

Lastly, students get to solve and graph simple inequalities, and study the usage of two variables and graphing.

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# INTEGERS



## PRE-ALGEBRAIC TOPIC BOOKS

77 PAGES (ANSWERS INCLUDED)

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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

- INTEGERS
- ADDITION
- SUBTRACTION
- MULTIPLICATION
- DIVISION
- NUMBER LINE MOVEMENTS
- MOVING FIGURES IN COORDINATE GRID
- GRAPHING LINEAR FUNCTIONS



SAMPLE PAGES AND ORDERING INFORMATION:  
[HTTP://WWW.MATHMAMMOTH.COM/INTEGERS.PHP](http://www.mathmammoth.com/integers.php)

*Math Mammoth Integers* worktext covers all important integer (signed numbers) topics for middle school (grades 6-8), with instructions written directly to the student. Thus, it requires very little teacher or parent involvement.

Integers are introduced using the number line to relate them to the concepts of temperature, elevation, and money. We also study briefly the ideas of absolute value (an integer's distance from zero) and the opposite of a number.

Adding and subtracting integers is presented through two main models: (1) movements along the number line and (2) positive and negative counters. With the help of these models, students should not only learn the shortcuts, or rules, for adding and subtracting integers, but also understand why these shortcuts work.

A lesson about subtracting integers explains the shortcut for subtracting a negative integer using three different viewpoints (counters, number line movements, and as a distance or difference). There is also a roundup lesson for addition and subtraction of integers.

Next, students learn to locate points in all four quadrants of the coordinate plane and how the coordinates of a figure change when it is reflected across the x or y-axis. Students also move points according to given instructions, and find distances between points with the same first coordinate or the same second coordinate.

Multiplication and division of integers is explained, first of all using counters, and then relying on the properties of multiplication and division. We use multiplication and division in the context of enlarging or shrinking geometric figures in the coordinate grid. These lessons also include a few simple equations, problems with several operations, and fun riddles.

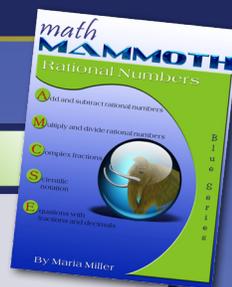
The last section of lessons in this book deal with graphing. Students plot points on the coordinate grid according to a given equation in two variables (such as  $y = x + 2$ ), this time also using negative numbers. They see the patterns in the coordinates of the points and the pattern in the points drawn in the grid, and also work through some real-life problems.

The book ends with two review lessons.

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# RATIONAL NUMBERS



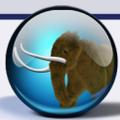
## PRE-ALGEBRAIC TOPIC BOOKS

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ENABLED FOR ANNOTATION.

- ADD AND SUBTRACT RATIONAL NUMBERS
- MULTIPLY AND DIVIDE RATIONAL NUMBERS
- COMPLEX FRACTIONS
- SCIENTIFIC NOTATION
- EQUATIONS WITH FRACTIONS & DECIMALS



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[HTTP://WWW.MATHMAMMOTH.COM/RATIONAL\\_NUMBERS.PHP](http://www.mathmammoth.com/rational_numbers.php)

In *Math Mammoth Rational Numbers* we study rational numbers, which are numbers that can be written as a ratio of two integers. All fractions and whole numbers are rational numbers, and so are percentages and decimals (except non-ending non-repeating decimals). Hopefully, students already know a lot about rational numbers and how to calculate with them. Our focus in this book is to extend that knowledge to negative fractions and negative decimals.

The first lesson, Fractions and Decimals, reviews methods of converting fractions to decimals and decimals to fractions.

Next, we present the definition of a rational number, how to convert rational numbers back and forth between their fractional and decimal forms, and a bit about repeating decimals (most fractions become repeating decimals when written as decimals). The next lesson deals with adding and subtracting rational numbers, with an emphasis on adding and subtracting negative fractions and decimals.

The next two lessons are about multiplying and dividing rational numbers. The first of the two focuses on basic multiplication and division with negative fractions and decimals. The second of the two compares multiplying and dividing in decimal notation to multiplying and dividing in fraction notation. Students come to realize that, though the calculations – and even the answers – may look very different, the answers are equal. The lesson also presents problems that mix decimals, fractions, and percentages, and deals with real-life contexts for the problems and the importance of pre-estimating what a reasonable answer would be.

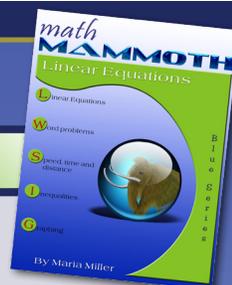
The lesson Multiple Operations with Rational Numbers reviews the order of operations and applies it to fraction and decimal problems with more than one operation. It also presents a simple method to solve complex fractions, which are fractions that contain another fraction, either in the numerator, in the denominator, or in both.

After a lesson on scientific notation, the instructional portion of the book concludes with two lessons on solving simple equations that involve fractions and decimals.

Menu

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# LINEAR EQUATIONS



## PRE-ALGEBRAIC TOPIC BOOKS

140 PAGES (INCLUDES ANSWERS)

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THE PDF VERSION OF THIS BOOK IS  
ENABLED FOR ANNOTATION.

-LINEAR EQUATIONS

-WORD PROBLEMS

-SPEED, TIME AND DISTANCE

-INEQUALITIES

-GRAPHING



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[HTTP://WWW.MATHMAMMOTH.COM/LINEAR\\_EQUATIONS.PHP](http://www.mathmammoth.com/linear_equations.php)

*Math Mammoth Linear Equations* presents the student with the basics of solving linear equations, including equations that involve a variable on both sides and equations that require the usage of the distributive property to eliminate parentheses. We also briefly study inequalities and graphing. This book best suits pre-algebra or grades 7-8 mathematics studies.

The first lesson reviews the concept of an equation and how to model equations using a pan balance (scale). The basic principle for solving equations is that, when you perform the same operation on both sides of an equation, the two sides remain equal.

The introduction to solving equations is followed by a lesson on addition and subtraction equations and another on multiplication and division equations. All the equations are easily solved in only one step of calculations. The twofold goal is to make the student proficient in manipulating negative integers and also to lay a foundation for handling more involved equations that are studied later on in the book.

In the next lesson, students write equations to solve simple word problems. Even though they could solve most of these problems without using the equations, the purpose of the lesson is to make the student proficient in writing simple equations before moving on to more complex equations from more difficult word problems.

The next topic, in the lesson Constant Speed, is solving problems with distance ( $d$ ), rate or velocity ( $v$ ), and time ( $t$ ). Students use the equivalent formulas  $d = vt$  and  $v = d/t$  to solve problems involving constant or average speed. They learn an easy way to remember the formula  $v = d/t$  from the unit for speed that they already know, "miles per hour."

In later lessons, we delve deeper into our study of equations. Now the equations require two or more steps to solve and may contain parentheses. The variable may appear on both sides of the equation. Students will also write equations to solve simple word problems.

There is also a lesson on growing patterns, which may seem to be simply a fascinating topic, but in reality presents the fundamentals of a very important concept in algebra – that of linear functions (although they are not mentioned by that name) – and complements the study of lines in the subsequent lessons.

The last major topic is graphing. Students begin the section by learning to graph linear equations and continue on to the concept of slope, which in informal terms is a measure of the inclination of a line. More formally, slope can be defined as the ratio of the change in  $y$ -values to the change in  $x$ -values. The final lesson applies graphing to the previously-studied concepts of speed, time, and distance through graphs of the equation  $d = vt$  in the coordinate plane.

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