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# Math Mammoth Multiplication Division 3

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# Introduction

*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 and factoring, including the sieve of Eratosthenes.

The “Introduction to Ratios” is an important lesson, showing the connection between fractional parts, ratios, and bar diagrams.

You can make additional worksheets for long multiplication and long division on the following page: [www.homeschoolmath.net/worksheets/grade\\_5.php](http://www.homeschoolmath.net/worksheets/grade_5.php)  
Scroll down to the multiplication and division sections.

*I wish you success with math teaching!*

*Maria Miller, the author*

## Helpful Resources on the Internet

Use these additional resources as you see fit, to complement the work in this book. Some of these games are quite fun!

### Calculator Chaos

Most of the keys have fallen off the calculator but you have to make certain numbers using the keys that are left.

[http://www.mathplayground.com/calculator\\_chaos.html](http://www.mathplayground.com/calculator_chaos.html)

### ArithmeTiles

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

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

### Choose Math Operation

Choose the mathematical operation(s) so that the number sentence is true. Practice the role of zero and one in basic operations or operations with negative numbers. Helps develop number sense and logical thinking.

<http://www.homeschoolmath.net/operation-game.php>

### MathCar Racing

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

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

### Fill and Pour

Fill and pour liquid with two containers until you get the target amount. A logical thinking puzzle.

[http://nlvm.usu.edu/en/nav/frames\\_asid\\_273\\_g\\_2\\_t\\_4.html](http://nlvm.usu.edu/en/nav/frames_asid_273_g_2_t_4.html)

### Mr. Martini's Classroom: Long Division

An interactive long division tool.

<http://www.thegreatmartinicompany.com/longarithmic/longdivision.html>

### Double-Division.org

Another form of long division algorithm - takes the guesswork away from estimating how many times the divisor goes into what needs to be divided. Also called 1-2-4-8 division.

<http://www.doubledivision.org/>

### Math Playground

Learn how to think algebraically with these clever weighing scales.

[http://www.mathplayground.com/algebraic\\_reasoning.html](http://www.mathplayground.com/algebraic_reasoning.html)

### Thinking Blocks

Thinking Blocks is an engaging, interactive math tool that helps students learn how to solve multistep word problems. Scroll down to Multiplication and Division.

<http://www.mathplayground.com/thinkingblocks.html>

### Rectangle Multiplication

An interactive tool that illustrates multiplying in parts using the area model. Choose the “common” option for multiplying in parts.

[http://nlvm.usu.edu/en/nav/frames\\_asid\\_192\\_g\\_2\\_t\\_1.html](http://nlvm.usu.edu/en/nav/frames_asid_192_g_2_t_1.html)

### **Interactive Pan Balance**

Each of the four shapes is assigned a certain weight. Place shapes on either side of the pan balance and figure out their relationships.

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=131>

### **Scales Problems from Math Kangaroo Problem Database**

[http://www.kangurusa.com/clark/pdb/quiz.pl?](http://www.kangurusa.com/clark/pdb/quiz.pl?dir=./kangur/output&y1=2002&i1=0304&i1=10&y2=2004&i2=0304&i2=10&y3=2005&i3=02&i3=19&r)

[dir=./kangur/output&y1=2002&i1=0304&i1=10&y2=2004&i2=0304&i2=10&y3=2005&i3=02&i3=19&r](http://www.kangurusa.com/clark/pdb/quiz.pl?dir=./kangur/output&y1=2002&i1=0304&i1=10&y2=2004&i2=0304&i2=10&y3=2005&i3=02&i3=19&r)

### **Arrays and factors**

Drag rectangles to show the factorizations of a given number.

[www.shodor.org/interactivate/activities/factors2/index.html](http://www.shodor.org/interactivate/activities/factors2/index.html).

### **Factor Game**

A fun, interactive game where you practice divisibility among numbers 1-100. You can play against the computer or against a friend.

[illuminations.nctm.org/ActivityDetail.aspx?ID=12](http://illuminations.nctm.org/ActivityDetail.aspx?ID=12)

### **MathGoodies Interactive Factor Tree Game**

Type in a missing number to the factor tree, and the program will find the other factor, and continue drawing the tree as needed.

[www.mathgoodies.com/factors/factor\\_tree.asp](http://www.mathgoodies.com/factors/factor_tree.asp)

### **Snake**

Eat factors, multiples, and prime numbers in this remake of the classic game.

[www.spacetime.us/arcade/play.php?game=2](http://www.spacetime.us/arcade/play.php?game=2)

### **Product game**

For two players; each selects a factor, computer colors the product - who gets four in row wins.

[illuminations.nctm.org/ActivityDetail.aspx?ID=29](http://illuminations.nctm.org/ActivityDetail.aspx?ID=29)