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## Introduction

*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 entitled “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.

*I wish you success in teaching math!*

*Maria Miller, the author*

## Helpful Resources on the Internet

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

### Multiplication Games

A list of times tables games and activities to practice multiplication facts.

<http://www.homeschoolmath.net/online/multiplication.php>

### Math FROG MultipliACTION

Online practice of 2 by 2 digit multiplication. You enter one digit in each box.

<http://cemc2.math.uwaterloo.ca/mathfrog/english/kidz/mult5.shtml>

### 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 multi-step 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)

### One-Digit by Two-Digits Multiplication Game

Students will multiply one-digit numbers by two-digit whole numbers, then get to try to shoot a basket.

<http://www.math-play.com/one-digit-by-two-digit-multiplication-game.html>

### Multiplication Jeopardy Game

You get to solve multi-digit multiplication questions of 1-digit by 1-digit, 1-digit by 2-digit, and 1-digit by 3-digit numbers in this game.

<http://www.math-play.com/Multiplicaton-Jeopardy/Multiplication-Jeopardy.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>

### Balance Beam Activity

A virtual balance that provides balance puzzles where the student has to find the weights of various figures, practicing algebraic thinking. Includes three levels.

<http://mste.illinois.edu/users/pavel/java/balance/>

### 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>

Sample worksheet from  
[www.mathmammoth.com](http://www.mathmammoth.com)

### **Order of Operations Quiz**

A 10-question online quiz that includes two different operations and possibly parentheses in each question. You can also modify the quiz parameters yourself.

<http://www.thatquiz.org/tq-1/?-j8f-la>

### **The Order of Operations Millionaire**

Answer multiple-choice questions that have to do with the order of operations, and win a million. Can be played alone or in two teams.

<http://www.math-play.com/Order-of-Operations-Millionaire/order-of-operations-millionaire.html>

### **Exploring Order of Operations (Object Interactive)**

The program shows an expression, and you click on the correct operation (either +, —, ×, ÷ or exponent) to be done first. The program then solves that operation, and you click on the *next* operation to be performed, etc., until it is solved. Lastly the resource includes a game where you click on the falling blocks in the order that order of operations would dictate.

[http://www.learnalberta.ca/content/mejhm/html/object\\_interactives/order\\_of\\_operations/use\\_it.htm](http://www.learnalberta.ca/content/mejhm/html/object_interactives/order_of_operations/use_it.htm)

### **Order of Operations Practice**

A simple online quiz of 10 questions. Uses parentheses and the four operations.

<http://www.onlinemathlearning.com/order-of-operations-practice.html>

### **Quick Calculate**

Practice the arithmetic of all four operations plus order of operations.

<http://themathtgames.com/arithmetic-games/addition-subtraction-multiplication-division/quick-calculate-game.php>

### **Multiplication Tool**

This online tool lets you illustrate and/or practice multi-digit multiplication using the standard algorithm, partial products algorithm, or the lattice method.

<http://www.multiplicationtool.org>

### **Mental Math Tricks for Multiplication**

Includes some very basic common-sense ones such as multiplying by 9 or multiplying by doubling and halving.

<http://wildaboutmath.com/2007/11/11/impress-your-friends-with-mental-math-tricks>

### **Free Worksheets for Order of Operations**

Generate printable & customizable worksheets for order of operations. Choose from five operations and parentheses. You can choose the number range used, number of problems, and more.

[http://www.homeschoolmath.net/worksheets/order\\_of\\_operations.php](http://www.homeschoolmath.net/worksheets/order_of_operations.php)

### **My Dear Aunt Sally**

A fun game you can play online for free, or purchase as an app. Choose whole numbers, integers, fractions, decimals, or rational numbers, and then which of the five operations to use. In the game, you need to place the given numbers into two expressions so that the operations make the two expressions have the same value.

<http://www.mydearauntsally.com>