

# MATH MAMMOTH

## Grade 4-A

### Complete Worktext

- Addition, subtraction, graphs, and money
- Big numbers & place value
- Multi-digit multiplication
- Time and measuring



By Maria Miller

[www.MathMammoth.com](http://www.MathMammoth.com)

---

# Contents

Foreword .....	6
Concerning Challenging Word Problems .....	7

## Chapter 1: Addition, Subtraction, Graphs and Money

Introduction .....	9
Addition Review .....	12
Adding in Columns .....	15
Subtraction Review .....	16
Subtract in Columns .....	19
Mental Math Workout and Pascal's Triangle .....	22
Subtraction Terms .....	25
Word Problems and Models .....	27
Missing Addend Solved with Subtraction .....	30
Order of Operations .....	33
Bar Graphs .....	35
Line Graphs .....	38
Rounding .....	41
Estimating .....	45
Reviewing Money .....	47
Review .....	50

## Chapter 2: Place Value

Introduction .....	51
Thousands .....	53
At the Edge of Whole Thousands .....	56
More Thousands .....	58
Practicing with Thousands .....	60
Place Value with Thousands .....	62
Comparing with Thousands .....	64

<b>Adding &amp; Subtracting Big Numbers .....</b>	<b>67</b>
<b>A Little Bit of Millions .....</b>	<b>72</b>
<b>Multiples of 10, 100 and 1000 .....</b>	<b>75</b>
<b>Review .....</b>	<b>77</b>

### **Chapter 3: Multiplication**

<b>Introduction .....</b>	<b>79</b>
<b>Multiplication Concept .....</b>	<b>81</b>
<b>Multiplication Tables Review .....</b>	<b>83</b>
<b>Scales Problems .....</b>	<b>86</b>
<b>Multiplying by Whole Tens and Hundreds .....</b>	<b>90</b>
<b>Multiply in Parts .....</b>	<b>95</b>
<b>Multiply in Parts with Money .....</b>	<b>99</b>
<b>Estimating Products .....</b>	<b>100</b>
<b>Multiply in Columns - the Easy Way .....</b>	<b>102</b>
<b>Multiply in Columns - Standard Way .....</b>	<b>105</b>
<b>Multiply in Columns, Practice .....</b>	<b>110</b>
<b>Error of Estimation .....</b>	<b>112</b>
<b>Order of Operations Again .....</b>	<b>114</b>
<b>Money and Change .....</b>	<b>117</b>
<b>So Many of the Same Thing .....</b>	<b>119</b>
<b>Multiply by Whole Tens and Hundreds .....</b>	<b>122</b>
<b>Multiplying in Parts with a 2-Digit Multiplier .....</b>	<b>124</b>
<b>The Standard Multiplication Algorithm with a 2-Digit Multiplier .....</b>	<b>128</b>
<b>Multiplying a Three-Digit Number by a Two-Digit Number .....</b>	<b>131</b>
<b>Review .....</b>	<b>133</b>

## Chapter 4: Time and Measuring

Introduction .....	136
Time Units .....	138
The 24-Hour Clock .....	143
Elapsed Time or How Much Time Passes .....	145
Temperature 1 .....	150
Temperature 2 .....	153
Remember Fractions? .....	155
Measuring Length .....	156
More of Measuring Length .....	159
Inches, Feet, Yards and Miles .....	161
Metric Units For Measuring Length .....	163
Measuring Weight .....	165
Measuring Weight in the Metric System .....	167
Customary Units of Volume .....	169
Metric Units of Volume .....	171
Review .....	173

---

# Foreword

Math Mammoth Grade 4-A and Grade 4-B worktexts comprise a complete math curriculum for the fourth grade mathematics studies.

In the fourth grade, students focus on multidigit multiplication and division, learning to use bigger numbers, solving multi-step word problems that involve several operations, and get started in studying fractions and decimals. This is of course accompanied by studies in geometry and measuring.

The year starts out with review of addition and subtraction, graphs, and money. We illustrate word problems with bar diagrams and study finding missing addends, which teaches algebraic thinking. Children also learn addition and subtraction terminology, the order of operations, and statistical graphs.

Next come large numbers -- up to millions, and the place value concept. At first the student reviews thousands and some mental math with them. Next are presented numbers till one million, calculations with them, place value concept and comparing. In the end of the chapter we find more about millions and an introduction to multiples of 10, 100, and 1000.

The third chapter is all about multiplication. After briefly reviewing the concept and the times tables, the focus is on learning multidigit multiplication (multiplication algorithm). The children also learn why it works when they work on multiplying in parts. We also study the order of operations again, touch on proportional reasoning, and do more money and change related word problems.

The last chapter in part A is about time, temperature, length, weight, and volume. Students will learn to solve more complex problems using various measuring units and to convert between measuring units.

In part B, we first study division. The focus is on learning long division and using division in word problems. The geometry chapter introduces students to measuring angles, and we do lots of drawing of different shapes and circles. Area and perimeter are other important topics in geometry.

Fractions and decimals are presented last in the school year. These two chapters practice only some of the basic operations with fractions and decimals. The focus is still on the conceptual understanding, building a good foundation towards 5th grade math, where fractions and decimals will be in focus.

When you use these books as your only or main mathematics curriculum, they can be like a “framework”, but you do have some liberty in organizing the study schedule. Chapters 1, 2, and 3 should be studied in this order, but you can be flexible with chapters 4 (Time and Measuring) and 6 (Geometry) and schedule them somewhat earlier or later if you so wish. Chapter 3 (Multiplication) needs to be studied before long division in Chapter 5. Many topics from chapters 7 and 8 (Fractions and Decimals) can also be studied earlier in the school year; however finding parts with division should naturally be studied only after mastering division.

This product also includes an HTML page that you can use to make extra practice worksheets for computation.

I wish you success in your math teaching!

*Maria Miller, the author*

## Concerning Challenging Word Problems

I would heartily recommend supplementing this program with regular practice of challenging word problems and puzzles. You could do that once a week to once every two weeks. The goal of challenging story problems and puzzles is to simply **develop children's logical and abstract thinking and mental discipline**. Fourth grade is a good place to start such a practice because students are able to read the problems on their own and have developed mathematical knowledge in many different areas. Of course I am not discouraging people from doing such in earlier grades, either.

I have made lots of word problems for the Math Mammoth curriculum. Those are for the most part multi-step word problems. I have included several lessons that utilize the bar model for solving problems and tried to vary the problems.

Even so, the problems I've created are usually tied to a specific concept or concepts. I feel children can also benefit from problem solving practice where the problems require “out of the box” thinking, or are puzzle-type in nature, or are just different from the ones I have made. Additionally, I feel others are more capable of making very different, very challenging problems.

So I'd like for you to use one or several of the resources below for some different problems and puzzles. Choose something that fits your budget (most of these are free) and that you will like using.

### **Math Kangaroo Problem Database**

Easily made worksheets of challenging math problems based on actual past Math Kangaroo competition problems.

<http://www.kangurusa.com/clark/pdb/>

### **Primary Grade Challenge Math by Edward Zaccaro**

The book is organized into chapters, with each chapter presenting a type of problem and the ways to think about that problem. And then there is a series of related story problems to solve, divided into 4 levels.

\$25, ISBN 978-0967991535

*You can find this at Amazon.com or various other bookstores.*

<http://www.amazon.com/Primary-Grade-Challenge-Edward-Zaccaro/dp/0967991536/>

### **Problem Solving Decks from North Carolina public schools**

Includes a deck of problem cards for grades 1-8, student sheets, and solutions. Many of these problems are best solved with calculators. All of these problems lend themselves to students telling and writing about their thinking.

[http://community.learnnc.org/dpi/math/archives/2005/06/problem\\_solving.php](http://community.learnnc.org/dpi/math/archives/2005/06/problem_solving.php)

### **Math Stars Problem Solving Newsletter (grades 1-8)**

These newsletters are a fantastic, printable resource for problems to solve and their solutions.

[http://community.learnnc.org/dpi/math/archives/2005/06/math\\_stars\\_news.php](http://community.learnnc.org/dpi/math/archives/2005/06/math_stars_news.php)

### **Mathematics Enrichment - [nrich.maths.org](http://nrich.maths.org)**

Open-ended, investigative math challenges for all levels from the UK. Find the past issues box down in the left sidebar. Use Stage 2, 1-star or 2-star problems for 4th grade.

<http://nrich.maths.org/public/>

<http://nrich.maths.org/public/themes.php> lets you find problems organized by mathematical themes.

### **Figure This! Math Challenges for Families**

Word problems related to real life. They don't always have all the information but you have to estimate and think. For each problem, there is a hint, other related problems, and interesting trivia. Website supported by National Council of Teachers of Mathematics.

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

### **MathStories.com**

Over 12,000 interactive and non-interactive NCTM compliant math word problems, available in both English and Spanish. Helps elementary and middle school children boost their math problem solving and critical-thinking skills. A membership site.

<http://www.mathstories.com/>

### **“Problem of the Week” (POWs)**

Problem of the week contests are excellent for finding challenging problems and for motivation. There exist several:

- **Math Forum: Problem of the Week**

Five weekly problem projects for various levels of math. Mentoring available.

<http://mathforum.org/pow/>

- **Math Contest at Columbus State University**

Elementary, middle, algebra, and “general” levels.

<http://www.colstate.edu/mathcontest/>

- **Aunty Math**

Math challenges in a form of short stories for K-5 learners posted bi-weekly. Parent/Teacher Tips for the current challenge explains what kind of reasoning the problem requires and how to possibly help children solve it.

<http://www.auntymath.com/>

- **Grace Church School's ABACUS International Math Challenge**

This is open to any child in three different age groups.

<http://www.gcschool.org/pages/program/Abacus.html>

- **MathCounts Problem of the Week Archive**

Browse the archives to find problems to solve. You can find the link to the current problem on the home page.

<http://mathcounts.org/Page.aspx?pid=355>

- **Math League's Homeschool Contests**

Challenge your children with the same interesting math contests used in schools. Contests for grades 4, 5, 6, 7, 8, Algebra Course 1, and High School are available in a non-competitive format for the homeschoolers. The goal is to encourage student interest and confidence in mathematics through solving worthwhile problems and build important critical thinking skills. By subscription only.

<http://www.mathleague.com/homeschool.htm>

---

# Chapter 1: Addition, Subtraction, Graphs and Money Introduction

The first chapter of *Math Mammoth Grade 4-A Complete Worktext* covers addition and subtraction topics, word problems, graphs, and money problems.

At first, we review the “technical aspects” of adding and subtracting: mental math techniques plus adding and subtracting in columns. If these are fairly easy for your student(s), you can choose to skip some problems.

Going beyond those, the chapter includes lessons in addition and subtraction terminology. These lessons are already preparing your child for algebraic thinking.

In the next lessons, the student reviews the addition/subtraction connection, and solves word problems with the help of bar models. Next, we solve simple missing addend equations using subtraction, such as  $x + 20 = 60$ . We use bar models to illustrate these and connect them with fact families.

The lesson on the order of operations contains some review but it goes beyond that. In many of the problems, the student builds the mathematical expression (calculation) needed for a certain real-life situation.

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

## The Lessons in Chapter 1

	page	span
Addition Review .....	12	3 pages
Adding in Columns .....	15	1 pages
Subtraction Review .....	16	3 pages
Subtract in Columns .....	19	3 pages
Mental Math Workout and Pascal's Triangle .....	22	3 pages
Subtraction Terms .....	25	2 pages
Word Problems and Bar Models .....	27	3 pages
Missing Addend Solved With Subtraction .....	30	4 pages
Order of Operations .....	33	2 pages
Bar Graphs .....	35	3 pages
Line Graphs .....	38	3 pages
Rounding .....	41	4 pages
Estimating .....	45	2 pages
Reviewing Money .....	47	3 pages
Review .....	50	1 page

## Helpful Resources on the Internet

### 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)

### Estimate Addition Quiz

Scroll down the page to find this quiz plus some others. Fast loading.

[http://www.quiz-tree.com/Math\\_Practice\\_main.html](http://www.quiz-tree.com/Math_Practice_main.html)

### Mental Addition and Subtraction

A factsheet, quiz, game, and worksheet about basic mental addition and subtraction.

<http://www.bbc.co.uk/skillswise/numbers/wholenumbers/addsubtract/mental/>

### Shop 'Til You Drop

Get as many items as you can and be left with the least amount of change, and practices your addition skills. The prices are in English pounds and pennies.

<http://www.channel4.com/learning/microsites/P/puzzlemaths/shop.shtml>

### Change Maker

Determine how many of each denomination you need to make the exact change. Good and clear pictures! Playable in US, Canadian, Mexican, UK, or Australian money.

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

### Cash Out

Give correct change by clicking on the bills and coins.

<http://www.mrnussbaum.com/cashd.htm>

**Piggy bank**

When coins fall from the top of the screen, choose those that add up to the given amount, and the piggy bank fills.

<http://fen.com/studentactivities/Piggybank/piggybank.html>

**Bar Chart Virtual Manipulative**

Build your bar chart online using this interactive tool.

[http://nlvm.usu.edu/en/nav/frames\\_asid\\_190\\_g\\_1\\_t\\_1.html?from=category\\_g\\_1\\_t\\_1.html](http://nlvm.usu.edu/en/nav/frames_asid_190_g_1_t_1.html?from=category_g_1_t_1.html)

**An Interactive Bar Grapher**

Graph data sets in bar graphs. The color, thickness and scale of the graph are adjustable. You can put in your own data, or you can use or alter pre-made data sets.

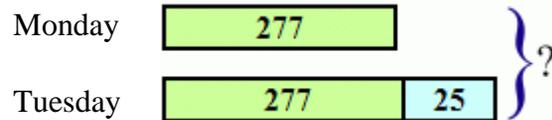
<http://illuminations.nctm.org/ActivityDetail.aspx?ID=63>

(This page intentionally left blank.)

# Word Problems and Bar Models

Bar models help you see how the numbers in a problem relate to each other. Whenever you get stumped by a word problem, try drawing a bar model.

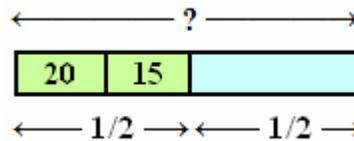
*On Monday, Dad drove 277 miles, and on Tuesday he drove 25 miles more than he did on Monday. How many miles did he drive in the two days?*



On Tuesday he drove  $277 + 25 = 302$  miles. Altogether he drove  $277 + 302 = 579$  miles.

The bracket “}” means addition or the total of the two bars. We do not know the total or the sum of the two days' journey, so it is marked with a question mark.

*After driving 20 miles, Dad says, “I still have 15 more miles to go to the half-way point.” How long is the trip?*



$20 \text{ mi} + 15 \text{ mi} = 35$  miles, and that is the first half of the trip. So, the total trip is  $2 \times 35 = 70$  miles.

We do not know the total length, so it is marked with “?”.

Mark the numbers given in the problem in the diagram. Mark what is asked with “?”. Then solve the problem.

- Jake worked for 56 days on a farm, and Ed worked for 14 days less. How many days did Ed work?



- Of his paycheck, Dad paid \$250 on taxes, and spent \$660 on other bills and purchases. Then, half of his paycheck was gone. How much was his paycheck?



- Dad bought two hammers. One cost \$18 and the other cost \$28 more. What was his total bill?



Angi and Rebecca split a \$100 paycheck so that Angi got \$10 more than Rebecca. How much did each one get?

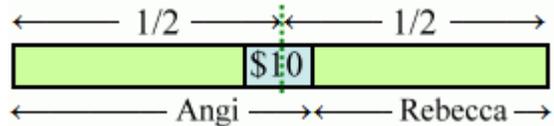


The bar diagram shows the situation. Angi got \$10 more than Rebecca, and together they earned \$100.

To solve it, you can think this way. If you took away (subtracted) the “additional” \$10, then the total would be \$90, and we would only have the two equal parts (the two green parts). So,  $\$90 \div 2 = \$45$  gives us the amount Rebecca got, and then Angi got  $\$45 + \$10 = \$55$ .

Here's another way of looking at the same situation.

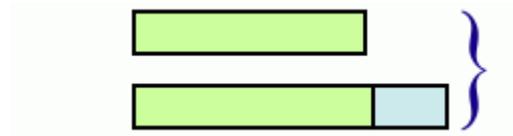
We draw just one bar for the paycheck, and divide it into two halves in the middle (the dashed line). Then we draw half of the \$10, or \$5, on either side of that middle line.



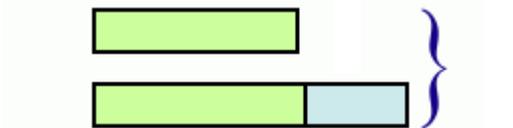
We can then see Angi got  $\$50 + \$5 = \$55$  and Rebecca got  $\$50 - \$5 = \$45$ .

Mark the numbers given in the problem in the diagram. Mark what is asked with “?”. Then solve the problem.

4. Mary and Luisa bought a \$46 gift together. Mary spent \$6 more on it than Luisa. How many dollars did each spend?



5. Henry bought two circular saws. One saw was \$100 cheaper than the other. His total bill was \$590. What did each saw cost?



6. Eric and Angela did yard work together. They earned \$80 and split it so that Eric got \$12 more than Angela. How much did each one get?

Draw a bar diagram.

*You can solve the rest of the problems any way you like best.*

7. Mark bought four towels for \$7 each, and a blanket for \$17. He paid, and the clerk handed him back \$5. What denomination was the bill Mark used to pay?

8. One plain yogurt costs \$2.40, strawberry yogurt costs \$0.15 less than plain yogurt, and plum yogurt costs \$0.30 more than plain yogurt. What is your total bill if you buy all three?

9. Erica was 132 cm tall when she was 9 years old. In the next year, she grew 6 cm, and the next year 2 cm less than the previous year. How tall was she at the age of 11?

10. John's monthly phone service bill is \$48. John said that with the money he earned on his summer job, he could pay his phone service for two months, spend \$120 for a bike, and still have half his money left. How much did he earn?

11. Melissa found a nice shirt for \$11.50, another for \$2.55 less, and yet another for \$2 less. If she buys all three, what will her total bill be?

(This page intentionally left blank.)

---

## Chapter 2: Place Value

### Introduction

The second chapter of *Math Mammoth Grade 4-A Complete Worktext* covers large numbers (up to 9 digits) and place value concepts with those.

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.

Besides the concept of place value, the chapter contains lessons on comparing numbers, adding and subtracting in columns, mental math problems, and the idea of multiples.

#### The Lessons in Chapter 2

	page	span
Thousands .....	53	3 pages
At the Edge of Whole Thousands .....	56	2 pages
More Thousands .....	58	2 pages
Practicing with Thousands .....	60	2 pages
Place Value with Thousands .....	62	2 pages
Comparing with Thousands .....	64	3 pages
Adding & Subtracting Big Numbers .....	67	5 pages
A Little Bit of Millions .....	72	3 pages
Multiples of 10, 100 and 1000 .....	75	2 pages
Review .....	77	2 pages

## Helpful Resources on the Internet

### Place Value Payoff

Match numbers written in standard form with numbers written in expanded form in this game.

<http://www.quia.com/mc/279741.html>

### Megapenny Project

Visualizes big numbers with pictures of pennies.

<http://www.kokogiak.com/megapenny/default.asp>

### Keep My Place

Fill in the big numbers to this cross-number puzzle.

<http://www.mathsyear2000.org/magnet/kaleidoscope2/Crossnumber/index.html>

### Place value puzzler

Place value or rounding game. Click on the asked place value in a number, or type in the rounded version of the number.

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

### Estimation at AAA Math

Exercises about rounding whole numbers and decimals, front-end estimation, estimating sums and differences. Each page has an explanation, interactive practice, and games.

<http://www.aaamath.com/B/est.htm>

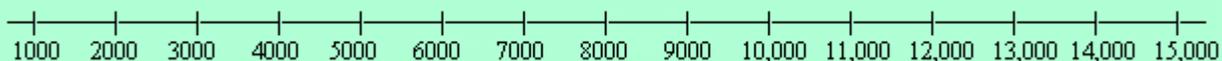
### Can you say really big numbers?

Enter a really big number, try say it out loud, and see it written.

<http://www.mathcats.com/explore/reallybignumbers.htm>

(This page intentionally left blank.)

## More Thousands



On this number line you see whole thousands from one thousand till fifteen thousand.

The colored digits are the “thousands period” and count as the whole thousands. Read the numbers as if you say the word “thousand” for the comma.

We continue with whole thousands until reaching *a thousand* thousands.

That number has a new name: *one million*.

	<b>78,000</b> <i>Read:</i> 78 thousand
	<b>153,000</b> <i>Read:</i> 153 thousand
	<b>802,000</b> <i>Read:</i> 802 thousand
	<b>990,000</b> <i>Read:</i> 990 thousand
	<b>999,000</b> <i>Read:</i> 999 thousand
	<b>1,000,000</b> Thousand thousand = 1 million

The rest of the digits tell us our hundreds, tens, and ones just like you have learned.

	<b>17,544</b> <i>Read:</i> 17 thousand 544
	<b>609,230</b> <i>Read:</i> 609 thousand two hundred thirty
	<b>70,080</b> <i>Read:</i> seventy thousand eighty
	<b>902,005</b> <i>Read:</i> 902 thousand five

1. Place a comma into the number. Fill in missing parts.

<b>a. 164000</b> ____ thousand	<b>b. 92000</b> ____ thousand	<b>c. 309000</b> ____ thousand	<b>d. 34000</b> ____ thousand	<b>e. 780000</b> ____ thousand
-----------------------------------	----------------------------------	-----------------------------------	----------------------------------	-----------------------------------

2. Place a comma into the number. Fill in missing parts. Read numbers aloud.

<b>a. 164,453</b> <u>164</u> thousand <u>453</u>	<b>b. 92908</b> ____ thousand ____	<b>c. 329033</b> ____ thousand ____	<b>d. 14004</b> ____ thousand ____
<b>e. 550053</b> ____ thousand ____	<b>f. 72001</b> ____ thousand ____	<b>g. 800004</b> ____ thousand ____	<b>h. 30036</b> ____ thousand ____

3. Read these numbers aloud.

a. 456,098

b. 950,050

c. 23,090

d. 560,008

e. 78,304

f. 266,894

g. 219,513

h. 306,700

4. Think in whole thousands and add!

a.  $30,000 + 5,000 =$

*think: 30 thousand + 5 thousand*

b.  $200,000 + 1,000 =$

c.  $400,000 + 30,000 =$

d.  $710,000 + 40,000 =$

e.  $300,000 + 600,000 =$

f.  $700,000 + 70,000 =$

5. Add and subtract, thinking in whole thousands.

a.  $35,000 + 5,000 =$

b.  $210,000 + 10,000 =$

c.  $420,000 + 30,000 =$

d.  $711,000 + 10,000 =$

e.  $300,000 - 60,000 =$

f.  $700,000 - 70,000 =$

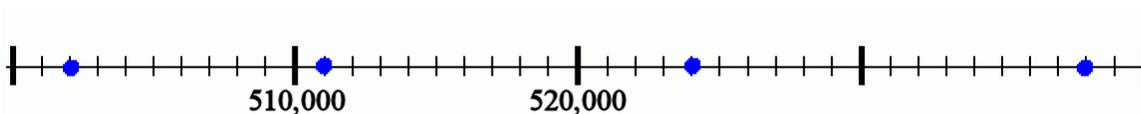
g.  $30,000 - 5,000 =$

h.  $200,000 - 6,000 =$

i.  $723,000 - 400,000 =$

j.  $500,000 - 1,000 =$

6. On the number line below, 510,000 and 520,000 are marked (at the “posts”).  
Write the numbers that correspond to the dots.



7. Make a number line from 320,000 to 340,000 with tick-marks at every whole thousand, similar to the one above. Then mark the following numbers on the number line:  
323,000 328,000 335,000 329,000 330,000

(This page intentionally left blank.)

---

# Chapter 3: Multiplication

## Introduction

The third chapter of *Math Mammoth Grade 4-A Complete Worktext* covers multi-digit multiplication and some related topics.

While the first lessons briefly review the multiplication concept and the times tables, the focus in fourth grade is on multi-digit multiplication (also called algorithm of multiplication, or multiplying in columns).

We start out by multiplying by whole tens and hundreds. After this is mastered, comes the very important concept of **multiplying in parts**. This essentially means that  $4 \times 63$  is done in two parts:  $4 \times 60$  and  $4 \times 3$ , and the results are added.

The whole algorithm of multiplication is based on this principle, so it is important to master it. I don't want kids to multiply in columns “blindly”, without understanding what is going on with that algorithm.

Before showing the traditional form of multiplying in columns, 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 comes next.

Other lessons in this chapter practice estimation and the order of operations, and multiplying with money. Many kinds of word problems abound.

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 by whole hundreds in order to prepare for double-digit multiplier problems, and to understand the algorithm of multiplication with more digits.

### The Lessons in Chapter 3

	page	span
Multiplication Concept .....	81	2 pages
Multiplication Tables Review .....	83	3 pages
Scales Problems .....	86	4 pages
Multiplying by Whole Tens and Hundreds .....	90	5 pages
Multiply in Parts .....	95	4 pages
Multiply in Parts with Money .....	99	1 pages
Estimating Products .....	100	2 pages
Multiply in Columns - the Easy Way .....	102	3 pages
Multiplying in Columns, Standard Way .....	105	5 pages
Multiplying in Columns, Practice .....	110	2 pages

Error of Estimation .....	112	2 pages
Order of Operations Again .....	114	3 pages
Money and Change .....	117	2 pages
So Many of the Same Thing .....	119	3 pages
Multiply by Whole Tens and Hundreds .....	122	2 pages
Multiplying in Parts with a 2-Digit Multiplier .....	124	4 pages
The Standard Multiplication Algorithm with a 2-Digit Number Multiplier .....	128	3 pages
Multiplying a Three-Digit Number by a Two-Digit Number .....	131	2 pages
Review .....	133	3 pages

## Helpful Resources on the Internet

### 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&l1=0304&i1=10&y2=2004&l2=0304&i2=10&y3=2005&l3=02&i3=19&r)

[dir=./kangur/output&y1=2002&l1=0304&i1=10&y2=2004&l2=0304&i2=10&y3=2005&l3=02&i3=19&r](http://www.kangurusa.com/clark/pdb/quiz.pl?dir=./kangur/output&y1=2002&l1=0304&i1=10&y2=2004&l2=0304&i2=10&y3=2005&l3=02&i3=19&r)

### Multiplication Games

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

[http://www.homeschoolmath.net/math\\_resources\\_2.php#multiplication](http://www.homeschoolmath.net/math_resources_2.php#multiplication)

(This page intentionally left blank.)

# Multiplying by Whole Tens and Hundreds

1. a. Ten tens make a hundred. How about 20 tens or more?	b. Ten hundreds make a thousand. How about 20 hundreds or more?
10 tens = $10 \times 10 =$ ____	10 hundreds = $10 \times 100 =$ ____
13 tens = $13 \times 10 =$ ____	12 hundreds = $12 \times 100 =$ ____
20 tens = $20 \times 10 =$ ____	15 hundreds = $15 \times 100 =$ ____
21 tens = $21 \times 10 =$ ____	18 hundreds = $18 \times 100 =$ ____
37 tens = $37 \times 10 =$ ____	20 hundreds = $20 \times 100 =$ ____

$56 \times 10$  is the same as  $10 \times 56$ . Both are 560.

$92 \times 100$  is the same as  $100 \times 92$ . Both are 9,200.

To multiply a number by 10, just tag a zero in the end.  
To multiply a number by 100, just tag two zeros in the end.

$$10 \times 56 = 560$$

$$100 \times 47 = 4700$$

$$10 \times 481 = 4,810$$

$$100 \times 2,043 = 204,300$$

Note especially what happens when the number you multiply already ends in a zero. The rule works the same; you still have to tag a zero or two zeros.

$$10 \times 60 = 600$$

$$100 \times 20 = 2,000$$

$$10 \times 500 = 5,000$$

$$100 \times 3,400 = 340,000$$

2. Multiply.

a.  $10 \times 315 =$  \_\_\_\_

b.  $100 \times 62 =$  \_\_\_\_

c.  $10 \times 25,000 =$  \_\_\_\_

$3,560 \times 10 =$  \_\_\_\_

$10 \times 1,200 =$  \_\_\_\_

$100 \times 25,000 =$  \_\_\_\_

$35 \times 100 =$  \_\_\_\_

$100 \times 130 =$  \_\_\_\_

$10 \times 5,060 =$  \_\_\_\_

**What is  $20 \times 14$ ?**

Imagine the problem without the zero. Then it becomes  $2 \times 14 = 28$ . Then, just tag a zero to the end result:  $20 \times 14 = 280$ .

**Why does that work?** It is based on the fact that  $20 = 10 \times 2$ . For example,

$$\underline{20} \times 14 = \underline{10} \times \underline{2} \times 14$$

In that problem, first multiply  $2 \times 14 = 28$ . Then multiply by ten:

$$10 \times (2 \times 14) = 10 \times 28 = 280.$$

**What is  $200 \times 31$ ?**

Imagine the problem without the zeros. Then it becomes  $2 \times 31 = 62$ . Then, just tag *two* zeros to the result:  $200 \times 31 = 6,200$ .

**Why does that work?** It is based on the fact that  $200 = 100 \times 2$ . For example,

$$\underline{200} \times 31 = \underline{100} \times \underline{2} \times 31$$

In that problem, you can multiply first  $2 \times 31 = 62$ . Then multiply by a hundred:

$$100 \times (2 \times 31) = 100 \times 62 = 6,200.$$

3. Multiply by 20 and 200.

a.  $20 \times 8 = \underline{\quad}$

b.  $200 \times 7 = \underline{\quad}$

c.  $20 \times 12 = \underline{\quad}$

d.  $20 \times 16 = \underline{\quad}$

$4 \times 20 = \underline{\quad}$

$5 \times 200 = \underline{\quad}$

$35 \times 20 = \underline{\quad}$

$42 \times 200 = \underline{\quad}$

$20 \times 5 = \underline{\quad}$

$11 \times 200 = \underline{\quad}$

$200 \times 9 = \underline{\quad}$

$54 \times 20 = \underline{\quad}$

The same principle works if you multiply by 30, 40, 50, 60, 70, 80, or 90. You can imagine multiplying by 3, 4, 5, 6, 7, 8, or 9, and then tag a zero into the end result.

Similarly, if you multiply by some whole hundred, imagine multiplying without those two zeros, and tag the two zeros to the end result.

$$\underline{50} \times 8 = \underline{400}$$

$$\underline{90} \times 11 = \underline{990}$$

$$\underline{300} \times 8 = \underline{2,400}$$

$$12 \times \underline{800} = \underline{9,600}$$

4. Multiply.

a.  $40 \times 3 = \underline{\quad}$

b.  $70 \times 6 = \underline{\quad}$

c.  $80 \times 9 = \underline{\quad}$

d.  $60 \times 11 = \underline{\quad}$

$8 \times 20 = \underline{\quad}$

$50 \times 11 = \underline{\quad}$

$30 \times 15 = \underline{\quad}$

$12 \times 40 = \underline{\quad}$

e.  $200 \times 9 = \underline{\quad}$

f.  $700 \times 6 = \underline{\quad}$

g.  $200 \times 12 = \underline{\quad}$

h.  $3 \times 1100 = \underline{\quad}$

$7 \times 400 = \underline{\quad}$

$600 \times 11 = \underline{\quad}$

$15 \times 300 = \underline{\quad}$

$8 \times 900 = \underline{\quad}$

**It even works this way:**

In a problem  $40 \times 70$  you can just multiply  $4 \times 7$ , and tag two zeros to the result:

$$40 \times 70 = 2,800$$

In a problem  $600 \times 40$  you can multiply  $6 \times 4$ , and tag three zeros to the result:

$$600 \times 40 = 24,000$$

In a problem  $700 \times 800$  you can multiply  $7 \times 8$ , and tag four zeros to the result.

$$700 \times 800 = 560,000$$

5. Multiply.

a.  $20 \times 90 =$

b.  $60 \times 80 =$

$70 \times 300 =$

$30 \times 900 =$

c.  $400 \times 50 =$

d.  $80 \times 800 =$

$200 \times 200 =$

$200 \times 500 =$

e.  $100 \times 100 =$

f.  $800 \times 300 =$

$40 \times 30 =$

$90 \times 1100 =$

6. Write different factors for these products, using whole tens and whole hundreds.

<b>Have you noticed?</b> $7 \times 80 = 560$ and $70 \times 8 = 560$ !!	a. $6 \times \underline{\quad} = 420$ and $60 \times \underline{\quad} = 420$	b. $\underline{\quad} \times \underline{\quad} = 350$ and $\underline{\quad} \times \underline{\quad} = 350$
c. $\underline{\quad} \times \underline{\quad} = 280$ and $\underline{\quad} \times \underline{\quad} = 280$	d. $\underline{\quad} \times \underline{\quad} = 400$ and $\underline{\quad} \times \underline{\quad} = 400$	e. $\underline{\quad} \times \underline{\quad} = 990$ and $\underline{\quad} \times \underline{\quad} = 990$
<b>Have you noticed?</b> $6 \times 400 = 2,400$ and $60 \times 40 = 2,400$ and $600 \times 4 = 2,400$ !!	f. $2 \times \underline{\quad} = 1,800$ and $20 \times \underline{\quad} = 1,800$ and $200 \times \underline{\quad} = 1,800$	g. $\underline{\quad} \times \underline{\quad} = 5,400$ and $\underline{\quad} \times \underline{\quad} = 5,400$ and $\underline{\quad} \times \underline{\quad} = 5,400$
h. $\underline{\quad} \times \underline{\quad} = 3,000$ and $\underline{\quad} \times \underline{\quad} = 3,000$ and $\underline{\quad} \times \underline{\quad} = 3,000$	i. $\underline{\quad} \times \underline{\quad} = 3,600$ and $\underline{\quad} \times \underline{\quad} = 3,600$ and $\underline{\quad} \times \underline{\quad} = 3,600$	j. $\underline{\quad} \times \underline{\quad} = 3,600$ and $\underline{\quad} \times \underline{\quad} = 3,600$ and $\underline{\quad} \times \underline{\quad} = 3,600$

(This page intentionally left blank.)

# Multiplying in Columns, Standard Way

Here we learn the standard algorithm of multiplication. It is based on the same principle of multiplying in parts: you simply multiply ones and tens separately, and add. In the standard algorithm the *adding* is done at the same time as multiplying. The calculation looks more compact and takes less space.

$$\begin{array}{r} \phantom{1} \\ 63 \\ \times 4 \\ \hline \phantom{2} \end{array}$$

Multiply the ones first.

$$4 \times 3 = 12$$

Place 2 under the line at the ones place, but the tens digit (1) is written above the tens column as a little memory note. This is called *carrying to tens*.

(In the calculation  $4 \times 6 + 1 = 25$ , the 6 and the 1 are actually tens. So in reality we calculate  $4 \times 60 + 10 = 250$ .)

$$\begin{array}{r} \phantom{1} \\ 63 \\ \times 4 \\ \hline 252 \end{array}$$

Then multiply the tens, and *add* the 1 ten that was carried over.

$$4 \times 6 + 1 = 25$$

There is a total of 25 tens, which actually signifies 250. Write the 25 in front of the ones digit (2).

$$\begin{array}{r} 63 \\ \times 4 \\ \hline 12 \\ + 240 \\ \hline 252 \end{array}$$

Compare to the method of “multiplying in parts” that you learned previously, where the adding is done separately.

Look at other examples. In each case, some tens are carried as a result of multiplying the ones.

$$\begin{array}{r} \phantom{2} \\ 27 \\ \times 4 \\ \hline \phantom{8} \end{array} \quad \begin{array}{r} \phantom{2} \\ 27 \\ \times 4 \\ \hline 108 \end{array}$$

$4 \times 7 = 28$        $4 \times 2 + 2 = 10$

$$\begin{array}{r} \phantom{6} \\ 69 \\ \times 7 \\ \hline \phantom{3} \end{array} \quad \begin{array}{r} \phantom{6} \\ 69 \\ \times 7 \\ \hline 483 \end{array}$$

$7 \times 9 = 63$        $7 \times 6 + 6 = 48$

$$\begin{array}{r} \phantom{2} \\ 54 \\ \times 6 \\ \hline \phantom{4} \end{array} \quad \begin{array}{r} \phantom{2} \\ 54 \\ \times 6 \\ \hline 324 \end{array}$$

$6 \times 4 = 24$        $5 \times 6 + 2 = 32$

$$\begin{array}{r} \phantom{8} \\ 83 \\ \times 9 \\ \hline \phantom{8} \end{array} \quad \begin{array}{r} \phantom{8} \\ 83 \\ \times 9 \\ \hline \phantom{8} \end{array}$$

$9 \times 3 =$        $9 \times 8 + 2 =$

$$\begin{array}{r} \phantom{4} \\ 77 \\ \times 7 \\ \hline \phantom{4} \end{array} \quad \begin{array}{r} \phantom{4} \\ 77 \\ \times 7 \\ \hline \phantom{4} \end{array}$$

$7 \times 7 =$

$$\begin{array}{r} \phantom{3} \\ 38 \\ \times 5 \\ \hline \phantom{3} \end{array} \quad \begin{array}{r} \phantom{3} \\ 38 \\ \times 5 \\ \hline \phantom{3} \end{array}$$

Compare the earlier method with the one in this lesson:

$$\begin{array}{r} 75 \\ \times 8 \\ \hline 40 \\ + 560 \\ \hline 600 \end{array}$$

OR

$$\begin{array}{r} 4 \\ 75 \\ \times 8 \\ \hline 0 \end{array} \qquad \begin{array}{r} 4 \\ 75 \\ \times 8 \\ \hline 600 \end{array}$$

$5 \times 8 = 40$ ,  
4 is carried.

$7 \times 8 + 4 =$   
 $56 + 4 = 60$

You can choose which one you use. Discuss it with your teacher.

1. Multiply. Be careful with the carrying.

a.  $\begin{array}{r} \phantom{0}53 \\ \times \phantom{0}8 \\ \hline \\ \\ \\ \end{array}$

b.  $\begin{array}{r} \phantom{0}51 \\ \times \phantom{0}6 \\ \hline \\ \\ \\ \end{array}$

c.  $\begin{array}{r} \phantom{0}88 \\ \times \phantom{0}3 \\ \hline \\ \\ \\ \end{array}$

d.  $\begin{array}{r} \phantom{0}79 \\ \times \phantom{0}3 \\ \hline \\ \\ \\ \end{array}$

e.  $\begin{array}{r} \phantom{0}62 \\ \times \phantom{0}2 \\ \hline \\ \\ \\ \end{array}$

f.  $\begin{array}{r} \phantom{0}46 \\ \times \phantom{0}7 \\ \hline \\ \\ \\ \end{array}$

g.  $\begin{array}{r} \phantom{0}18 \\ \times \phantom{0}5 \\ \hline \\ \\ \\ \end{array}$

h.  $\begin{array}{r} \phantom{0}19 \\ \times \phantom{0}3 \\ \hline \\ \\ \\ \end{array}$

i.  $\begin{array}{r} \phantom{0}66 \\ \times \phantom{0}6 \\ \hline \\ \\ \\ \end{array}$

j.  $\begin{array}{r} \phantom{0}39 \\ \times \phantom{0}9 \\ \hline \\ \\ \\ \end{array}$

k.  $\begin{array}{r} \phantom{0}87 \\ \times \phantom{0}3 \\ \hline \\ \\ \\ \end{array}$

l.  $\begin{array}{r} \phantom{0}67 \\ \times \phantom{0}2 \\ \hline \\ \\ \\ \end{array}$

m.  $\begin{array}{r} \phantom{0}20 \\ \times \phantom{0}9 \\ \hline \\ \\ \\ \end{array}$

n.  $\begin{array}{r} \phantom{0}54 \\ \times \phantom{0}8 \\ \hline \\ \\ \\ \end{array}$

o.  $\begin{array}{r} \phantom{0}34 \\ \times \phantom{0}6 \\ \hline \\ \\ \\ \end{array}$

p.  $\begin{array}{r} \phantom{0}46 \\ \times \phantom{0}2 \\ \hline \\ \\ \\ \end{array}$

q.  $\begin{array}{r} \phantom{0}17 \\ \times \phantom{0}9 \\ \hline \\ \\ \\ \end{array}$

r.  $\begin{array}{r} \phantom{0}43 \\ \times \phantom{0}4 \\ \hline \\ \\ \\ \end{array}$

s.  $\begin{array}{r} \phantom{0}76 \\ \times \phantom{0}8 \\ \hline \\ \\ \\ \end{array}$

t.  $\begin{array}{r} \phantom{0}35 \\ \times \phantom{0}9 \\ \hline \\ \\ \\ \end{array}$

With a 3-digit number you might have to carry twice, to tens and to hundreds.

$$\begin{array}{r} \overset{3}{2}38 \\ \times 4 \\ \hline \end{array}$$

Multiply the ones first.

$$4 \times 8 = 32$$

Place 2 under the line and carry the tens digit (3) to the tens' column.

$$\begin{array}{r} \overset{13}{2}38 \\ \times 4 \\ \hline \end{array}$$

Then multiply the tens' digit, and add the 3 tens that were carried over.

$$4 \times 3 + 3 = 15$$

Place the 5 in the tens' place and carry the 1 into the hundreds' column.

$$\begin{array}{r} \overset{13}{2}38 \\ \times 4 \\ \hline \end{array}$$

Then multiply the hundreds digit, and add the 1 hundred that was carried over.

$$4 \times 2 + 1 = 9$$

Place the 9 in the hundreds' place.

Look at other examples. Compare to the earlier method of multiplying in parts.

$$\begin{array}{r} \overset{2}{1}27 \\ \times 4 \\ \hline \end{array}$$

$$4 \times 7 = 28$$

$$\begin{array}{r} \overset{12}{1}27 \\ \times 4 \\ \hline \end{array}$$

$$4 \times 2 + 2 = 10$$

$$\begin{array}{r} \overset{12}{1}27 \\ \times 4 \\ \hline \end{array}$$

$$4 \times 1 + 1 = 5$$

$$\begin{array}{r} 127 \\ \times 4 \\ \hline 28 \\ 80 \\ + 400 \\ \hline 508 \end{array}$$

$$\begin{array}{r} \overset{3}{4}96 \\ \times 5 \\ \hline \end{array}$$

$$5 \times 6 = 30$$

$$\begin{array}{r} \overset{43}{4}96 \\ \times 5 \\ \hline \end{array}$$

$$5 \times 9 + 3 = 48$$

$$\begin{array}{r} \overset{43}{4}96 \\ \times 5 \\ \hline \end{array}$$

$$5 \times 4 + 4 = 24$$

$$\begin{array}{r} 496 \\ \times 5 \\ \hline 30 \\ 450 \\ + 2000 \\ \hline 2480 \end{array}$$

$$\begin{array}{r} \overset{\phantom{1}}{7}29 \\ \times 4 \\ \hline \end{array}$$

multiply ones

$$\begin{array}{r} \overset{\phantom{1}}{7}29 \\ \times 4 \\ \hline \end{array}$$

multiply tens and add what was carried

$$\begin{array}{r} \overset{\phantom{1}}{7}29 \\ \times 4 \\ \hline \end{array}$$

multiply hundreds and add what was carried

$$\begin{array}{r} 729 \\ \times 4 \\ \hline 36 \\ 80 \\ + 2800 \\ \hline \end{array}$$

2. Multiply.

a. 

	1	2	3
x			8
<hr/>			

b. 

	1	5	1
x			6
<hr/>			

c. 

	2	8	8
x			3
<hr/>			

d. 

	2	7	9
x			3
<hr/>			

e. 

	4	6	2
x			2
<hr/>			

f. 

	5	0	6
x			7
<hr/>			

g. 

	2	7	8
x			5
<hr/>			

h. 

	3	1	9
x			7
<hr/>			

i. 

	1	5	6
x			6
<hr/>			

j. 

	8	0	9
x			9
<hr/>			

k. 

	2	8	7
x			3
<hr/>			

l. 

	3	6	7
x			2
<hr/>			

m. 

	1	2	0
x			8
<hr/>			

n. 

	2	5	4
x			2
<hr/>			

o. 

	3	3	4
x			2
<hr/>			

p. 

	1	5	7
x			7
<hr/>			

3. Solve the word problems. Write a number sentence for each one.

a. The school has 304 students. To go to the museum, they hired buses which can each seat 43 passengers. How many buses did they need?

b. The school also has 24 teachers. How many seats were left empty when all of the students and all of the teachers joined the trip?

c. Each package of paper contains 250 sheets. Marie needed 1300 sheets. How many packages did she need to buy?

d. Mick earned \$345 from strawberry picking, and Jeanine earned three times as much. How much did they earn in all?

e. Emily solved 17 crossword puzzles, and Elaine solved three times as many. How many more did Elaine solve than Emily?

### Puzzle Corner

Find the missing numbers in these multiplications:

$$\begin{array}{r} \square 1 \square \\ \times \quad 4 \\ \hline 468 \end{array}$$

$$\begin{array}{r} 1 \square 4 \\ \times \quad \square \\ \hline 870 \end{array}$$

$$\begin{array}{r} \square 3 \square \\ \times \quad 7 \\ \hline 9 \square 6 \end{array}$$

$$\begin{array}{r} 3 \square 9 \\ \times \quad 3 \\ \hline \square 5 \square \end{array}$$

(This page intentionally left blank.)

# Chapter 4: Time and Measuring

## Introduction

The fourth chapter of *Math Mammoth Grade 4-A Complete Worktext* includes time, temperature, length, weight, and volume related lessons.

The focus on fourth grade is no longer the actual act of measuring, but calculations that involve conversions between different measuring units.

In time lessons, the student gets to do fairly complex calculations concerning hours and minutes. In temperature, the student is introduced to negative numbers and gets to do a few simple calculations even.

The lessons concerning measuring units usually include a table 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 as well in order to get the student used to two basic ideas of metric measuring units:

1. How the units always differ by a factor of ten,
2. How the units are *named* consistently, with always the same prefixes such as milli-, centi-, deci-, deca-, hecto-, and kilo-. These prefixes and their meanings are NOT yet studied in detail in fourth grade; but I wanted to include the charts to familiarize the students with the terms and the ideas. You may, of course, at your discretion, explain it all to the student.

### The Lessons in Chapter 4

	page	span
Time Units .....	138	5 pages
The 24-Hour Clock .....	143	2 pages
Elapsed Time or How Much		
Time Passes .....	145	5 pages
Temperature 1 .....	150	2 pages
Temperature 2 .....	153	2 pages
Remember Fractions .....	155	1 pages
Measuring Length .....	156	3 pages

More Measuring Length .....	159	2 pages
Inches, Feet, Yards and Miles .....	161	2 pages
Metric Units for Measuring Length .....	163	2 pages
Measuring Weight .....	165	2 pages
Measuring Weight in the Metric System .....	167	2 pages
Customary Units of Volume .....	169	2 pages
Metric Units of Volume .....	171	2 pages
Review .....	173	2 pages

## Helpful Resources on the Internet

### Calculating Time from BBC SkillsWise

Fact sheets, worksheets, and an online game to practice time calculations.

<http://www.bbc.co.uk/skillswise/numbers/measuring/time/calculatingtime/>

### A Dictionary of Units of Measurement

Explains the common measuring systems and has lots of background info of their history.

<http://www.unc.edu/~rowlett/units/>

### Measure It!

Practice measuring lines with either centimeters or inches. Multiple choice questions.

<http://onlineintervention.funbrain.com/measure/index.html>

### Measures

Activities, revision bites, and quizzes about measuring time, weight, and capacity (in metric units).

[http://www.bbc.co.uk/schools/ks2bitesize/maths/shape\\_space\\_measures.shtml](http://www.bbc.co.uk/schools/ks2bitesize/maths/shape_space_measures.shtml)

### Measurements

Online lessons with interactive exercises on metric prefixes, symbols, number values, metric mass, length, volume, US length and volume, and temperature conversions.

<http://www.aaamath.com/B/mea.htm>

### Units of Measurement Quizzes

Quizzes for area, distance, volume, and mass - both metric and English systems.

[http://www.quiz-tree.com/Units\\_of\\_Measurement\\_main.html](http://www.quiz-tree.com/Units_of_Measurement_main.html)

### Metric Measurement Matching Game

Match metric terms and prefixes with the correct match

<http://www.quia.com/mc/4177.html>

### Reading a tape measure worksheets

Worksheet generator - you can choose to which accuracy to measure, inches, or inches & feet.

[http://themathworksheetsite.com/read\\_tape.html](http://themathworksheetsite.com/read_tape.html)

(This page intentionally left blank.)

# Metric Units for Measuring Length

The basic unit in the metric system is the meter. All of the other metric units for measuring length have the word “meter” in them.

The conversion factors in the metric system are based on 10. That is why you will use either 10, 100, or 1,000 when changing one metric unit of length to another.

10 millimeters makes 1 centimeter.  
 10 centimeters makes 1 decimeter.  
 10 decimeters makes 1 meter. And so on.

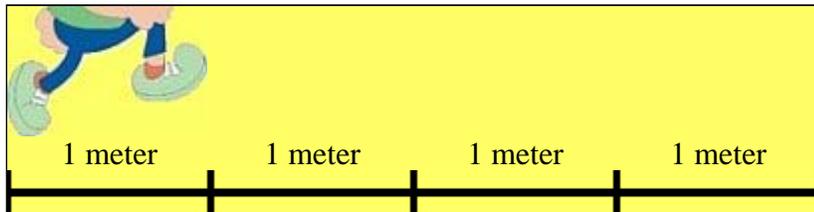
## Units of length in the metric system

10	<b>kilometer</b>	<b>km</b>	1,000 meters
10	hectometer	hm	(not used)
10	decameter	dam	(not used)
10	<b>meter</b>	<b>m</b>	the basic unit
10	decimeter	dm	(not used much)
10	<b>centimeter</b>	<b>cm</b>	look at your ruler!
10	<b>millimeter</b>	<b>mm</b>	look at your ruler!

Remember that 1 meter is very close to 1 yard. 1 meter is a tiny bit longer than 1 yard.

1. Outside, or in a long corridor or room, draw two lines that start at the same place.

- a. Using a measuring tape, mark on the one line 1 m, 2 m, 3 m, and 4 m. Can you take “hops” 1 meter long?



- b. Mark on the second line marks from 1 foot to 13 feet. Make 1-yard hops. Compare: do the two kinds of hops feel about the same?



2. Measure how tall you and other people are in centimeters. Write it also using whole meters and centimeters.

Name	How tall
	_____ cm = <u>1</u> m _____ cm.

### Conversions between units

Remember what millimeters look like on your ruler.  $10 \text{ mm} = 1 \text{ cm}$ .  
Decimeters aren't usually marked on rulers.  $10 \text{ centimeters make } 1 \text{ decimeter}$ .  
 $10 \text{ decimeters end up being } 100 \text{ centimeters, and that is } 1 \text{ meter}$ .

$$1 \text{ km} = 1,000 \text{ m}$$

$$1 \text{ m} = 100 \text{ cm}$$

$$1 \text{ cm} = 10 \text{ mm}$$

3. Convert between meters, centimeters, and millimeters.

<b>a.</b> $5 \text{ m} = \underline{\hspace{2cm}} \text{ cm}$ $12 \text{ m} = \underline{\hspace{2cm}} \text{ cm}$ $6 \text{ m } 20 \text{ cm} = \underline{\hspace{2cm}} \text{ cm}$	<b>b.</b> $4 \text{ m } 6 \text{ cm} = \underline{\hspace{2cm}} \text{ cm}$ $10 \text{ m } 80 \text{ cm} = \underline{\hspace{2cm}} \text{ cm}$ $9 \text{ m } 9 \text{ cm} = \underline{\hspace{2cm}} \text{ cm}$	<b>c.</b> $800 \text{ cm} = \underline{\hspace{2cm}} \text{ m}$ $239 \text{ cm} = \underline{\hspace{1cm}} \text{ m } \underline{\hspace{1cm}} \text{ cm}$ $407 \text{ cm} = \underline{\hspace{1cm}} \text{ m } \underline{\hspace{1cm}} \text{ cm}$
<b>d.</b> $58 \text{ mm} = \underline{\hspace{1cm}} \text{ cm } \underline{\hspace{1cm}} \text{ mm}$ $78 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$ $234 \text{ mm} = \underline{\hspace{1cm}} \text{ cm } \underline{\hspace{1cm}} \text{ mm}$	<b>e.</b> $5 \text{ km} = \underline{\hspace{2cm}} \text{ m}$ $57 \text{ km} = \underline{\hspace{2cm}} \text{ m}$ $5,000 \text{ m} = \underline{\hspace{2cm}} \text{ km}$	<b>f.</b> $2 \text{ km } 800 \text{ m} = \underline{\hspace{2cm}} \text{ m}$ $6 \text{ km } 50 \text{ m} = \underline{\hspace{2cm}} \text{ m}$ $60,000 \text{ m} = \underline{\hspace{2cm}} \text{ km}$

4. Calculate. Give your answer using kilometers and meters.

**a.**  $5 \text{ km } 200 \text{ m} + 8 \text{ km } 900 \text{ m}$

**b.**  $3 \times 2 \text{ km } 800 \text{ m}$

**c.**  $1,500 \text{ m} + 2 \text{ km}$

**d.**  $6 \times 700 \text{ m}$

5. Solve the problems.

**a.** How many millimeters are in a meter?**b.** Mary can walk 1 km in 10 minutes. How far can she walk in 34 minutes?**c.** John jogs through a track 1 km 800 m long twice a day, five days a week. How long a distance does he jog in a week?**d.** A 10-meter wall is divided into five segments (not of equal length). Four of the segments are 1 m 20 cm each; how long is the fifth segment?**e.** Kathy's wallpaper has butterflies that are 80 mm wide. She will put the wallpaper in her room. How many complete butterflies can she have on a wall 3 meters long?