

math

MAMMOTH

Grade 4-A Worktext

Addition, subtraction,
patterns, and graphs

Large numbers

Multi-digit
multiplication

Time and
measuring



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By Maria Miller

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Foreword

Math Mammoth Grade 4-A and Grade 4-B worktexts comprise a complete math curriculum for the fourth grade mathematics studies, aligned to the Common Core Standards.

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

The year starts out with a review of addition and subtraction, patterns and graphs. 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 up to one million, calculations with them, the concept of place value and comparing. In the end of the chapter we find out 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 multi-digit multiplication (multiplication algorithm). The children also learn why it works when they multiply 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. In geometry, we first review area and perimeter, and then concentrate on the topic of angles. Students measure and draw angles, solve simple angle problems, and classify triangles according to their angles. They also study parallel and perpendicular lines.

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 conceptual understanding and on 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.

I wish you success in your math teaching!

Maria Miller, the author

Chapter 1: Addition, Subtraction, Patterns, and Graphs

Introduction

The first chapter of *Math Mammoth Grade 4* covers addition and subtraction topics, problem solving, patterns, graphs, and money.

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 chapter then contains straightforward lessons on bar graphs, line graphs, rounding, estimating, and money problems.

The Lessons in Chapter 1

	page	span
Addition Review	10	3 pages
Adding in Columns	13	1 page
Subtraction Review	14	3 pages
Subtract in Columns	17	3 pages
Patterns and Mental Math	20	2 pages
Patterns in Pascal's Triangle	22	2 pages
Bar Models in Addition and Subtraction	24	4 pages
Order of Operations	28	2 pages
Making Bar Graphs	30	2 pages
Line Graphs	32	3 pages
Rounding	35	3 pages
Estimating	38	2 pages
Money and Discounts	40	3 pages
Calculate and Estimate Money Amounts	43	3 pages
Review	46	2 pages

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

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

Division and Order of operations and Division and Addition - Order of Operations

Two mystery picture games.

<http://www.dositey.com/2008/math/m/mystery2MD.htm> and

<http://www.dositey.com/2008/math/m/mystery2AD.htm>

Order of Operations Quiz

A 10-question online quiz that includes two different operations and possibly parenthesis 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 $+$, $-$, $\times$, $\div$ 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

Order of Operations Practice

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

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

Quick Calculate

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

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

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

Shop 'Til You Drop

Get as many items as you can and be left with the least amount of change, and practice 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

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>

Create a Graph

A neat online tool for creating a graph from your own data.

<http://nces.ed.gov/nceskids/createagraph/>

Math Mahjong

A Mahjong game where you need to match tiles with the same value. It uses all four operations and has three levels.

http://www.sheppardsoftware.com/mathgames/mixed_mahjong/mahjongMath_Level_1.html

Pop the Balloons

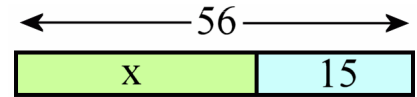
Pop the balloons in the order of their value. You need to use all four operations.

<http://www.sheppardsoftware.com/mathgames/numberballoons/BalloonPopMixed.htm>

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Bar Models in Addition and Subtraction

Think of this **bar model** as a long board, cut into two pieces. It is 56 units long in total (you can think of inches, for example), and the two parts are 15 and x units long.



From the bar model, we can write TWO addition and TWO subtraction sentences—a *fact family*.

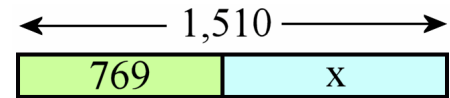
$x + 15 = 56$	$56 - x = 15$
$15 + x = 56$	$56 - 15 = x$

The x stands for a number, too. We just do not know what it is yet. It is an *unknown*.

From this bar model, we can write a **missing addend** problem.

It means that a number to be added is “missing” or unknown.

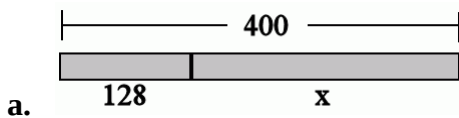
We can solve it by **subtracting** the one part (769) from the total (1,510).



$$769 + x = 1,510$$

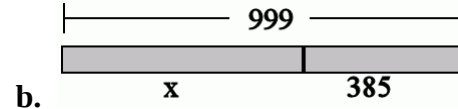
$$x = 1,510 - 769 = 741$$

1. Write a missing addend problem that matches the bar model. Then solve it by subtracting.



$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$x = \underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$



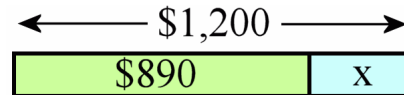
$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$x = \underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

c. A car costs \$1,200. Dad has \$890.
How much more does he need to buy it?

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

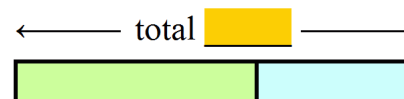
$$x = \underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$



d. The school has 547 students, of which 265 are girls. How many are boys?

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$x = \underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$



2. Write the numbers and x to the model. Remember, x is the unknown, or what the problem asks for. Write an addition using the numbers and x . Lastly solve.

- a.** Of their 1,200-mile trip, the Jones family traveled 420 miles yesterday and 370 miles today. How many miles do they have left to travel?



Addition:

Solution: $x =$ _____

- b.** The store is expecting a shipment of 4,000 blank CDs. Three boxes of 400 arrived. How many CDs are yet to come?



Addition:

Solution: $x =$ _____

- c.** A 250-cm board is divided into three parts: two 28-cm parts at the ends and a part in the middle. How long is the middle part?



Addition:

Solution: $x =$ _____

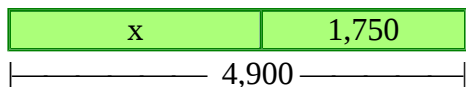
- d.** After traveling 56 miles, Dad said, "Okay, in 9 miles we will be at Kensville, and from there we will have 118 miles left." How many total miles is the trip?



Addition:

Solution: $x =$ _____

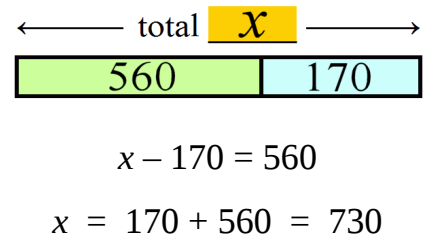
3. Make a word problem that matches the model. Then solve for x .



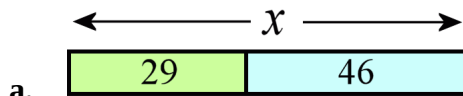
$x =$ _____

In this problem: $x - 170 = 560$, the TOTAL is unknown.
Remember, subtraction problems start with the total.

Look at the bar model. We can solve x by adding.

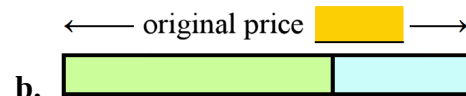


4. Write a subtraction problem that matches the bar model. Then solve it by adding.



$$x - \underline{29} = \underline{\hspace{2cm}}$$

$$x = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$



$$x - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$x = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

5. The number you subtract from is missing! Solve.

a. $\underline{\hspace{2cm}} - 4 = 20$

b. $\underline{\hspace{2cm}} - 15 = 17$

c. $\underline{\hspace{2cm}} - 22 - 7 = 70$

Still, the number you subtract from is missing. But this time, it is denoted by x , not by an empty line.

d. $x - 8 = 7$

$$x = \underline{\hspace{2cm}}$$

e. $x - 24 = 48$

$$x = \underline{\hspace{2cm}}$$

f. $x - 300 - 50 = 125$

$$x = \underline{\hspace{2cm}}$$

6. Here, the number you subtract is the unknown. Write the numbers and x into the bar model. Notice carefully what number is the total. Then write another matching subtraction that helps you solve x .



$$52 - x = 28$$

$$x = \underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$



$$97 - x = 54$$

$$x = \underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

7. The number you subtract is still the unknown. Solve.

a. $20 - \underline{\hspace{2cm}} = 12$

b. $55 - \underline{\hspace{2cm}} = 34$

c. $234 - \underline{\hspace{2cm}} = 100$

d. $61 - x = 43$

$$x = \underline{\hspace{2cm}}$$

e. $100 - x = 72$

$$x = \underline{\hspace{2cm}}$$

f. $899 - x = 342$

$$x = \underline{\hspace{2cm}}$$

8. Circle the number sentence that fits the problem. Then solve for x.

a. Jane had \$15. After Dad gave Jane her allowance (x), Jane had \$22. $\\$15 + x = \\22 OR $\\$15 + \\$22 = x$ $x = \underline{\hspace{2cm}}$	b. Mike had many drawings. He put 24 of them in the trash. Then he had 125 left. $125 - 24 = x$ OR $x - 24 = 125$ $x = \underline{\hspace{2cm}}$
c. Jill had 120 marbles, but some of them got lost. Now she has 89 left. $120 - x = 89$ OR $120 + 89 = x$ $x = \underline{\hspace{2cm}}$	d. Dave gave 67 of his stickers to a friend and now he has 150 left. $150 - 67 = x$ OR $x - 67 = 150$ $x = \underline{\hspace{2cm}}$

9. Write a number sentence (addition or subtraction) with x. Solve it.

a. A school's teachers and students filled a 450-seat auditorium. If the school had 43 teachers, how many students did it have?	$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ $x = \underline{\hspace{2cm}}$
b. Mom went shopping with \$250 and came back home with \$78. How much did she spend?	originally – spent = left $\underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ $x = \underline{\hspace{2cm}}$
c. Janet had \$200. She bought an item for \$54 and another for \$78. How much money is left?	$\underline{\hspace{2cm}} - \underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ $x = \underline{\hspace{2cm}}$
d. Jean bought one item for \$23 and another for \$29, and she had \$125 left. How much did she have initially?	$\underline{\hspace{2cm}} - \underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ $x = \underline{\hspace{2cm}}$

Puzzle Corner

Find the missing numbers.

a. $200 - 45 - \underline{\hspace{2cm}} - 70 = 25$

b. $\underline{\hspace{2cm}} - 5 - 55 - 120 = 40$

c. $23 + 56 + x = 110$

$x = \underline{\hspace{2cm}}$

d. $x + 15 + 15 + 15 + 15 = 97$

$x = \underline{\hspace{2cm}}$

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Chapter 2: Large Numbers and Place Value

Introduction

The second chapter of *Math Mammoth Grade 4* covers large numbers (up to 1 million) and place value.

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 four-digit numbers before moving on to larger numbers. Then, larger numbers will be very easy to study.

Then we go on to study numbers up to one million, or numbers that have tens or hundreds of thousands. Students write them in expanded form, compare them, add and subtract them, and learn more about rounding.

Lastly we study briefly the multiples of 10, 100, and 1000. This lesson prepares the way for some very important ideas in the next chapter (multi-digit multiplication).

The Lessons in Chapter 2

	page	span
Thousands	50	3 pages
At the Edge of Whole Thousands	53	2 pages
More Thousands	55	2 pages
Practicing with Thousands	57	2 pages
Place Value with Thousands	59	2 pages
Comparing with Thousands	61	3 pages
Adding and Subtracting Big Numbers	64	4 pages
Rounding and Estimating Large Numbers	68	4 pages
Multiples of 10, 100, and 1000	72	3 pages
Mixed Review	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>

Keep My place

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

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

Can you say really big numbers?

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

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

Megapenny Project

Visualizes big numbers with pictures of pennies.

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

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>

Rounding Sharks

You'll be asked to round numbers in the thousands to the nearest hundred. Click on the shark that has the correctly rounded number.

<http://www.free-training-tutorial.com/rounding/sharks.html>

Rounding Master

A Mathionaire-type game where you answer rounding questions, and try to become a Rounding Master Math Millionaire.

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

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>

Maximum Capacity

Drag as many gorillas as you can into the elevator without exceeding the weight capacity. You will have to use your quick addition, estimation, and number sense skills.

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

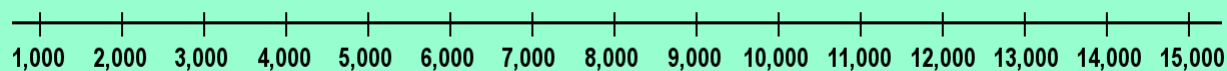
Home Run Derby Math

Estimate answers to math problems. The closer you get, the further your ball will fly at-bat. In addition and subtraction, the numbers are in the thousands. In multiplication, the numbers are in the hundreds.

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

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More Thousands



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

The colored digits are the “thousands period” and count as the whole thousands. Read the colored digits as its own number. 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*.

7 8,0 0 0 Read: 78 thousand

1 5 3,0 0 0 Read: 153 thousand

8 0 2,0 0 0 Read: 802 thousand

9 9 0,0 0 0 Read: 990 thousand

9 9 9,0 0 0 Read: 999 thousand

1,0 0 0,0 0 0 Thousand thousand
= 1 million

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

1 7,5 4 4 Read: 17 thousand five hundred forty four

6 0 9,2 3 0 Read: 609 thousand two hundred thirty

7 0,0 8 0 Read: 70 thousand eighty

9 0 2,0 0 5 Read: 902 thousand five

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

a. 1 6 4 0 0 0	b. 9 2 0 0 0	c. 3 0 9 0 0 0	d. 3 4 0 0 0	e. 7 8 0 0 0 0
_____ thousand	_____ thousand	_____ thousand	_____ thousand	_____ thousand

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

a. 1 6 4,4 5 3	b. 9 2 9 0 8	c. 3 2 9 0 3 3	d. 1 4 0 0 4
<u>1 6 4</u> thousand <u>4 5 3</u>	_____ thousand _____	_____ thousand _____	_____ thousand _____
e. 5 5 0 0 5 3	f. 7 2 0 0 1	g. 8 0 0 0 0 4	h. 3 0 0 3 6
_____ thousand _____	_____ thousand _____	_____ thousand _____	_____ 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. 1,000,000

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. $300,000 + 700,000 =$

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

5. Add and subtract, thinking in whole thousands.

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

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

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

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

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

f. $1,000,000 - 200,000 =$

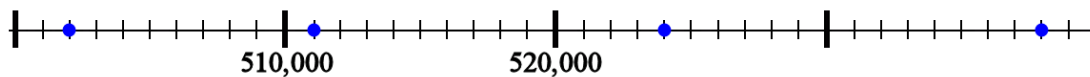
g. $30,000 - 5,000 =$

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

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Chapter 3: Multi-Digit Multiplication

Introduction

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

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 20×4 or 500×6). After this is mastered, we study a very important concept of **multiplying in parts** (also called partial products algorithm). It means that 4×63 is done in two parts: 4×60 and 4×3 , and the results are added.

This principle underlies all other multiplication algorithms, so it is important to master. 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.

The Lessons in Chapter 3

	page	span
Understanding Multiplication	83	3 pages
Multiplication Tables Review	86	3 pages
Scales Problems	89	4 pages
Multiplying by Whole Tens and Hundreds	93	4 pages
Multiply in Parts, 1	97	3 pages
Multiply in Parts, 2	100	4 pages
More Practice	104	2 pages
Estimating in Multiplication	106	2 pages

	page	span
Multiply in Columns - the Easy Way	108	3 pages
Multiply in Columns - the Easy Way, Part 2	111	3 pages
Multiplying in Columns - the Standard Way	114	4 pages
Multiplying in Columns, Practice	118	3 pages
Order of Operations Again	121	3 pages
Money and Change	124	3 pages
So Many of the Same Thing	127	3 pages
Multiplying Two-Digit Numbers in Parts.....	130	5 pages
Multiply by Whole Tens in Columns	135	2 pages
Multiplying in Parts: Another Way	137	2 pages
The Standard Multiplication Algorithm with a Two-Digit Number Multiplier	139	4 pages
Mixed Review	143	2 pages
Review	145	3 pages

Helpful Resources on the Internet

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

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

One-Digit by Two-Digits Multiplication Game

Students will multiply one-digit numbers by two-digit whole numbers, and then get to try 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>

Order of Operations Quiz

A 10-question online quiz that includes two different operations and possibly parenthesis 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 +, —, $\times$, $\div$ 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

Order of Operations Practice

A simple online quiz of 10 questions. Uses parenthesis 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://thematgames.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>

Mental math multiplication guide

Rules of thumb and other "tricks" for mental multiplication of two-digit or bigger numbers, conveniently in one place. (This is not about single-digit multiplication; you are supposed to know those by heart of course.)

http://arscalcula.com/mental_math_multiplication_guide.shtml

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Multiplying by Whole Tens and Hundreds

We have studied the SHORTCUTS for multiplying any number by 10, 100, or 1,000:

To multiply any number **by 10**, just **tag ONE zero** on the end.

To multiply any number **by 100**, just **tag TWO zeros** on the end.

To multiply any number **by 1,000**, just **tag THREE zeros** on the end.

$$1\text{0} \times 481 = 4,81\text{0}$$

$$1\text{00} \times 47 = 4,7\text{00}$$

$$1\text{000} \times 578 = 578,\text{000}$$

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

$$1\text{0} \times 800 = 800\text{0}$$

$$1\text{00} \times 6,600 = 660,0\text{00}$$

$$1\text{000} \times 40 = 40,\text{000}$$

1. Multiply.

a. $10 \times 315 = \underline{\hspace{2cm}}$

b. $100 \times 6,200 = \underline{\hspace{2cm}}$

c. $1,000 \times 250 = \underline{\hspace{2cm}}$

$$3,560 \times 10 = \underline{\hspace{2cm}}$$

$$10 \times 1,200 = \underline{\hspace{2cm}}$$

$$38 \times 1,000 = \underline{\hspace{2cm}}$$

$$35 \times 100 = \underline{\hspace{2cm}}$$

$$100 \times 130 = \underline{\hspace{2cm}}$$

$$10 \times 5,000 = \underline{\hspace{2cm}}$$

SHORTCUT for multiplying by 20 or 200 (You can probably guess this one!)

What is 20×14 ?

Imagine the problem without the zero. Then it becomes $2 \times 14 = 28$. Then, just tag a zero to the 28 you got, so it becomes 280. So, $20 \times 14 = 280$.

What is 200×31 ?

Imagine the problem without the zeros. Then it becomes $2 \times 31 = 62$. Then, just tag two zeros to the result you got, so you get 6,200. In other words, $200 \times 31 = 6,200$.

2. Now try it! Multiply by 20 and 200.

a.

$$20 \times 8 = \underline{\hspace{2cm}}$$

$$4 \times 20 = \underline{\hspace{2cm}}$$

$$20 \times 5 = \underline{\hspace{2cm}}$$

b.

$$200 \times 7 = \underline{\hspace{2cm}}$$

$$5 \times 200 = \underline{\hspace{2cm}}$$

$$11 \times 200 = \underline{\hspace{2cm}}$$

c.

$$20 \times 12 = \underline{\hspace{2cm}}$$

$$35 \times 20 = \underline{\hspace{2cm}}$$

$$200 \times 9 = \underline{\hspace{2cm}}$$

d.

$$20 \times 16 = \underline{\hspace{2cm}}$$

$$42 \times 200 = \underline{\hspace{2cm}}$$

$$54 \times 20 = \underline{\hspace{2cm}}$$

Why does the shortcut work? It is based on the fact that you can multiply in any order.

When multiplying by 20, we can change the 20 into 10×2 . For example:

$$20 \times 14 = 10 \times 2 \times 14$$

In that problem, first multiply $2 \times 14 = 28$. Then the problem becomes 10×28 , which we know is 280.

$$20 \times 14 = 10 \times 2 \times 14$$

$$= 10 \times 28$$

$$= 280$$

That's it!

Let's try the same with 200.
For example,

$$200 \times 31 = 100 \times 2 \times 31$$

In that problem, first multiply $2 \times 31 = 62$. The problem now becomes 100×62 , which is 6,200:

$$200 \times 31 = 100 \times 2 \times 31$$

$$= 100 \times 62$$

$$= 6,200$$

3. Try it yourself! Fill in.

a. 20×7	b. 20×5	c. 200×8	d. 200×25
$= \underline{\hspace{2cm}} \times 2 \times 7$	$= \underline{\hspace{2cm}} \times 2 \times 5$	$= \underline{\hspace{2cm}} \times 2 \times 8$	$= \underline{\hspace{2cm}} \times 2 \times 25$
$= 10 \times \underline{\hspace{2cm}}$	$= 10 \times \underline{\hspace{2cm}}$	$= 100 \times \underline{\hspace{2cm}}$	$= 100 \times \underline{\hspace{2cm}}$
$= \underline{\hspace{2cm}}$	$= \underline{\hspace{2cm}}$	$= \underline{\hspace{2cm}}$	$= \underline{\hspace{2cm}}$

4. Mark's shed measures 20 ft by 15 ft. What is its area? Write a number sentence. A means area.

$$A = \underline{\hspace{4cm}}$$

5. Write a number sentence, and find the area of Mark's driveway.



$$A = \underline{\hspace{4cm}}$$

6. Mark was told he needed four truckloads of gravel to cover his driveway. One truckload costs $5 \times \$20$ plus \$30 for the delivery. How much will it cost him to cover the driveway with gravel?

SHORTCUT for multiplying by whole tens and whole hundreds

The same principle works if you multiply by whole tens (30, 40, 50, 60, 70, 80, or 90): simply multiply by 3, 4, 5, 6, 7, 8, or 9, and then tag a zero to the end result.

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

$$50 \times 8 = 400$$

$$90 \times 11 = 990$$

$$300 \times 8 = 2,400$$

$$12 \times 800 = 9,600$$

7. Multiply.

a. $40 \times 3 =$ _____ $8 \times 20 =$ _____	b. $70 \times 6 =$ _____ $50 \times 11 =$ _____	c. $80 \times 9 =$ _____ $30 \times 15 =$ _____
d. $60 \times 11 =$ _____ $12 \times 40 =$ _____	e. $200 \times 9 =$ _____ $7 \times 400 =$ _____	f. $700 \times 6 =$ _____ $600 \times 11 =$ _____
g. $200 \times 12 =$ _____ $15 \times 300 =$ _____	h. $3 \times 1100 =$ _____ $8 \times 900 =$ _____	i. $11 \times 120 =$ _____ $8 \times 300 =$ _____

It even works this way:

To multiply 40×70 , simply multiply 4×7 , and tag two zeros to the result:

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

To multiply 600×40 , simply multiply 6×4 , and tag three zeros to the result:

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

To multiply 700×800 , simply multiply 7×8 , and tag four zeros to the result.

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

8. Multiply.

a. $20 \times 90 =$ _____ $70 \times 300 =$ _____	b. $60 \times 80 =$ _____ $30 \times 900 =$ _____	c. $400 \times 50 =$ _____ $200 \times 200 =$ _____
d. $80 \times 800 =$ _____ $200 \times 500 =$ _____	e. $100 \times 100 =$ _____ $40 \times 30 =$ _____	f. $800 \times 300 =$ _____ $90 \times 1100 =$ _____

Write a number sentence for each question.

9. One hour has _____ minutes.

How many minutes are in 12 hours? _____

How many minutes are in 24 hours? _____

10. One hour has _____ minutes, and one minute has _____ seconds.

How many seconds are there in one hour? _____

11. Ed earns \$30 per hour.

a. How much will he earn in a 8-hour workday? _____

b. How much will he earn in a 40-hour workweek? _____

c. How many days will he need to work in order to earn more than \$1,000?

12. Find the missing factor. Think “backwards”! How many zeros do you need?

a. _____ $\times$ 3 = 360 _____ $\times$ 50 = 450	b. 40 $\times$ _____ = 320 5 $\times$ _____ = 600	c. _____ $\times$ 40 = 400 _____ $\times$ 2 = 180
d. _____ $\times$ 30 = 4,800 _____ $\times$ 200 = 1,800	e. 40 $\times$ _____ = 2,000 6 $\times$ _____ = 4,200	f. _____ $\times$ 800 = 56,000 _____ $\times$ 20 = 12,000

Puzzle Corner

John wanted to prove that 40×70 is indeed 2,800 by breaking the multiplication into smaller parts. He wrote 40 as 4×10 and 70 as 7×10 , and then multiplied in a different order:

$$\begin{aligned} 40 \times 70 &= 4 \times 10 \times 7 \times 10 \\ &= 10 \times 10 \times (4 \times 7) = 100 \times 28 = 2,800. \end{aligned}$$

You do the same, and prove that 600×50 is indeed 30,000.

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Multiplying in Columns, the Standard Way

The standard algorithm of multiplication is based on the principle that you already know: **multiplying in parts** (partial products): simply multiply ones and tens separately, and add.

However, in the standard way the *adding* is done at the same time as multiplying. The calculation looks more compact and takes less space than the “easy way to multiply” you have learned.

The standard way to multiply	“The easy way”
$\begin{array}{r} 1 \\ 63 \\ \times 4 \\ \hline \end{array}$ $\begin{array}{r} 1 \\ 63 \\ \times 4 \\ \hline 252 \end{array}$ Multiply the ones: $4 \times 3 = 12$ Place 2 in the ones place, but write the tens digit (1) above the tens column as a little memory note. You are <i>regrouping</i> (or carrying). Then multiply the tens, adding the 1 ten that was regrouped. $4 \times 6 + 1 = 25$ Write 25 in front of the 2. Note that 25 tens means 250!	$\begin{array}{r} 63 \\ \times 4 \\ \hline 12 \\ + 240 \\ \hline 252 \end{array}$ In the “easy way,” we multiply in parts, and the adding is done separately.
The standard way to multiply	“The easy way”
$\begin{array}{r} 3 \\ 75 \\ \times 7 \\ \hline \end{array}$ $\begin{array}{r} 3 \\ 75 \\ \times 7 \\ \hline 525 \end{array}$ Multiply the ones: $7 \times 5 = 35$ Regroup the 3 tens. Multiply & add the tens: $7 \times 7 + 3 = 52$	$\begin{array}{r} 75 \\ \times 7 \\ \hline 35 \\ + 490 \\ \hline 525 \end{array}$

1. Multiply using both methods: the standard one and the easy one.

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2. Multiply using both methods: the standard one and the easy one.

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3. Multiply. Be careful with the regrouping.

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4. Solve. Also, write number sentences (additions, subtractions, multiplications) on the empty lines.

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b. You earn \$77 a day. How many days do you need to work in order to have \$600 or more? Guess and check. _____ _____	<table style="margin: 10px auto; border-collapse: collapse;"> <tr><td style="border: 1px solid black; width: 30px; height: 30px;"></td><td style="border: 1px solid black; width: 30px; height: 30px;"></td><td style="border: 1px solid black; width: 30px; height: 30px;"></td></tr> <tr><td style="border: 1px solid black;"></td><td style="border: 1px solid black;"></td><td style="border: 1px solid black;"></td></tr> <tr><td style="border: 1px solid black; text-align: center;">x</td><td style="border: 1px solid black;"></td><td style="border: 1px solid black;"></td></tr> <tr><td colspan="3" style="border: 1px solid black; height: 1px;"></td></tr> <tr><td style="border: 1px solid black;"></td><td style="border: 1px solid black;"></td><td style="border: 1px solid black;"></td></tr> <tr><td style="border: 1px solid black;"></td><td style="border: 1px solid black;"></td><td style="border: 1px solid black;"></td></tr> </table>							x											
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With a 3- or 4-digit number you have to regroup many times.

$$\begin{array}{r} 238 \\ \times 4 \\ \hline \end{array}$$

Multiply the ones first.

$$4 \times 8 = 32$$

Write 2 in the ones place and regroup the 3 tens to the tens column.

$$\begin{array}{r} 238 \\ \times 4 \\ \hline 52 \end{array}$$

Then multiply the tens, adding the 3 regrouped tens.

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

Write 5 in the tens place and regroup the 1 hundred.

$$\begin{array}{r} 238 \\ \times 4 \\ \hline 952 \end{array}$$

Then multiply the hundreds, adding the regrouped hundred.

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

Write 9 in the hundreds place.

$$\begin{array}{r} 7652 \\ \times 5 \\ \hline \end{array}$$

Multiply the ones:

$$5 \times 2 = 10$$

Write 0 in the ones place and regroup the 1 ten.

$$\begin{array}{r} 7652 \\ \times 5 \\ \hline 60 \end{array}$$

Then the tens. Add the regrouped ten:

$$5 \times 5 + 1 = 26$$

Write 6 in the tens place and regroup the 2 hundreds.

$$\begin{array}{r} 7652 \\ \times 5 \\ \hline 260 \end{array}$$

Multiply the hundreds.

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

Write 2 in the hundreds place, and regroup the 3 thousands.

$$\begin{array}{r} 7652 \\ \times 5 \\ \hline 38260 \end{array}$$

Multiply the thousands:

$$5 \times 7 + 3 = 38$$

Write 38 in front of the 260.

5. Multiply using both methods: the standard one and the easy one.

a.

$$\begin{array}{r} 123 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 123 \\ \times 8 \\ \hline \end{array}$$

b.

$$\begin{array}{r} 279 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 279 \\ \times 3 \\ \hline \end{array}$$

c.

$$\begin{array}{r} 463 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 463 \\ \times 5 \\ \hline \end{array}$$

d.

$$\begin{array}{r} 156 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 156 \\ \times 6 \\ \hline \end{array}$$

6. Multiply using the standard method.

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7. Solve the word problems. Also, write number sentences (additions, subtractions, multiplications) on the empty lines to show what you calculate.

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? <i>Hint: Guess and check.</i> 	<table style="border-collapse: collapse; width: 100%;"> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td></tr> </table>																								
b. The school also has 24 teachers. How many seats were left empty in those buses when all the students and all the teachers joined the trip? 	<table style="border-collapse: collapse; width: 100%;"> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td></tr> <tr><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td><td style="border: 1px solid black; width: 20px; height: 20px;"></td></tr> </table>																								

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Chapter 4: Time and Measuring

Introduction

The fourth chapter of *Math Mammoth Grade 4* includes lessons on time, temperature, length, weight, and volume. The focus is no longer the actual act of measuring, but on conversions between the units and on word problems that involve conversions.

Students may have difficulty with the conversions, and that is why they will also be studied in 5th grade. At this point, students should be able to easily convert from a bigger unit to a smaller unit (such as converting 3 feet into 36 inches, or 2 kg into 2,000 grams).

And while the Common Core standards do not include them for 4th grade, I have also included some problems where we convert from a smaller unit to a bigger unit (such as 4,500 ml into 4 L 500 ml or 12 feet into 4 yards), because I feel most children are capable of doing these in 4th grade. If you feel your child has difficulty with these types of conversions (from a smaller unit to a bigger unit), feel free to omit those particular exercises. They are intermixed though, and not marked in any special way.

There are separate lessons for customary units and for metric units. These lessons include a table that lists the units and the conversion factors. For metric units, those tables always include all the units, even when they are not in common usage. For example, for metric units of volume, the chart looks like this:

1 L = 1,000 ml	10	liter	L	for larger amounts of liquid
	10	deciliter	dl	(for medium amounts of liquid)
	10	centiliter	cl	(for small amounts of liquid)
	10	milliliter	ml	for small amounts of liquid

The lesson only deals with milliliters and liters. However, the chart *also* shows the two other units (deciliters and centiliters) in order to help familiarize the students with these two basic ideas of the metric system:

1. The units always differ by a factor of ten;
2. The units are *named* consistently with the same prefixes (milli-, centi-, deci-, deka-, hecto-, and kilo-). These prefixes and their meanings are not yet studied in detail in fourth grade. You may, of course, at your discretion, explain them to the student.

The Lessons in Chapter 4

	page	span
Time Units	151	3 pages
The 24-Hour Clock	154	2 pages
Elapsed Time or How Much Time Passes	156	5 pages
Measuring Temperature: Celsius	161	4 pages
Measuring Temperature: Fahrenheit	165	2 pages
Temperature Line Graphs	167	2 pages

Measuring Length	169	3 pages
More Measuring in Inches and Centimeters	172	2 pages
Feet, Yards and Miles	174	5 pages
Metric Units for Measuring Length	179	3 pages
Customary Units of Weight	182	4 pages
Metric Units of Weight	186	3 pages
Customary Units of Volume	189	3 pages
Metric Units of Volume	192	3 pages
Mixed Review	195	2 pages
Review	197	2 pages

Helpful Resources on the Internet

The Ruler Game

Choose between whole inches, half-inches, quarters, eighths, or sixteenth parts of an inch to measure. Click on the given measurement on a ruler. Timed or not timed versions available.

<http://www.rickyspears.com/rulergame>

Measure It!

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

<http://www.funbrain.com/measure>

Sal's Sub Shop

Customers order subs, and you need to cut them to the given measurements - sometimes in metric units, sometimes in inches.

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

Reading a Tape Measure Worksheets

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

http://themathworksheetsite.com/read_tape.html

Measurement Game for Kids

Measure the length and weight of various parcels using the interactive scales and ruler so you can give them a stamp with the correct postage rate. Uses grams and centimeters.

<http://www.kidsmathgamesonline.com/geometry/measurement.html>

Reading Scales

You can illustrate a variety of measuring devices, such as scales, measuring cup, thermometer, and speedometer, and how to read them. Generate examples using different scales on different devices at the press of a button.

<http://www.teacherled.com/2008/01/28/reading-scales>

Reading Scales

Weigh objects on this virtual balance scale, using weights of 10 g, 50 g, 250 g, and 500 g.

<http://www.teacherled.com/resources/oldscales/oldscalesload.html>

Measures

An online activity about metric measuring units and how to read scales, a measuring cup, and a ruler. Uses British spelling.

http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/measures

Hours vs Minutes Game BBC SkillsWise

An online quiz to practice minutes versus hours. You have to tell whether, for example, 76 minutes or 1 hour is more.

<http://www.bbc.co.uk/skillswise/game/ma25time-game-hours-vs-minutes>

24 hour snap game

Two times are given, one using the 24-hour clock, and another using the am/pm system. Snap or don't snap the two times together.

<http://www.bbc.co.uk/skillswise/game/ma25time-game-24-hour-snap>

A Dictionary of Units of Measurement

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

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

Bitesize Measures

Facts, problems, and quizzes about measuring length, mass, and capacity (in metric units).

http://www.bbc.co.uk/bitesize/ks2/maths/shape_space/measures/read/1/

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>

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Metric Units for Measuring Length

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

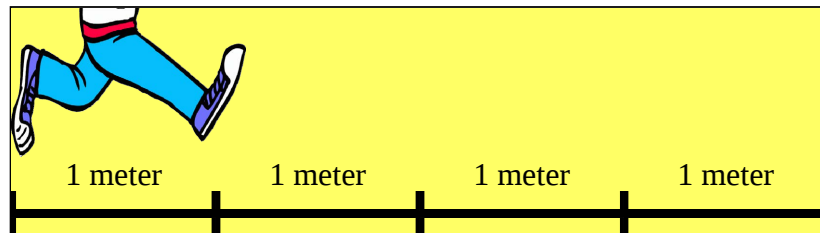
Each unit is 10 times the smaller unit. For example, 1 kilometer is 10 hectometers. But we do not commonly use hectometers, dekameters, or decimeters. You only need to learn the bolded units in the chart.

<u>Units of length in the metric system</u>			
10	kilometer	km	“Kilo” means 1,000.
	hectometer	hm	(not used)
10	dekameter	dam	(not used)
10	meter	m	the basic unit
10	decimeter	dm	(not used much)
10	centimeter	cm	100 of these make a meter.
10	millimeter	mm	This is 1/10 of a centimeter.

Remember also that 1 meter is very close to 1 yard. One 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 millimeters make 1 cm.

And 100 centimeters is 1 meter. “Centi” actually means a hundred (from the Latin word *centum*).

Lastly, 1 kilometer means one thousand meters, because “kilo” means 1,000!

1 km = 1,000 m	1 m = 100 cm	1 cm = 10 mm
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3. One meter is 100 cm. Convert between meters and centimeters.

a. 5 m = _____ cm 8 m = _____ cm 12 m = _____ cm	b. 4 m 6 cm = _____ cm 9 m 19 cm = _____ cm 10 m 80 cm = _____ cm	c. 800 cm = _____ m 239 cm = ____ m ____ cm 407 cm = ____ m ____ cm
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4. One centimeter is 10 mm. Convert between centimeters and millimeters.

a. 5 cm = _____ mm 8 cm = _____ mm 14 cm = _____ mm	b. 2 cm 8 mm = _____ mm 7 cm 5 mm = _____ mm 10 cm 4 mm = _____ mm	c. 50 mm = ____ cm ____ mm 72 mm = ____ cm ____ mm 145 mm = ____ cm ____ mm
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5. One kilometer is 1,000 m. Convert between kilometers and meters.

a. 5 km = _____ m 23 km = _____ m 1 km 200 m = _____ m	b. 2 km 800 m = _____ m 6 km 50 m = _____ m 13 km 579 m = _____ m	c. 2,000 m = _____ km 4,300 m = ____ km ____ m 18,700 m = ____ km ____ m
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6. Calculate. Give your answer using whole kilometers and meters.

a. 5 km 200 m + 8 km 900 m

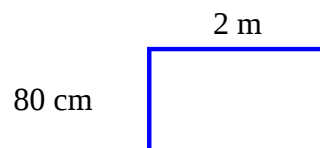
b. 3 km 600 m + 2 km 800 m

c. 1,500 m + 2 km 600 m

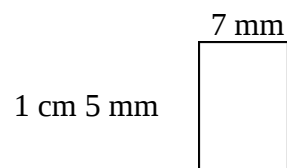
d. 6×700 m

7. Solve.

a. Find the perimeter of this rectangle.



b. Find the perimeter of this rectangle.



c. One side of a square measures 5 cm 6 mm. What is its perimeter?

d. *A challenge.* A square has a perimeter of 6 cm. How long is its side?

8. Solve the problems.

a. How many millimeters are in a *meter*?

b. John jogs around a track 1 km 800 m long twice a day, five days a week.
How long a distance does he jog in a day?

In a week?

c. Gary is 1 m 34 cm tall and Jared is 142 cm tall.
How much taller is Jared?

d. Kathy's wallpaper has butterflies that are 8 cm wide. She will
put the wallpaper in her room. How many complete butterflies
can she have on a wall that is 1 meter long?

How about if the wall is 3 meters long?

