math MAMMOTH

Grade 4-A Worktext

Addition, subtraction, patterns, and graphs

Large numbers

Multi-digit multiplication

Time and measuring

Light Blue Series

Sample worksheet from https://www.mathmammoth.com

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Foreword

Math Mammoth Grade 4 comprises a complete math curriculum for the fourth grade mathematics studies. The curriculum meets and exceeds the Common Core standards.

The main areas of study in Math Mammoth Grade 4 are:

1. Students develop understanding and fluency with multi-digit multiplication, and use efficient multiplication procedures to solve problems.
2. They develop understanding of division to find quotients involving multi-digit dividends (long division), and they solve word problems involving division, including division with a remainder.
3. Students develop an understanding of fraction equivalence and some operations with fractions. They learn to add and subtract fractions with same denominators, and to multiply a fraction by a whole number.
4. Students learn the concept of angle. They draw and identify lines and angles, and classify shapes by properties of their lines and angles.

Additional topics we study are place value, time, measuring, graphs, and decimals.

This book, 4-A, covers addition and subtraction and graphs (chapter 1), place value (chapter 2), multi-digit multiplication (chapter 3), and time and measuring (chapter 4). The rest of the topics are covered in the 4-B worktext.

Some important points to keep in mind when using the curriculum:

- The two books (parts A and B) are like a "framework", but you still have a lot of liberty in planning the child's studies. Chapters 1, 2, and 3 should be studied in order, and Chapter 3 (multiplication) should be studied before Chapter 5 (division). However, you can be flexible with chapters 4 (time and measuring) and 6 (geometry), and schedule them earlier or later. Also, most lessons from chapters 7 and 8 (fractions and decimals) can be studied earlier; however the topic of finding parts with division should naturally be studied only after mastering division.

  Math Mammoth is mastery-based, which means it concentrates on a few major topics at a time, in order to study them in depth. However, you can still use it in a *spiral* manner, if you prefer. Simply have the child study in 2-3 chapters simultaneously. This type of flexible use of the curriculum enables you to truly individualize the instruction for the child.

- Don't automatically assign all the exercises. Use your judgment, trying to assign just enough for the child's needs. You can use the skipped exercises later for review. For most children, I recommend to start out by assigning about half of the available exercises. Adjust as necessary.

- For review, the curriculum includes a worksheet maker (Internet access required), mixed review lessons, additional cumulative review lessons, and the word problems continually require usage of past concepts. Please see more information about review (and other topics) in the FAQ at **https://www.mathmammoth.com/faq-lightblue.php**

I heartily recommend that you view the full user guide for your grade level, available at **https://www.mathmammoth.com/userguides/**

And lastly, you can find free videos matched to the curriculum at **https://www.mathmammoth.com/videos/**

I wish you success in teaching math!

Maria Miller, the author

Chapter 1: Addition, Subtraction, Patterns, and Graphs

Introduction

The first chapter of *Math Mammoth Grade 4* covers addition and subtraction, 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, students use bar models (visual models with one or more horizontal "bars") to help them write addition and subtraction sentences with unknowns and to solve them. They are actually learning algebraic thinking and how to write and solve simple equations.

The lesson on the order of operations contains some review. We also connect this topic with real-life situations, such as shopping. The student writes simple expressions (number sentences) for word problems, which, again, practices algebraic thinking, and also helps students learn how to show their work in math problems. As applications of math, the chapter then contains straightforward lessons on bar graphs, line graphs, rounding, estimating, and money problems.

Keep in mind that the specific lessons in the chapter can take several days to finish. They are not "daily lessons." Instead, use the general guideline that fourth graders should finish about 2 pages daily or 9-11 pages a week. Also, I recommend not assigning all the exercises by default, but that you use your judgment, and strive to vary the number of assigned exercises according to the student's needs.

Please see the user guide at https://www.mathmammoth.com/userguides/ for more guidance on using and pacing the curriculum.

I also offer free videos matched to the curriculum at https://www.mathmammoth.com/videos/.

The Lessons in Chapter 1

	page	span
Addition Review	11	*3 pages*
Adding in Columns	14	*1 page*
Subtraction Review	15	*3 pages*
Subtract in Columns	18	*3 pages*
Patterns and Mental Math	21	*2 pages*
Patterns in Pascal's Triangle	23	*2 pages*
Bar Models in Addition and Subtraction	25	*4 pages*
Order of Operations	29	*2 pages*
Making Bar Graphs	31	*2 pages*
Line Graphs	33	*3 pages*
Rounding	36	*3 pages*
Estimating	39	*2 pages*
Money and Discounts	41	*3 pages*
Calculators and Estimating Money Amounts	44	*3 pages*
Review Chapter 1	47	*2 pages*

Helpful Resources on the Internet

THE BASIC OPERATIONS

Add Like Mad
Click on single-digit numbers that add up to the given sum as quickly as you can, clearing the board.
http://www.mathnook.com/addlikemad.html

Sum Tracks
The game board shows square and round tiles with numbers. Drag the square number tiles over the round tiles, so that the sum of the round tiles equals the number on the square tile.
http://www.coolmath-games.com/0-sum-tracks

A Maze'n Math
Move the red piece through the maze and use it to eliminate the other numbers, according to certain rules relating to addition and difference.
http://www.hoodamath.com/games/amazenmath.html

Minus Mission
Practice subtraction facts within your chosen range, such as 0-12 or 0-20 while destroying green slime.
http://www.mathplayground.com/ASB_MinusMission.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

Math Mahjong
Match tiles with the same value. The game uses all four operations and has three levels.
http://www.sheppardsoftware.com/mathgames/mixed_mahjong/mahjongMath_Level_1.html

PATTERNS AND PASCAL'S TRIANGLE

Crack the Code
Find the missing numbers in the patterns, and unlock the safe.
http://www.sciencekids.co.nz/gamesactivities/math/numberpatterns.html

Pascal's Triangle at Maths Is Fun
Learn fascinating facts and patterns in Pascal's triangle!
http://www.mathsisfun.com/pascals-triangle.html

Coloring Multiples
Color various multiples (such as multiples of 6 or 10) in Pascal's Triangle, and see the patterns!
http://www.shodor.org/interactivate/activities/ColoringMultiples/

BAR MODELS AND PROBLEM SOLVING

Thinking Blocks - Addition and Subtraction
Model and solve word problems.
https://www.mathplayground.com/tb_addition/index.html

Jugs Puzzle
Fill and pour the water out of the two jugs until you get the desired quantity. Drag the jugs to empty or fill them. A puzzle using logical thinking.
https://www.mathsisfun.com/games/jugs-puzzle.html

Algebra Puzzle
Figure out the values of the objects so that they add up to the target numbers.
https://www.mathplayground.com/algebra_puzzle.html

Calculator Chaos
Most of the keys have fallen off the calculator. "Make" numbers using the keys that are left.
https://www.mathplayground.com/calculator_chaos.html

ORDER OF OPERATIONS

Addition Mystery Picture
Reinforce your addition skills while uncovering a hidden picture.
https://www.mathmammoth.com/practice/mystery-picture#min=20&max=100

Subtraction Mystery Picture
Practice subtraction of two-digit numbers while uncovering a hidden picture.
https://www.mathmammoth.com/practice/mystery-picture-subtraction#min=11&max=100

Choose Math Operation
Choose the operation(s) so that the given number sentence becomes true.
https://www.homeschoolmath.net/operation-game.php

Order of Operations Quiz
A 10-question online quiz that includes two different operations and possibly parentheses in each question. You can also modify the quiz parameters yourself.
http://www.thatquiz.org/tq-1/?-j8f-la

Order of Ops
Choose the expression to be solved in each step, and solve it. The program uses a visual representation of steps to show how the expression gets shorter at each step.
https://mrnussbaum.com/order-ops-online-game

The Order of Operations Millionaire
Answer multiple-choice questions that have to do with the order of operations, and win a million.
http://www.math-play.com/Order-of-Operations-Millionaire/order-of-operations-millionaire.html

Exploring Order of Operations (Object Interactive)
Click on the operation to be done first in the given expression. The program then solves that, and you click on the *next* operation to be performed, etc., until it is solved. The resource also includes a game.
http://www.learnalberta.ca/content/mejhm/html/object_interactives/order_of_operations/use_it.html

Order of Operations Practice
A simple online quiz of 10 questions. Uses parentheses and the four operations.
http://www.onlinemathlearning.com/order-of-operations-practice.html

ROUNDING AND ESTIMATING

Online Rounding Practice
Practice rounding to the nearest ten, hundred, or thousand.
https://www.mathmammoth.com/practice/rounding#number-range=0to10000&round-to=ten,hundred,thousand

Rounding Sharks Game
Round numbers to the nearest hundred by clicking the shark with the correct rounded number.
http://www.free-training-tutorial.com/rounding/sharks.html

Brain Racer Rounding
Round numbers as fast as you can to beat two other walkers in the walking race. Choose to round either to the nearest ten, nearest hundred, or nearest thousand.
http://www.mathnook.com/math/brain-racer-rounding.html

Ice Ice Maybe
Fast estimation game. Help penguins migrate across a perilous ocean patrolled by hungry killer whales. The game uses all operations; addition and subtraction are most appropriate for this level. Start the game from the circular button near the top.
https://www.mangahigh.com/en/games/iceicemaybe

Estimation Games
Find the answer fast! You also get points for being close. Choose "Add 100s" or "Add Tens" "Subtract Tens", or "Subtract 100s" for 4th graders.
https://www.mathsisfun.com/numbers/estimation-game.php

MONEY

Change Maker
Determine how many of each denomination you need to make the exact change. Choose the "hard" level for 4th graders. Playable in US, Canadian, Mexican, UK, or Australian money.
https://www.funbrain.com/games/change-maker

Cash Out
Give correct change by clicking on the bills and coins. It has three levels of difficulty.
https://mrnussbaum.com/cash-out-online-game

DATA AND GRAPHS

Bar Charts
Interactive questions about bar charts. First, choose a topic for the graph. Next, choose how the vertical axis is presented; for example, "20 intervals, 10 marked". Lastly, choose the type of questions asked.
http://www.topmarks.co.uk/Flash.aspx?f=barchartv2

Graphs Quiz
A 10-question online quiz that involves a variety of types of questions on line graphs, bar graphs, and pictograms. You can also easily change the quiz parameters to your liking.
http://www.thatquiz.org/tq-5/?-j50f15-l5-p0

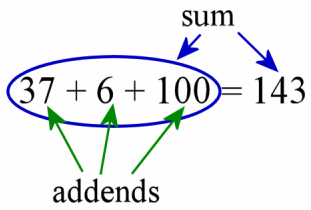
Line Graphs at Maths Is Fun
A simple tutorial on line graphs, followed by ten interactive practice questions.
https://www.mathsisfun.com/data/line-graphs.html

An Interactive Bar Grapher
Graph data sets in bar graphs. The color, thickness and scale of the graph are adjustable. You can input your own data or use or alter pre-made data sets.
http://illuminations.nctm.org/Activity.aspx?id=4091

Graph Master
Create a graph from your own data (you can even make it up). The interactive activity creates the graph, and also makes up multiple-choice questions from your data for you to answer.
https://mrnussbaum.com/graphmaster

Addition Review

The numbers to be added are **addends**. The result is a **sum**.



You can write any number as a sum of its different parts: whole thousands, whole hundreds, whole tens, and ones.

$5{,}248 = 5{,}000 + 200 + 40 + 8$

thousands hundreds tens ones

$2{,}019 = 2{,}000 + 0 + 10 + 9$

You can add in parts (hundreds, tens, ones):

$56 + 124$

$= 100 + 50 + 20 + 6 + 4$

$= 100 + 70 + 10 = 180$

You can add in any order:

$7 + 90 + 91 + 3$

$= 7 + 3 + 90 + 91$

$= 10 + 90 + 91 = 191$

Trick: first add a bigger but easier number, then subtract to correct the error:

$76 + 89$

$= 76 + 90 - 1$

$= 166 - 1 = 165$

1. Add mentally. Compare the problems in each box!

a.	**b.**	**c.**	**d.**
$70 + 80 =$ _____	$140 + 50 =$ _____	$50 + 60 =$ _____	$80 + 90 =$ _____
$77 + 80 =$ _____	$141 + 50 =$ _____	$54 + 65 =$ _____	$82 + 93 =$ _____
$77 + 82 =$ _____	$144 + 55 =$ _____	$58 + 62 =$ _____	$88 + 91 =$ _____

2. Write each number as a sum of its parts: thousands, hundreds, tens, and ones.

a. $487 =$	**b.** $2{,}103 =$
c. $8{,}045 =$	**d.** $650 =$

3. Solve.

a. Emma added three numbers. Two of them were 56 and 90. The sum was 190. What was the third number she added?

b. The sum of four numbers is 70 and the sum of five other numbers is 80. What is the sum of all nine numbers?

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Adding in Columns

1. Add in columns. Check by adding the numbers in each column in a different order (for example, starting at the bottom and working up).

a.	b.	c.
3 8 4 2 9 1 2 2 0 0 8 2 0 9 + 2 6	2 4 5 1 3 9 3 0 2 9 3 1 5 9 4 4 5 9 3 + 5 2 6	1 7 3 8 2 3 9 0 1 0 7 8 3 6 4 2 8 0 3 2 1 1 + 9 9

2. Add. Write the numbers under each other, carefully aligning the ones, tens, hundreds, and thousands. You may use a separate piece of paper if you prefer.

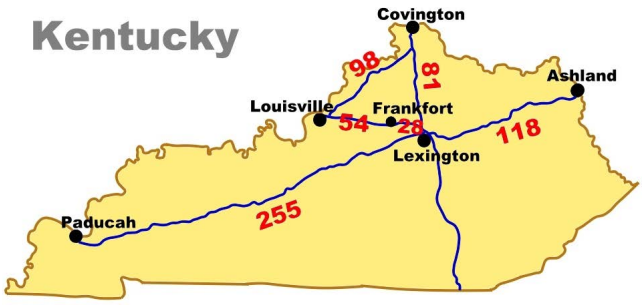
   a. 5,609 + 1,388 + 89 + 402 + 837

   b. 67 + 504 + 1,298 + 492 + 3,288 + 8

3. The map shows some Kentucky cities and distances between them.

   The two distances that may be hard to read are: from Louisville to Frankfort is 54 miles; from Frankfort to Lexington is 28 miles.

   Calculate the total driving distance, if a family goes on a trip like this:



   a. Covington - Lexington - Paducah - Lexington - Covington

   b. A trip from Lexington via Covington, Louisville, and Frankfort, and back to Lexington.

Subtraction Review

Compare the methods.

Marie: "I subtract in parts: first to the previous whole ten, then the rest."

$35 - 7$

$= (35 - 5) - 2$

$= \quad 30 \quad - 2 \quad = 28$

John: "I use a helping problem."

$15 - 7 = 8$ is the helping problem for $35 - 7$.

The answer to $35 - 7$ also ends in "8" and is in the previous ten (the twenties). So, $35 - 7$ is 28.

1. Subtract.

a.	b.	c.	d.
$13 - 7 =$ _____	$12 - 6 =$ _____	$15 - 9 =$ _____	$16 - 8 =$ _____
$63 - 7 =$ _____	$82 - 6 =$ _____	$150 - 90 =$ _____	$1{,}600 - 800 =$ _____

2. Subtract from whole hundreds. You can subtract in parts.

a.	b.	c.	d.
$100 - 2 =$ _____	$200 - 4 =$ _____	$500 - 5 =$ _____	$400 - 7 =$ _____
$100 - 20 =$ _____	$200 - 40 =$ _____	$500 - 50 =$ _____	$400 - 70 =$ _____
$100 - 22 =$ _____	$200 - 45 =$ _____	$500 - 56 =$ _____	$400 - 71 =$ _____

3. Subtract and compare the results. The problems are "related" — can you see how?

a.	b.	c.
$12 - 8 =$ _____	$15 - 9 =$ _____	$13 - 7 =$ _____
$42 - 8 =$ _____	$75 - 9 =$ _____	$73 - 7 =$ _____
$120 - 80 =$ _____	$150 - 90 =$ _____	$1{,}300 - 700 =$ _____
$520 - 80 =$ _____	$650 - 90 =$ _____	$430 - 70 =$ _____

4. Write here four different subtraction problems that are "related" to the problem $14 - 8 = 6$. See the examples above!

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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, as understanding place value with four-digit numbers is crucial before moving on to larger numbers. After that we go on to numbers with five and six digits (numbers till one million). Students write them in expanded form, compare them, add and subtract them, and learn more about rounding.

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

Please recall that it is not recommended to assign all the exercises by default. Use your judgment, and strive to vary the number of assigned exercises according to the student's needs.

The Lessons in Chapter 2

	page	span
Thousands	51	*3 pages*
At the Edge of Whole Thousands	54	*2 pages*
More Thousands	56	*2 pages*
Practicing with Thousands	58	*2 pages*
Place Value with Thousands	60	*2 pages*
Comparing with Thousands	62	*3 pages*
Adding and Subtracting Big Numbers	65	*4 pages*
Rounding and Estimating with Large Numbers	69	*4 pages*
Multiples of 10, 100, and 1000	73	*3 pages*
Mixed Review Chapter 2	76	*2 pages*
Review Chapter 2	78	*2 pages*

Helpful Resources on the Internet

Teaching Place Value
What is the value of the red underlined digit? Answer the questions in this online quiz.
http://www.softschools.com/math/place_value/teaching_place_value/TeachingPlaceValue.swf

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

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

Base Ten Blocks
Click on buttons to make blocks appear. Show a problem to challenge yourself to match the correct number of blocks with a written number. The level of difficulty can be adjusted.
http://www.mathplayground.com/thelittlegames/basetenblocks.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.
https://www.funbrain.com/games/place-value

Fruit Splat — Compare Numbers (Choose Level 3)
Compare numbers by picking >, <, or = .
http://www.sheppardsoftware.com/mathgames/placevalue/FSCompareNumbers.htm

Balloon Pop Math—Order Numbers
Pop the balloons in order from the smallest one to the largest one. Choose the number range 1-10,000.
http://www.sheppardsoftware.com/mathgames/placevalue/BPOrder1000.htm

Addition Quiz
Practice adding in columns in this 10-question online quiz.
http://www.thatquiz.org/tq-1/?-jg41-l34-p0

Complements of 1,000 Interactive Mad Maths
Answer as many questions as you can in this interactive timed addition quiz.
http://www.snappymaths.com/addition/make1000/interactive/make1000imin/make1000imin.htm

Adding and Subtracting Powers of Ten
Practice adding and subtracting powers of ten up to 1,000,000 in this interactive online quiz.
http://www.snappymaths.com/addsub/addsubp10/interactive/addsubpowers10/addsubpowers10.htm

ROUNDING AND ESTIMATING

Online Rounding Practice
Reinforce your rounding skills with this interactive online exercise
https://www.mathmammoth.com/practice/rounding#number-range=0to1000000&round-to=any-place

Online Addition Practice
Practice adding large numbers in expanded form with this interactive online exercise.
https://www.mathmammoth.com/practice/place-value#mode=write-number&max-digits=6&question-number=10

Missing Addend Addition Practice
Find the missing number in each addition problem in this interactive online exercise.
https://www.mathmammoth.com/practice/place-value#mode=missing-part&max-digits=6&question-number=10

Rounding Sharks
Round numbers to the nearest hundred. Click on the shark that has the correctly rounded number.
http://www.free-training-tutorial.com/rounding/sharks.html

Rounding Quiz
Practice rounding large numbers with this interactive 10-question quiz.
https://www.thatquiz.org/tq-c/?-jg020-l5-mpnv600-p0

Money Word Problems Worksheets: Addition and Subtraction
Practice addition and subtraction of various amounts of money with these printable worksheets.
https://www.dadsworksheets.com/worksheets/money-word-problems-addition-and-subtraction.html

Rounding to Thousands, Ten Thousands, or Hundred Thousands
Practice your rounding skills with this online multiple-choice quiz.
https://www.tutorialspoint.com/ordering_rounding_and_order_of_operations/rounding_to_thousands_ten_thousand_or_hundred_thousand_

Place Value Worksheets, Riddles, and Challenges
This page offers a variety of printable activities that practice place value on a fourth grade level.
https://www.mathsalamanders.com/4th-grade-place-value.html

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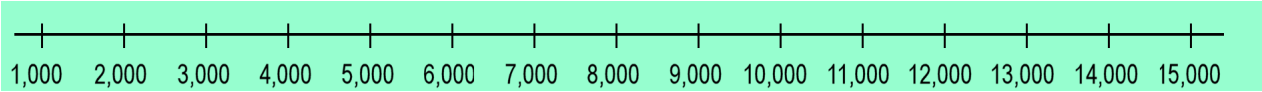
More Thousands



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

In the numbers on the right, the colored digits tell us the number of whole thousands. A comma separates those digits from the rest of the number.

Read the colored digits as a number by itself, and when you come to the comma, say the word "thousand."

We continue with whole thousands until we reach *a thousand* thousands. That number has a new name: **one million**.

78,000	*Read:* 78 thousand
153,000	*Read:* 153 thousand
802,000	*Read:* 802 thousand
990,000	*Read:* 990 thousand
999,000	*Read:* 999 thousand
1,000,000	Thousand thousand = 1 million

The rest of the digits (not colored) tell us the hundreds, tens, and ones just like you have learned in the past.

17,544	*Read:* 17 thousand five hundred forty four
609,230	*Read:* 609 thousand two hundred thirty
70,080	*Read:* 70 thousand eighty
902,005	*Read:* 902 thousand five

1. Place a comma in the number to separate the thousands. Fill in the missing parts.

a. 164000	**b. 92000**	**c. 309000**	**d. 34000**	**e. 780000**
_____ thousand	_____ thousand	_____ thousand	_____ thousand	_____ thousand

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

a. 164,453	**b. 92908**	**c. 329033**	**d. 14004**
164 thousand *453*	_____ thousand _____	_____ thousand _____	_____ thousand _____
e. 550053	**f. 72001**	**g. 800004**	**h. 30036**
_____ 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 =

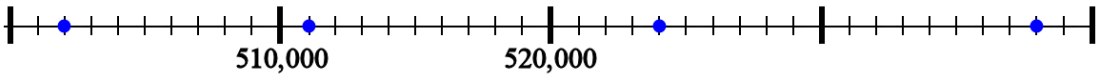
g. 30,000 − 5,000 =

h. 200,000 − 6,000 =

i. 723,000 − 400,000 =

j. 500,000 − 1,000 =

6. The numbers 510,000 and 520,000 are marked on the number line below (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. This is one of the focus areas of 4th grade math. For further help in teaching these topics, check out the free videos matched to the curriculum at https://www.mathmammoth.com/videos/.

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.

The focus of the chapter is multi-digit multiplication. We start out by multiplying numbers by whole tens and hundreds (such as 20×4 or 500×6). After this, students learn multiplication part-by-part (also called partial products) — a very important concept. It means that we calculate, for example, 4×63 in two parts: first we solve 4×60 and 4×3, and then we add the two results ($240 + 12 = 252$).

This principle underlies the standard multiplication algorithm and it also allows us to calculate the result of a multiplication mentally, so it is very important to master. Additionally, multiplying in parts is tied in with an area model — which also is important to learn.

Before learning the traditional form of the multiplication algorithm, students encounter a simplified form of that algorithm in the lesson *Multiply in Columns—the Easy Way*. At your discretion, you may skip that lesson or skim through it quickly, if your student 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. These lessons have numerous word problems. Students are instructed to write a number sentence or several for each word problem, which helps them learn how to show their work for math problems.

The idea in the lesson *So Many of the Same Thing* is very simple, yet it actually prepares students to study proportions (in middle school math). In this lesson, students fill in values for two quantities in tables (for example, the quantity of the items and the total cost).

Nearing the end of the chapter, we study 2-digit by 2-digit multiplication (e.g. 52×63). Again, we first use partial products, including in the context of an area model. The lesson *Multiplying in Parts: Another Way* presents an alternate way to multiply and is optional. After that we end the chapter with the standard algorithm for multiplying a two-digit number by a two-digit number.

The Lessons in Chapter 3

	page	span
Understanding Multiplication	84	*3 pages*
Multiplication Tables Review	87	*3 pages*
Scales Problems	90	*4 pages*
Multiplying by Whole Tens and Hundreds	94	*4 pages*
Multiply in Parts, 1	98	*3 pages*
Multiply in Parts, 2	101	*2 pages*
Multiply in Parts—Area Model	103	*2 pages*
Multiplying Money Amounts	105	*2 pages*

	page	span
Estimating in Multiplication	107	*2 pages*
Multiply in Columns - the Easy Way	109	*3 pages*
Multiply in Columns - the Easy Way, Part 2	112	*3 pages*
Multiplying in Columns - the Standard Way	115	*4 pages*
Multiplying in Columns, Practice	119	*2 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 Chapter 3	143	*2 pages*
Review Chapter 3	145	*3 pages*

Helpful Resources on the Internet

Multiplication tables — online practice
Ad-free online practice of the multiplication tables at MathMammoth.com website. Also works as an offline program in most browsers. Includes the option for both timed and non-timed practice.
https://www.mathmammoth.com/practice/multiplication.php

Multiplication games for the multiplication tables
Improve your multiplication skills with these fun games!
http://www.multiplication.com/games/all-games

http://www.hoodamath.com/games/multiplication.html

Interactive Pan Balance
Each of the four shapes is assigned a certain (unknown) weight. You need to figure out their weights by placing them on the two sides of the pan balance in different configurations.
http://illuminations.nctm.org/Activity.aspx?id=3531

Stable Scales Quiz
In each picture, the scales are balanced. Can you find the weight of the items on the scales?
https://www.transum.org/Software/SW/Starter_of_the_day/Students/Stable_Scales_Quiz.asp

MULTIPLYING IN PARTS (PARTIAL PRODUCTS)

Mental Multiplication of Multiples of 10 and 100
This activity allows you to rehearse the mental multiplication of multiples of 10 and 100, e.g. 30 × 400 etc. Play against the clock and see what level you can get up to before you run out of time!
https://www.studyzone.tv/game86-code3dc5617c60ff2ca509aabc60944162d1

Multiply by Multiples of 10 Bicycle Race
Answer the multiplication problems correctly to help the bicycle rider win the race.
https://www.studyladder.com/games/activity/multiply-by-multiples-of-10-22221

Open Array Multiplication Tool
This interactive tool shows the partial products algorithm and an area model for multi-digit multiplication, allowing students to easily link the two. The model accommodates 2-digit × 2-digit problems and 1-digit × 1, 2, 3, or 4-digit problems.
https://www.conceptuamath.com/app/tool/open-array-multiplication

Partial Products Finder App
An interactive app that illustrates multiplication (up to 30 x 30) with an area model.
https://apps.mathlearningcenter.org/partial-product-finder/

Amoeba Multiplication Game (Choose Beginner or Medium Level)
Practice multiplication by splitting numbers. Choose Beginner or Medium Level for this chapter.
http://www.bbc.co.uk/skillswise/game/ma12pape-game-written-multiplication

MULTIPLICATION ALGORITHM

One-Digit by Two-Digits Multiplication Game
Students will multiply one-digit numbers by two-digit whole numbers, then get to try to shoot a basket.
http://www.math-play.com/one-digit-by-two-digit-multiplication-game.html

Multiplication Jeopardy Game
You get to solve multi-digit multiplication questions of 1-digit by 1-digit, 1-digit by 2-digit, and 1-digit by 3-digit numbers in this game.
http://www.math-play.com/Multiplicaton-Jeopardy/Multiplication-Jeopardy.html

Canoe Penguins
Answer the multiplication problems quickly and correctly to help your penguins win the race!
http://www.arcademics.com/games/canoe-penguins/canoe-penguins.html

Batter's Up Baseball
Answer the multiplication problems correctly to help the home team beat the visiting team. Choose “Double” or “Homerun” level.
http://prongo.com/baseball-multiply/

Multi-Digit Multiplication Number Battle Card Game (page 18 of PDF file)
Arrange your cards to make the highest product possible.
http://www.pepnonprofit.org/uploads/2/7/7/2/2772238/acing_math.pdf

Multiplication Quiz
Practice multiplying by one digit in this 10-question online quiz.
http://www.thatquiz.org/tq-1/?-jg24-la-p0

Math FROG MultipliACTION
Practice 2 by 2 digit multiplication online. Enter one digit in each box.
http://cemc2.math.uwaterloo.ca/mathfrog/english/kidz/mult5.shtml

Math Computation Practice: Multiply Two digits by Two Digits
Practice two-digit multiplication in columns.
http://www.mathplayground.com/multiplication05.html

ORDER OF OPERATIONS

Choose Math Operation
Choose the operation(s) so that the number sentence is true. Helps develop number sense and logical thinking.
http://www.homeschoolmath.net/operation-game.php

Order of Ops
Save seven members of a Royal Family from prison by using your order of operation skills. Choose the expression to be solved in each step, and solve it. The program uses a visual representation of a stairway to show how the expression gets shorter at each step.
https://mrnussbaum.com/order-ops-online-game

Order of Operations Quiz
A 10-question online quiz that includes two different operations and possibly parentheses in each question. You can also modify the quiz parameters yourself.
http://www.thatquiz.org/tq-1/?-j8f-la

Exploring Order of Operations (Object Interactive)
Click on the operation to be done first in the given expression. The program then solves that, and you click on the *next* operation to be performed, etc., until it is solved. The resource also includes a game.
http://www.learnalberta.ca/content/mejhm/html/object_interactives/order_of_operations/use_it.html

Order of Operations Practice
A simple online quiz of 10 questions. Uses parentheses and the four operations.
http://www.onlinemathlearning.com/order-of-operations-practice.html

MISCELLANEOUS

Multiplication Matching Game
Practice the multiplication tables while also uncovering a hidden picture in this fun matching game!
https://www.mathmammoth.com/practice/multiplication-matching

Matching Rates
Match each rate to its unit rate. Get a 1,000 point bonus for each round in which you don't make mistakes!
http://www.sheppardsoftware.com/mathgames/ratios/MatchingRates.htm

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

Multiplication Word Problem Quiz
This 10-question quiz focuses on using multiplication to solve word problems.
http://www.softschools.com/quizzes/math/multiplication_word_problems/quiz1059.html

Mental Math Tricks for Multiplication
Includes some basic common-sense tricks, such as multiplying by 9 or multiplying by doubling and halving.
http://wildaboutmath.com/2007/11/11/impress-your-friends-with-mental-math-tricks

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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** to the end.

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

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

1**0** × 481 = 4,81**0**	1**00** × 47 = 4,7**00**	1**000** × 578 = 578**,000**

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

1**0** × 800 = 800**0**	1**00** × 6,600 = 660,0**00**	1**000** × 40 = 40**,000**

1. Multiply.

a. 10 × 315 = _____	**b.** 100 × 6,200 = _____	**c.** 1,000 × 250 = _____
3,560 × 10 = _____	10 × 1,200 = _____	38 × 1,000 = _____
35 × 100 = _____	100 × 130 = _____	10 × 5,000 = _____

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

What is 20 × 14?

First solve the problem without the zero in 20: 2 × 14 = 28. Next, tag a zero to the answer, 28, and you get 280. So, 20 × 14 = 280.

What is 200 × 31?

First solve the problem without the zeros: 2 × 31 = 62. Next, just *two* zeros to the result, 62, to get 6,200. In other words, 200 × 31 = 6,200.

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

a.	**b.**	**c.**	**d.**
20 × 8 = _____	200 × 7 = _____	20 × 12 = _____	20 × 16 = _____
4 × 20 = _____	5 × 200 = _____	35 × 20 = _____	42 × 200 = _____
20 × 5 = _____	11 × 200 = _____	200 × 9 = _____	54 × 20 = _____

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

When multiplying any number by 20, we can write the 20 as 10 × 2. For example:

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

In that problem, first multiply 2 × 14 = 28. Then the problem becomes 10 × 28, which equals 280. Notice again how we did it:

$$\underline{20} \times 14$$
$$= \underline{10 \times 2} \times 14$$
$$= 10 \times 28$$
$$= 280$$

Let's try the same idea with 200. We will write 200 as 100 × 2. For example:

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

In that problem, first multiply 2 × 31 = 62. The problem now becomes 100 × 62, which is 6,200. Notice again how it was done:

$$\underline{200} \times 31$$
$$= \underline{100 \times 2} \times 31$$
$$= 100 \times 62$$
$$= 6{,}200$$

3. Try it yourself! Fill in.

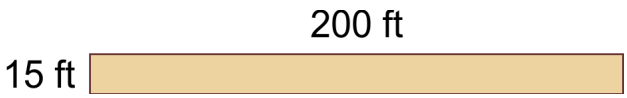
a. 20 × 7	**b.** 20 × 5	**c.** 200 × 8	**d.** 200 × 25
= _____ × 2 × 7	= _____ × 2 × 5	= _____ × 2 × 8	= _____ × 2 × 25
= 10 × _____	= 10 × _____	= 100 × _____	= 100 × _____
= _____	= _____	= _____	= _____

4. Mark's shed measures 20 ft by 15 ft. Write and solve a number sentence for its area. ("A" means area.)

A = _____

Hint: To calculate the area of a rectangle, multiply its two sides.

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



A = _____

6. Mark was told he needed four truckloads of gravel to cover his driveway. *One* truckload costs 5 × $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 result. Similarly, if you multiply by some whole hundred, first solve the multiplication without the two zeros of the hundreds, and then tag two zeros to the result.			
50 × 8 = 400	90 × 11 = 990	300 × 8 = 2,400	12 × 800 = 9,600

7. Multiply.

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

It even works this way:		
To multiply 40 × 70, simply multiply 4 × 7, and tag two zeros to the result: 40 × 70 = 2,800	To multiply 600 × 40, simply multiply 6 × 4, and tag three zeros to the result: 600 × 40 = 24,000	To multiply 700 × 800, simply multiply 7 × 8, and tag four zeros to the result. 700 × 800 = 560,000

8. Multiply.

a. 20 × 90 = _____ 70 × 300 = _____	**b.** 60 × 80 = _____ 30 × 900 = _____	**c.** 400 × 50 = _____ 200 × 200 = _____
d. 80 × 800 = _____ 200 × 500 = _____	**e.** 100 × 100 = _____ 40 × 30 = _____	**f.** 800 × 300 = _____ 90 × 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 an 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. _____ × 3 = 360 _____ × 50 = 450	**b.** 40 × _____ = 320 5 × _____ = 600	**c.** _____ × 40 = 400 _____ × 2 = 180
d. _____ × 30 = 4,800 _____ × 200 = 1,800	**e.** 40 × _____ = 2,000 6 × _____ = 4,200	**f.** _____ × 800 = 56,000 _____ × 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:

$$40 \times 70 = 4 \times 10 \times 7 \times 10$$

$$= 10 \times 10 \times (4 \times 7) = 100 \times 28 = 2{,}800.$$

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

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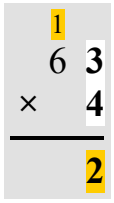
Multiplying in Columns, the Standard Way

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

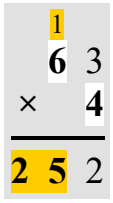
However, in the standard algorithm, the additions are done *at the same time* as the multiplications – not afterwards. That way, the calculation looks more compact and takes less space.

The standard way to multiply



Multiply the ones: 4 × 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 *regrouping* (carrying).



Then multiply the tens, *adding* the 1 ten that was regrouped:

4 × 6 + 1 = 25

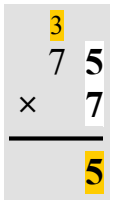
Write 25 in front of the 2.
Note: This 25 means 25 tens or 250!

"The easy way"

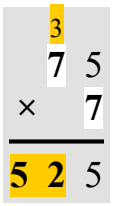
```
  6 3
×   4
-----
  1 2
+ 2 4 0
-------
  2 5 2
```

In the "easy way," we multiply in parts, and the adding is done separately.

The standard way to multiply



Multiply the ones: 7 × 5 = 35
Regroup the 3 tens.



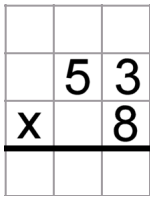
Multiply & add the tens:
7 × 7 + 3 = 52

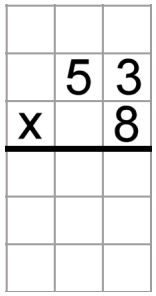
"The easy way"

```
  7 5
×   7
-----
  3 5
+ 4 9 0
-------
  5 2 5
```

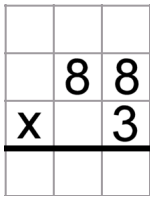
1. Multiply using both methods: the standard way and the easy way.

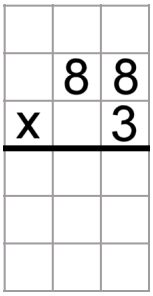
a.





b.





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

a.

	7	9
x		3

	7	9
x		3

b.

	1	8
x		5

	1	8
x		5

3. Multiply. Be careful with the regrouping.

a.

	5	1
x		6

b.

	1	9
x		3

c.

	6	2
x		2

d.

	4	6
x		7

e.

	6	6
x		6

f.

	3	9
x		9

g.

	8	7
x		3

h.

	6	7
x		2

i.

	2	0
x		9

j.

	5	4
x		8

k.

	3	4
x		6

l.

	4	6
x		2

4. Write number sentences (additions, subtractions, multiplications) on the lines, and solve.

a. What is the cost of buying three chairs for $48 each?

_____

And the cost for six chairs? _____

x		

b. You earn $77 a day. How much do you earn in five days?

_____

How much in ten days? _____

x		

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Chapter 4: Time and Measuring
Introduction

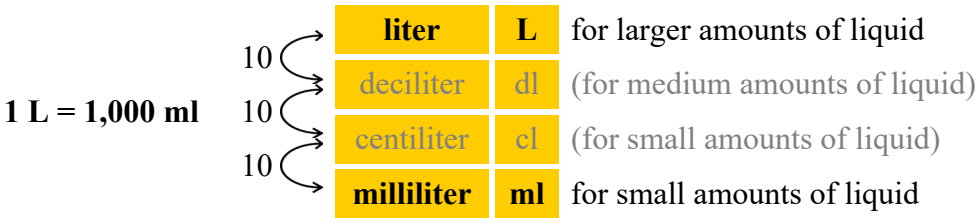
The fourth chapter of *Math Mammoth Grade 4* includes lessons on time, temperature, length, weight, and volume. The focus is no longer on the actual act of measuring, but on conversions between the units and on word problems that involve conversions.

We start out studying clock and time, with a focus on elapsed time. In contrast to third grade, the time intervals can now include the change from AM to PM, and the given times do not follow five-minute increments. The lessons give several strategies for finding the elapsed time. Students also make schedules and solve a variety of word problems involving time.

Conversions between measurement units is a big focus point of the chapter. Students may have difficulties with this, and that is why this topic will also be studied in 5th grade. At this point, students should be able to easily convert a bigger unit into a smaller unit (such as converting 3 feet into 36 inches or 2 kg into 2,000 grams).

While the Common Core standards do not include them for fourth 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 fourth grade. If you feel your child has difficulty with converting from a smaller unit to a bigger one, feel free to omit those particular exercises. They are intermixed though, and not marked in any special way.

The chapter includes separate lessons for customary and metric units. Each lesson dealing with measuring units includes a table that lists the units we are studying 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:



The lesson deals only with milliliters and liters. However, the chart also shows the other two units (deciliters and centiliters) in order to help students become familiar with those basic units 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, at your discretion, explain them to the student.

The Lessons in Chapter 4

	page	span
Time Units	153	*3 pages*
Elapsed Time 1	156	*3 pages*
The 24-Hour Clock	159	*2 pages*
Elapsed Time 2	161	*3 pages*
Elapsed Time 3	164	*3 pages*
Measuring Temperature: Celsius	167	*4 pages*
Measuring Temperature: Fahrenheit	171	*2 pages*
Temperature Line Graphs	173	*2 pages*
Measuring Length	175	*3 pages*
More Measuring in Inches and Centimeters	178	*2 pages*
Feet, Yards and Miles	180	*5 pages*
Metric Units for Measuring Length	185	*3 pages*
Customary Units of Weight	188	*4 pages*
Metric Units of Weight	192	*3 pages*
Customary Units of Volume	195	*3 pages*
Metric Units of Volume	198	*3 pages*
Mixed Review Chapter 4	201	*2 pages*
Review Chapter 4	203	*2 pages*

Helpful Resources on the Internet

ELAPSED TIME

Elapsed Time
Find how much time passes between two different given times (elapsed time or time intervals) in this customizable online exercise.
https://www.mathmammoth.com/practice/clocks

Elapsed Time
Click "New Time". Then click the buttons that advance the time on the clock, until the time matches the "End" time. Choose difficulty levels 1 and 2 for this grade level.
http://www.shodor.org/interactivate/activities/ElapsedTime/

Elapsed Time Worksheets
Generate printable worksheets for elapsed time. You can practice the elapsed time, finding the starting time, or finding the ending time.
http://www.mathnook.com/elapsedtimegen.html

Find the Start Time
Word problems about starting times with multiple-choice answers. Choose "full screen", then "Find the start time". Next, choose option 4 or 5.
http://mathsframe.co.uk/en/resources/resource/119/find_the_start_time

Time for Crime—Elapsed Time Mystery
A single mystery problem which can be solved by thinking of the elapsed time: who is the thief?
http://teacher.scholastic.com/maven/timefor/index.htm

ThatQuiz—Elapsed time
A ten-question quiz on Elapsed Time
http://www.thatquiz.org/tq-g/?-j4-l4-p0

Adding Time Word Problems
Read the time and then answer a word problem involving adding a given time.
http://mathsframe.co.uk/en/resources/resource/118/adding_time_word_problems

Converting Units of Time Quiz
Practice converting between various units of time with this multiple-choice quiz.
https://www.turtlediary.com/quiz/converting-units-of-time.html

24-hour Snap Game
Snap together the matching times, one given with the 24-hour clock, and another with AM/PM.
http://www.bbc.co.uk/skillswise/game/ma25time-game-24-hour-snap

Interactivate: Elapsed Time
Practice calculating elapsed time with analog or digital clocks.
http://www.shodor.org/interactivate/activities/ElapsedTime/

Elapsed Time Quiz
A 10-question online quiz that practices elapsed time in hours and minutes.
https://www.thatquiz.org/tq-g/?-j4-l3-mpnv600-p0

TEMPERATURE

Thermo Quiz
Select the box that contains the temperature the thermometer is showing.
http://www.mathnook.com/math/thermo-quiz.html

Fun Physics from NASA: Temperature
Practice matching different things to their temperature. You can choose Celsius, Fahrenheit, or Kelvin degrees (the Kelvin scale is not studied in this curriculum). When you are done, you can compare the temperature scales, learn more about temperature, or click on one of the objects to learn more about it.
https://funphysics.jpl.nasa.gov/adventures/temperature-game.html

Hot Stuff
Practice estimating temperatures in Fahrenheit.
http://www.beaconlearningcenter.com/WebLessons/HotStuff/default.htm

Be a Scientist
Practice estimating temperatures in Celsius.
http://www.beaconlearningcenter.com/WebLessons/BeAScientist/default.htm

Temperature
Practice reading thermometers with different scales.
http://www.topmarks.co.uk/Flash.aspx?f=Temperaturev2

Temperature Quiz
Answer questions about reasonable temperatures in Fahrenheit and Celsius in this interactive multiple-choice quiz.
http://www.softschools.com/quizzes/math/temperature_measurement/quiz2112.html

Line Graph Quiz
Read the line graph and answer 5 questions in this simple quiz.
http://www.mcwdn.org/Graphs/LineGraphQuiz.html

LENGTH

The Ruler Game
Click on the measurements on the ruler that correspond with the measurements that appear.
http://www.rulergame.net/

Reading a Ruler by Eighths
Practice reading a ruler by eighths with a matching exercise and a game of Concentration.
https://www.quia.com/jg/1364429.html

Measure It!
Practice measuring lines with either centimeters or inches. Multiple choice questions.
https://www.funbrain.com/games/measure-it

Sal's Sub Shop
Cut the subs to the given measurements—sometimes in metric units, sometimes in inches.
https://mrnussbaum.com/sal-s-sub-shop-online-game

Reading a Tape Measure Worksheets
Worksheet generator—choose to measure in inches, or inches and feet.
http://themathworksheetsite.com/read_tape.html

Feet to Yards and Feet
Match the correct conversions. Get a 1,000-point bonus per round if you get all correct.
http://www.sheppardsoftware.com/mathgames/measurement/MeasurementYards.htm

Metric Length Matching
Match the conversions as fast as you can!
http://www.sheppardsoftware.com/mathgames/measurement/MeasurementMeters.htm

Quiz on metric units of length
Practice converting between metric units of length in this 10-question quiz.
http://www.thatquiz.org/tq-n/?-j147-l2-p0

WEIGHT

Matching Math: Customary Weight
Practice converting between pounds and ounces in this matching game.
http://www.sheppardsoftware.com/mathgames/measurement/MeasurementOunces.htm

Reading Scales
Illustrate how to read a variety of measuring devices, such as scales, measuring cup, thermometer. You can generate examples using different scales on different devices.
http://www.teacherled.com/resources/dials/dialsload.html

Ounces, Pounds, and Tons
Answer questions about customary units of weight in this jeopardy-style game.
https://www.quia.com/cb/426998.html

VOLUME

Artie Ounces Soda Jerk
Practice standard units of volume with this fun soda jerk game. Fill the client orders as fast as you can!
https://mrnussbaum.com/artie-ounces-soda-jerk-online-game

Standard Liquid Volume Matching Game
Match standard liquid volumes with equivalent volumes
https://www.quia.com/mc/126277.html

GENERAL

Matching Math: Customary Measuring Units
Match each item with its best estimate of capacity, weight, or length.
http://www.sheppardsoftware.com/mathgames/measurement/BestMeasure2.htm

Measures
An online activity about metric measuring units and how to read scales, a measuring cup, and a ruler.
Note: You will need to use the British spellings "centimetres" and "millilitres" in the activity.
http://flash.topmarks.co.uk/674

A Dictionary of Units of Measurement
This resource explains the common measuring systems and their history.
http://www.ibiblio.org/units/

Measuring
Worksheets, fact sheets, and quizzes that practice various measuring concepts in both metric and imperial units.
http://www.bbc.co.uk/skillswise/topic-group/measuring

Conversion Quizzes - ThatQuiz.org
A customizable online quiz about conversions between measuring units. The options include both metric and customary systems and six different difficulty levels.
http://www.thatquiz.org/tq-n/science/metric-system/

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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 are based on the meter, and in fact, have the word "meter" in them.

Each unit in the metric system is 10 times the smaller unit. For example, 1 kilometer is 10 hectometers and 1 centimeter is 10 millimeters. However, we don't commonly use hectometers, dekameters, or decimeters. You need to learn only the units that are bolded in the chart.

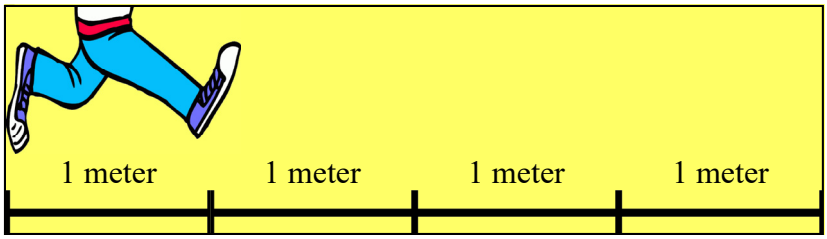
Units of length in the metric system

10 →	**kilometer**	**km**	"Kilo" means 1,000.
10 →	hectometer	hm	(not used)
10 →	dekameter	dam	(not used)
10 →	**meter**	**m**	**the basic unit**
10 →	decimeter	dm	(not used much)
10 →	**centimeter**	**cm**	This is 1/100 of 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 just a bit longer than one yard.

1. Draw two lines at least 4 m long that start at the same place (outside, in a hallway, or a large room).

a. On the one line, make marks for 1 m, 2 m, 3 m, and 4 m. Then try to take "hops" one meter long.



b. On the second line make marks at each foot, from 1 to 13 feet. Then take 1-yard hops.

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	Height
	_____ cm = _1_ m _____ cm.

Conversions between units		
Remember what millimeters look like on a ruler. They are tiny! **Ten millimeters make 1 cm.** Then verify from a measuring tape that **100 centimeters makes one meter**. "Centi" means one hundred (from the Latin word *centum*). That is why 1 dollar has 100 *cents*, and 1 meter has 100 *centi*meters. Lastly, **1 kilometer is 1,000 meters**, because "kilo" means one thousand.		
1 km = 1,000 m	**1 m = 100 cm**	**1 cm = 10 mm**

3. One meter is 100 cm. Convert between meters and centimeters.

a. 5 m = _____ cm	**b.** 4 m 6 cm = _____ cm	**c.** 800 cm = _____ m
8 m = _____ cm	9 m 19 cm = _____ cm	239 cm = ____ m _____ cm
12 m = _____ cm	10 m 80 cm = _____ cm	407 cm = ____ m _____ cm

4. One centimeter is 10 mm. Convert between centimeters and millimeters.

a. 5 cm = _____ mm	**b.** 2 cm 8 mm = _____ mm	**c.** 50 mm = ____ cm _____ mm
8 cm = _____ mm	7 cm 5 mm = _____ mm	72 mm = ____ cm _____ mm
14 cm = _____ mm	10 cm 4 mm = _____ mm	145 mm = ____ cm _____ mm

5. One kilometer is 1,000 m. Convert between kilometers and meters.

a. 5 km = _____ m	**b.** 2 km 800 m = _____ m	**c.** 2,000 m = _____ km
23 km = _____ m	6 km 50 m = _____ m	4,300 m = ____ km _____ m
1 km 200 m = _____ m	13 km 579 m = _____ m	18,700 m = ____ km _____ m

6. Calculate. Give your answer using whole kilometers and meters.

a. 5 km 200 m + 8 km 900 m

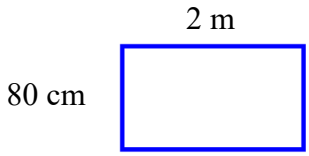
b. 3 km 600 m + 2 km 800 m

c. 1,500 m + 2 km 600 m

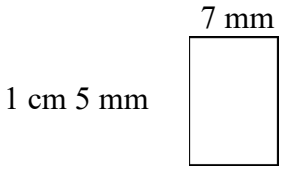
d. 6 × 700 m

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?

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?

Puzzle Corner

How about if the wall is 3 meters long?