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

By Maria Miller

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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

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

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*

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

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

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

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

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

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

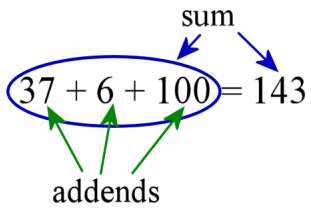
An Interactive Bar Grapher
Graph data sets in bar graphs. The color, thickness and scale of the graph are adjustable. You can input your own data or use or alter pre-made data sets.
http://illuminations.nctm.org/Activity.aspx?id=4091

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

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

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?

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

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

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.

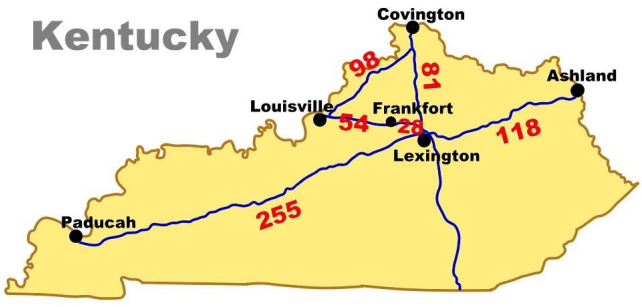
   a. 5,609 + 1,388 + 89 + 402 + 837

   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.

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

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!

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

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

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.noodlemath.com/mobile/games/basetenblocks.html

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

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

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

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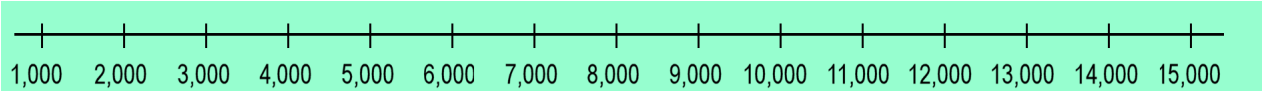
Sample worksheet from
https://www.mathmammoth.com

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

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

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 =

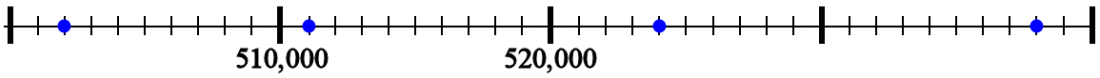
g. 30,000 − 5,000 =

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

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

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

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*

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

	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

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

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

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

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

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

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

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 = _____

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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.

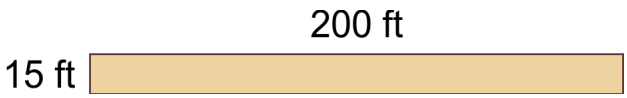
a. 20 × 7	**b.** 20 × 5	**c.** 200 × 8	**d.** 200 × 25
= _____ × 2 × 7	= _____ × 2 × 5	= _____ × 2 × 8	= _____ × 2 × 25
= 10 × _____	= 10 × _____	= 100 × _____	= 100 × _____
= _____	= _____	= _____	= _____

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?

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

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 = _____

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

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.

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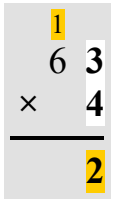
Sample worksheet from
https://www.mathmammoth.com

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.

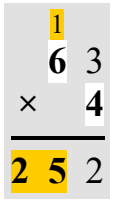
However, in the standard algorithm, the additions are done *at the same time* as the multiplications – not afterwards. That way, the calculation looks more compact and takes less space.

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

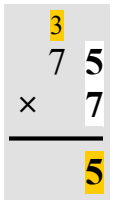
Write 25 in front of the 2.
Note: This 25 means 25 tens or 250!

"The easy way"

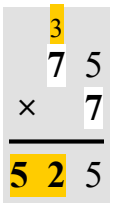
```
  6 3
×   4
-----
  1 2
+ 2 4 0
-------
  2 5 2
```

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.



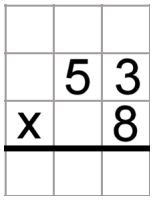
Multiply & add the tens:
7 × 7 + 3 = 52

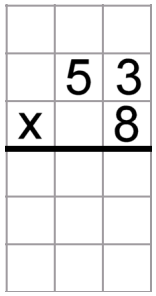
"The easy way"

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

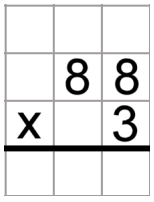
1. Multiply using both methods: the standard way and the easy way.

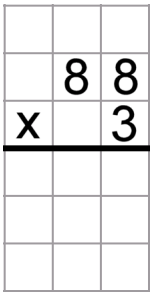
a.





b.





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

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		

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

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

Chapter 4: Time and Measuring
Introduction

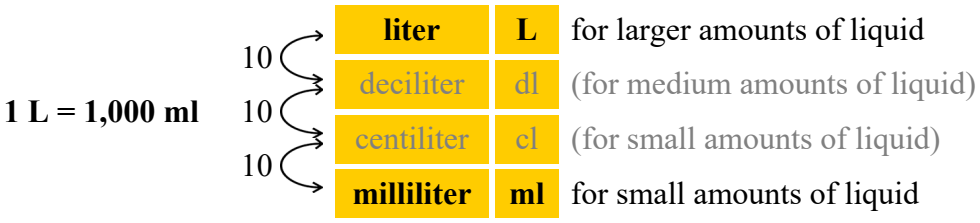
The fourth chapter of *Math Mammoth Grade 4* includes lessons on time, temperature, length, weight, and volume. The focus is no longer on the actual act of measuring, but on conversions between the units and on word problems that involve conversions.

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.

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

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*
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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

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

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

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

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

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

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/

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

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

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.

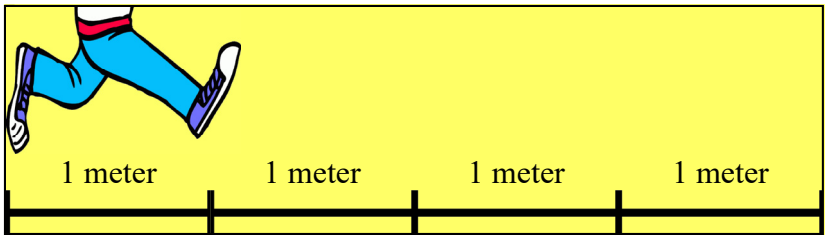
Units of length in the metric system

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.

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

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

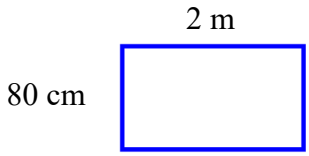
c. 1,500 m + 2 km 600 m

d. 6 × 700 m

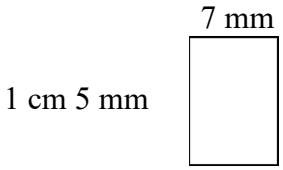
Sample worksheet from
https://www.mathmammoth.com

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?

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

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

math MAMMOTH

Grade 4-B Worktext

Division

Geometry

Fractions

Decimals

Light Blue Series

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

By Maria Miller

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https://www.MathMammoth.com/contact.php

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

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

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-B, covers division (chapter 5), geometry (chapter 6), fractions (chapter 7), and decimals (chapter 8). The rest of the topics are covered in the 4-A 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 your 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 your child study in 2-3 chapters simultaneously. This type of flexible use of the curriculum enables you to truly individualize the instruction for your child.

- Don't automatically assign all the exercises. Use your judgment, trying to assign just enough for your 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

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

Chapter 5: Division
Introduction

The fifth chapter of *Math Mammoth Grade 4* includes lessons on division, long division, remainder, average, divisibility, and problem solving. It is a long chapter, because division and long division are "in focus" in fourth grade. Therefore, feel free to mix the lessons from this chapter with lessons from some other chapter, essentially using the curriculum in a somewhat spiral manner. This is especially advisable if your student has difficulties retaining the material or starts feeling bored with these topics.

For further help in teaching these topics, check out the free videos matched to the curriculum at https://www.mathmammoth.com/videos/. Remember not to automatically assign all the exercises. Instead, adjust the amount of exercises according to the student's needs. The rest can be used later for review.

We start out by reviewing basic division facts by single-digit numbers (such as 24 ÷ 4 or 56 ÷ 7). After that, we study terminology of division and dividing numbers by whole tens and hundreds (such as 400 ÷ 20).

The lesson *Finding Fractional Parts with Division* shows an important relationship between fractions and division. For example, we can find 3/4 of a number by first finding 1/4 (dividing by 4) and then multiplying the result by 3.

Next students practice the order of operations again—this time with division as one of the operations.

Then we study the concept of remainder, preparing students for the upcoming lessons on long division. At first, the concept of remainder is presented visually. Soon, students solve simple division problems with a remainder, written with the long division symbol (or long division "corner", as I like to call it).

Next comes a set of lessons intended to teach long division in several small steps. We start with divisions where each of the digits in the dividend (thousands, hundreds, tens, and ones) can be divided evenly by the divisor (for example, 3096 ÷ 3). As the next step, there is a remainder in the ones. Then, the divisions have a remainder in the tens. Finally, there is a remainder in the hundreds and in the thousands, and this completes the step-by-step learning process for long division. The lessons also include lots of word problems to solve.

After long division, we study the concept of average, which is a nice application of division, and problems that involve a fractional part of a quantity (such as 3/4 of $600). Students get help from visual bar models to solve the problems.

The last section deals with elementary number theory. We study basic divisibility rules (though not all of them), prime numbers, and finding all factors of a given two-digit number.

The Lessons in Chapter 5

	page	span
Review of Division	10	*3 pages*
Division Terms and Division with Zero	13	*2 pages*
Dividing with Whole Tens and Hundreds	15	*3 pages*
Order of Operations and Division	18	*2 pages*
The Remainder, Part 1	20	*3 pages*
The Remainder, Part 2	23	*2 pages*
The Remainder, Part 3	25	*2 pages*
Long Division 1	27	*4 pages*
Long Division 2	31	*3 pages*
Long Division 3	34	*4 pages*
Long Division with 4-Digit Numbers	38	*4 pages*

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

More Long Division	42	*3 pages*
Remainder Problems	45	*4 pages*
Long Division with Money	49	*2 pages*
Long Division Crossword Puzzle	51	*1 page*
Average	52	*3 pages*
Finding Fractional Parts with Division	55	*3 pages*
Problems with Fractional Parts	58	*2 pages*
Problems to Solve	60	*3 pages*
Divisibility	63	*4 pages*
Prime Numbers	67	*3 pages*
Finding Factors	70	*2 pages*
Mixed Review Chapter 5	72	*2 pages*
Review Chapter 5	74	*2 pages*

Helpful Resources on the Internet

DIVISION CONCEPT AND DIVISION FACTS

The Forty Frogs Game
Learn to find fractions of sets by dividing a set of baby frogs into equal groups.
http://www.mathactivities.net/frogs.htm

Patty's Paints Division
Help Patty paint cars by solving basic division questions. Lastly, drive your newly painted car in a fun race!
http://www.multiplication.com/games/play/pattys-paints-division

Flying High Division
Fly your plane safely through the storm clouds by answering the division facts correctly.
http://www.multiplication.com/games/play/flying-high-division

Times or Divide Bingo
A useful class teaching resource on division and multiplication by 10 and 100. It includes decimals and is suitable for use on an interactive whiteboard.
http://www.topmarks.co.uk/Flash.aspx?f=bingotimesordivide

Leftovers—game with beads
Practice division with this fun dice game!
http://www.learn-with-math-games.com/long-division-games-for-the-classroom.html

Fraction of a Number
Practice finding a fraction of a given number.
http://www.mathplayground.com/fractions_fractionof.html

Multiply & Divide Whole Numbers by 10, 100, 1000
Practice multiplying and dividing by 10, 100, and 1,000 with this interactive online quiz.
https://www.khanacademy.org/math/cc-fifth-grade-math/cc-5th-place-value-decimals-top/cc-5th-mult-div-whole-num-10-100-1000/e/mult-div-whole-numbers-by-10-100-1000

Division with remainders (mental math) — online practice
Practice division with remainders with this ad-free online practice program at MathMammoth.com website. Also works well on tablets and most browsers. Includes the option for both timed and non-timed practice.
https://www.mathmammoth.com/practice/division-remainder.php

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

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

Free customizable worksheets for the order of operations
Choose from five operations and parentheses. You can choose the number range, number of problems, and more.
http://www.homeschoolmath.net/worksheets/order_of_operations.php

ITP Remainders
This ITP sets up an empty grid into which you can place counters. Removing or highlighting extra counters will change the calculation displayed.
http://mathsframe.co.uk/en/resources/resource/67/itp_remainders

Moving Remainders Division Game
Practice your division skills with this printable board game for two or more players.
https://www.lauracandler.com/wp-content/uploads/2018/06/MovingRemaindersGame.pdf

Division with Remainders
Practice modeling division with remainders in the quotients in this interactive online activity.
http://www.harcourtschool.com/activity/elab2004/gr4/5.html

LONG DIVISION

MathFrog Dividerama!
Interactive long division practice. Guided help available.
http://cemc2.math.uwaterloo.ca/mathfrog/english/kidz/div5.shtml

Mr. Martini's Classroom: Long Division
An interactive long division tool.
http://www.thegreatmartinicompany.com/longarithmetic/longdivision.html

Drag-and-Drop Math
Practice division interactively. Choose "Division", 2-digit dividend, and 1-digit divisor.
https://mrnussbaum.com/drag-n-drop-math-online

Long Division Millionaire Game
Learn to divide large numbers up to thousands. Can you answer all 15 questions?
http://www.kidsmathtv.com/free/math-games/sixth-grade/long-division/millionaire/game.html

Bike Racing Math Average
Race your motorcycle against others while answering questions about average. Correct answers speed you up!
http://www.mathnook.com/math/bike-racing-math-average.html

Division Jump — board game
Practice division of one-digit numbers into two, three, and four-digit numbers.
http://www.learn-with-math-games.com/division-activities.html

Long Division Quiz
Practice dividing four-digit numbers by single-digit numbers in this online quiz.
http://i4c.xyz/nmenbdv

Double-Division.org
Double-division is a form of the long division algorithm that takes away the guesswork of finding how many times the divisor goes into the number to be divided. Also called 1-2-4-8 division.
http://www.double-division.org/

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

Short Division
This is a web page that explains short division in detail. Short division is the same algorithm as long division, but some steps are only done in your head and not written down.
http://www.themathpage.com/ARITH/divide-whole-numbers.htm

FACTORS AND PRIMES

Arrays and Factors
Drag rectangles to show the factorizations of a given number on a grid.
http://www.shodor.org/interactivate/activities/FactorizeTwo/

Find all the factors of a given number — online practice
An ad-free online practice program at MathMammoth.com. Also works as an offline program in most browsers. Choose the minimum and maximum numbers and the amount of practice problems.
https://www.mathmammoth.com/practice/factorfind.php

Factor Game
Choose a number from the game board, and your opponent gets all the numbers that are its proper factors. Adjust the number of rows and columns on the board to get a more challenging (and interesting) game. The game can be adapted to be played offline.
http://illuminations.nctm.org/Activity.aspx?id=4134

Sliding Tile Factorization Game
Slide a number over another to capture it, but you can only do this if the number you slide is a factor of the other. Number 1 is only supposed to be used to capture prime numbers.
http://www.visualmathlearning.com/Games/sliding_factors.html

Octopus Factors
Move counters up the legs of an octopus but only when the number on the circle is a multiple of the number on the card.
https://web.archive.org/web/20171024183705/http://www.counton.org/games/map-numbers/octopus/

Not a Factor
Choose a number that is *not* a factor of the given number.
http://www.helpingwithmath.com/resources/games/target_factors01/not_factor.html

Product Game
Choose factors, and the product of those gets colored in on the game board. The player who gets four products in a row wins. This game can easily be adapted to be played offline, with paper and colored pencils.
http://illuminations.nctm.org/Activity.aspx?id=4213

Primes, Factors and Divisibility—Explorer at CountOn.org
Lessons explaining divisibility tests, primes, and factors.
https://web.archive.org/web/20180319072651/http://www.counton.org:80/explorer/primes/

Factoring Calculator
This tool lists all the factors of a given number and shows an interesting visual that pairs the various factors of the number. You can even find all the factors of very large numbers, and it is fun to experiment with!
http://www.dadsworksheets.com/factoring-calculator.html

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

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

Long Division 1

Divide hundreds, tens, and ones separately.

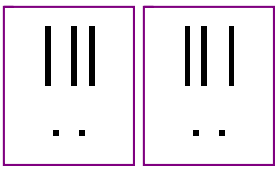
Write the dividend inside the long division "corner", and the quotient on top.

64 ÷ 2 = ?

Divide tens and ones separately:

6 tens ÷ 2 = 3 tens (t)

4 ones ÷ 2 = 2 ones (o)



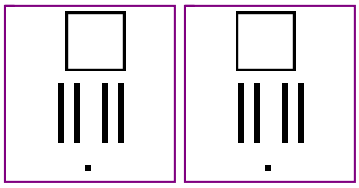
	t	o
2)	3	2
	6	4

282 ÷ 2 = ?

2 hundreds ÷ 2 = 1 hundred (h)

8 tens ÷ 2 = 4 tens (t)

2 ÷ 2 = 1 (o)



	h	t	o
2)	2	8	2
	1	4	1

1. Make groups. Divide. Write the dividend inside the "corner" if it is missing.

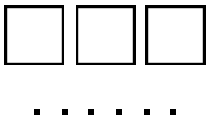
a. Make 2 groups

2)6 2

b. Make 3 groups

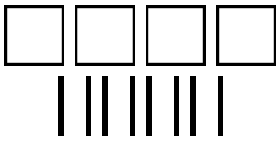
3)

c. Make 3 groups



3)

d. Make 4 groups



4)

2. Divide thousands, hundreds, tens, and ones separately.

a. 4)8 4 **b.** 3)3 9 3 **c.** 3)6 6 0 **d.** 4)8 0 4 0

e. 3)6 6 **f.** 2)6 0 4 2 **g.** 3)3 3 0 **h.** 4)4 8 0 4

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

h t o 0 4)2 4 8 h t o 0 6 2 4)2 4 8 Four does not go into 2. You can put zero in the quotient in the hundreds place or omit it. Four does go into 24, six times. Put 6 in the quotient.	th h t o 0 5)3 5 0 5 th h t o 0 7 0 1 5)3 5 0 5 Five does not go into 3. You can put zero in the quotient. Five does go into 35, seven times.
Explanation: The 2 of 248 is 200 in reality. If you divided 200 by 4, the result would be less than 100, so that is why the quotient will not have any whole hundreds. Then you combine the 2 hundreds with the 4 tens. That makes 24 tens, and you CAN divide 24 tens by 4. The result, 6 tens goes as part of the quotient. Check the final answer: 4 × 62 = 248.	**Explanation:** 3,000 ÷ 5 will not give any whole thousands to the quotient because the answer is less than 1,000. But 3 thousands and 5 hundreds make 35 hundreds together. You can divide 3,500 ÷ 5 = 700, and place 7 as part of the quotient in the hundreds place. Check the final answer: 5 × 701 = 3,505.
If the divisor does not "go into" the first digit of the dividend, look at the first two digits of the dividend.	

3. Divide. Check your answer by multiplying the quotient and the divisor.

a. 0 4 / 3)1 2 3

b. 4)2 8 4

c. 6)3 6 0

d. 8)2 4 8

e. 2)1 8 4

f. 7)4 2 7

g. 3)1 8 3 3

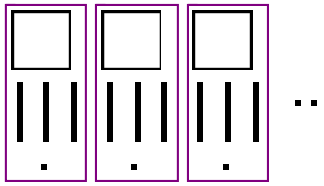
h. 4)2 4 0 4

i. 7)4 9 7 0

j. 5)4 5 0 5

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

The ones division is not even. There is a remainder.



395 ÷ 3 = 131 R2

h t o
1 3
3) 3 9 5

3 goes into 3 one time.
3 goes into 9 three times.

h t o
1 3 1 R2
3) 3 9 5

3 goes into 5 one time, but not evenly.
Write the remainder 2 after the quotient.

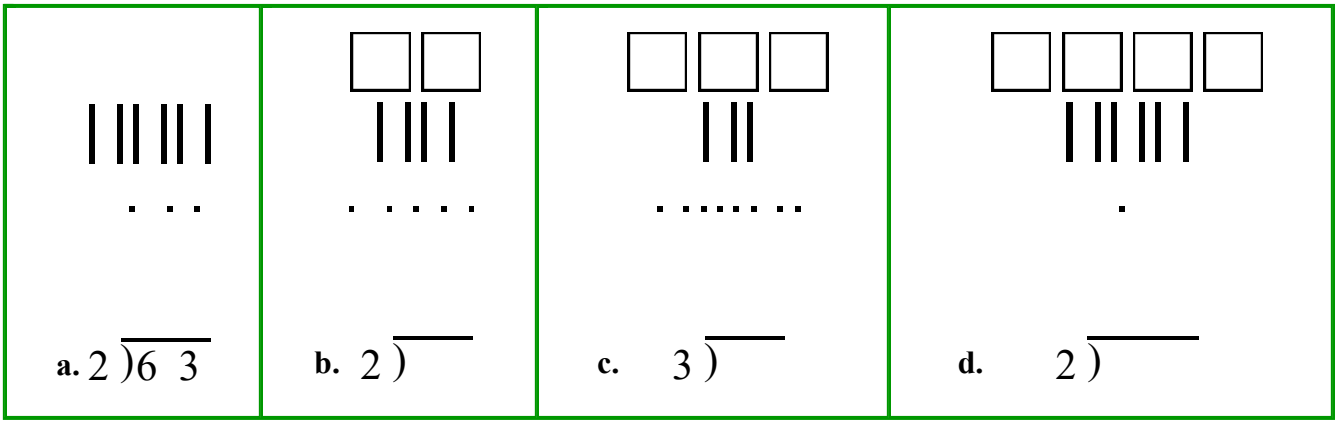
h t o
0 4 1 R1
4) 1 6 5

Four does not go into 1 (hundred). So combine the 1 hundred with the 6 tens (160).
Four goes into 16 four times.
Four goes into 5 once, with a remainder of 1.

th h t o
0 4 0 0 R7
8) 3 2 0 7

Eight does not go into 3 of the thousands. So combine the 3 thousands with the 2 hundreds (3,200).
Eight goes into 32 four times (3,200 ÷ 8 = 400)
Eight goes into 0 zero times (tens).
Eight goes into 7 zero times, with a remainder of 7.

4. Divide into groups. Find the remainder.



5. Divide. Indicate the remainder if any.

a. 4)8 4 7 **b.** 2)6 9 **c.** 3)3 6 7 **d.** 4)8 9

e. 2)1 2 1 **f.** 6)1 8 0 5 **g.** 7)2 1 5 **h.** 8)2 4 8 2

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

In the problems before, you just wrote down the remainder of the ones. Usually, we write down the subtraction that actually finds the remainder. Look carefully:

h t o 0 6 1 4) 2 4 7 − 4 3 When dividing the ones, 4 goes into 7 one time. Multiply 1 × 4 = 4, write that four under the 7, and subtract. This finds us the remainder of 3. Check: 4 × 61 + 3 = 247	th h t o 0 4 0 2 4) 1 6 0 9 − 8 1 When dividing the ones, 4 goes into 9 two times. Multiply 2 × 4 = 8, write that eight under the 9, and subtract. This finds us the remainder of 1. Check: 4 × 402 + 1 = 1,609

6. Practice some more. Subtract to find the remainder in the ones. Check your answer by multiplying the divisor times the quotient, and then adding the remainder. You should get the dividend.

a. $3\overline{)128}$

b. $3\overline{)95}$

c. $6\overline{)4267}$

d. $4\overline{)2845}$

e. $5\overline{)5507}$

f. $2\overline{)8063}$

7. Divide these numbers mentally. Remember, you can always check by multiplying!

a. 440 ÷ 4 = 820 ÷ 2 =	**b.** 3600 ÷ 400 = 369 ÷ 3 =	**c.** 824 ÷ 2 = 560 ÷ 90 =

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

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

Divisibility

A number ***n*** is **divisible** by another number ***m***, if the division ***n*** ÷ ***m*** is exact (no remainder).

For example, 18 ÷ 3 = 6, so 18 is divisible by 3.

Also, 18 is divisible by 6, because we can write the other division 18 ÷ 6 = 3.
So, 18 is divisible by *both* 6 and 3. We say 6 and 3 are **divisors** of 18.

You can use long division to check if a number is divisible by another.

For example, 67 ÷ 4 = 16, R3. There is a remainder, so 67 is *not* divisible by 4.

Also, from this we learn that neither 4 nor 16 are divisors of 67.

```
  16
4)67
 -4
  27
 -24
   3
```

1. Divide and determine if the number is divisible by the other number.

a. 21 ÷ 3 = _____ Is 21 divisible by 3?	**b.** 40 ÷ 6 = _____ Is 40 divisible by 6?	**c.** 17 ÷ 5 = _____ Is 5 a divisor of 17?	**d.** 84 ÷ 7 = _____ Is 7 a factor of 84?

2. Answer the questions. You may need long division.

a. Is 98 divisible by 4?

b. Is 603 divisible by 7?

c. Is 3 a factor of 1,256?

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

In any multiplication, the numbers that are multiplied are called **factors** and the result is called a **product**.

factor		factor		product
7	×	6	=	42

For example, since 6 × 7 = 42, 6 and 7 are **factors** of 42.

From this multiplication fact we can write two divisions: 42 ÷ 6 = 7 and 42 ÷ 7 = 6. So, this means that 6 and 7 are also divisors of 42.

From this we can notice the following:

If a number is a factor of another number, it is also its divisor.

There is yet one more new word to learn that ties in with all of this: **multiple**.

We say **42 is a multiple of 6**, because 42 is some number times 6 (namely 7 × 6).

And of course 42 is also a multiple of 7, because 42 is some number times 7 (namely, 6 × 7)!

3. Fill in.

We know that 8 × 9 = 72. So, 8 is a _____ of 72, and so is 9.

Also, 72 is a _____ of 8, and 72 is a _____ of 9.

And, 72 is _____ by 8 and by 9.

4. Fill in.

a. Is 5 a factor of 55? Yes, because ____ ÷ ____ = _____.	**b.** Is 8 a divisor of 45? No, because ____ ÷ ____ = _____.
c. Is 36 a multiple of 6? _____, because ____ ÷ ____ = _____.	**d.** Is 34 a multiple of 7? _____, because ____ ÷ ____ = _____.
e. Is 7 a factor of 46? _____, because _____.	**f.** Is 63 a multiple of 9? _____, because _____.

Multiples of 6 are all those numbers we get when we multiply 6 by other numbers. For example, we can multiply 0 × 6, 7 × 6, 11 × 6, 109 × 6, and so on. The resulting numbers are all multiples of six.

In fact, the skip-counting pattern of 6 gives us a list of multiples of 6:

0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, and so on.

5. **a.** Make a list of multiples of 11, starting at 0 and continue at least to 154.

b. Make a list of multiples of 111, starting at 0. Continue as long as you can in this space!

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

Divisibility by 2

Numbers that are divisible by 2 are called **even** numbers.
Numbers that are NOT divisible by 2 are called **odd** numbers.

Even numbers end in 0, 2, 4, 6, or 8. Every second number is even.

Divisibility by 5

Numbers that end in 0 and 5 are divisible by 5.

For example, 10, 35, 720, and 3,675 are such numbers.

6. Mark an "x" if the number is divisible by 2 or by 5.

number	divisible	
	by 2	by 5
750		
751		
752		
753		
754		

number	divisible	
	by 2	by 5
755		
756		
757		
758		
759		

number	divisible	
	by 2	by 5
760		
761		
762		
763		
764		

number	divisible	
	by 2	by 5
765		
766		
767		
768		
769		

Divisibility by 10

Numbers that end in 0 are divisible by 10.

For example, 10, 60, 340, and 2,570 are such numbers.

7. Mark an "x" if the number is divisible by 2, by 5, or by 10.

number	divisible		
	by 2	by 5	by 10
860			
861			
862			
863			
864			

number	divisible		
	by 2	by 5	by 10
865			
866			
867			
868			
869			

number	divisible		
	by 2	by 5	by 10
870			
871			
872			
873			
874			

If a number is divisible by 10, it ends in a zero, so it is ALSO divisible by ____ and ____.

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

8. **a.** Write a list of numbers that are divisible by 2, from 0 to 60.

_____

This is also a list of _____ of 2.

b. In the list above, *underline* those numbers that are divisible by 4.
What do you notice?

c. In the list above, *color* those numbers that are divisible by 6.
What do you notice?

d. Which numbers are divisible by both 4 and by 6?

9. **a.** Write a list of numbers that are divisible by 3, from 0 to 60.

_____

This is also a list of _____ of 3.

b. In the list above, *underline* those numbers that are divisible by 6.
What do you notice?

c. In the list above, *color* those numbers that are divisible by 9.
What do you notice?

10. Use the lists you made in (8) and (9). Find numbers that are divisible by *both* 2 and 9.

11. What number is a factor of every number?

12. Twenty is a multiple of 4. It is also a multiple of 5. It is also a multiple of four other numbers. Which ones?

Who am I?
(Hint: I am less than 50.)

Divided by 9, I leave a remainder of 6.
Divided by 4, I leave a remainder of 1.
Divided by 10, I leave a remainder of 3.

Who am I?
(Hint: I am less than 100.)

I am a multiple of 3, 4, 5, and 6.
I am a factor of 120.
Divided by 7, I leave a remainder of 4.

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

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

Chapter 6: Geometry
Introduction

We start our study of geometry by reviewing the third grade concepts of area and the perimeter of rectangles. Students also apply these concepts in various problems, including problems where they write simple equations and a problem where they explore all possible perimeters for a given area.

Note: Students will need a ruler and a protractor throughout the chapter.

The focus of the chapter is angles. Students learn about lines, rays, and angles; and about acute, right, obtuse, and straight angles. They learn how to measure and draw angles with a protractor. We also study angle problems where students write simple equations. The lesson *Estimating Angles* has an optional section on turning in an angle, which can be challenging, so feel free to omit it if you wish.

The lesson *Parallel and Perpendicular Lines* also ties in with the topic of angles, because two lines are perpendicular if they form a right angle. After that, we study parallelograms and other quadrilaterals in more detail, paying attention to their angles and lengths of sides.

We also study triangles and classify them according to their angles (acute, obtuse, or right triangles). Classifying triangles according to their sides (equilateral, isosceles, or scalene) will be studied in 5th grade. The last (and easy) topic in this chapter is line symmetry.

The lessons include quite a few drawing exercises which can be done on blank paper, in a notebook, or in the worktext (for most). Please stress to the student to always use a ruler and other proper tools, such as a protractor or a triangular ruler, so the drawings will be as accurate as possible. Some exercises may mention to only sketch something, in which case it is okay to not use any drawing tools.

Geometry is full of strange-sounding words. I suggest that student(s) keep a geometry notebook, where they draw picture(s) and text to explain every new concept or term. This will help them to remember those terms. They can also do the drawing exercises in the notebook. Encourage the students to be creative so that the notebook becomes their own special work. You can even give them credit for it.

The Lessons in Chapter 6

	page	span
Review: Area of Rectangles	81	*3 pages*
Problem Solving: Area of Rectangles	84	*2 pages*
Review: Area and Perimeter	86	*4 pages*
Lines, Rays, and Angles	90	*3 pages*
Measuring Angles	93	*7 pages*
Drawing Angles	100	*2 pages*
Estimating Angles	102	*5 pages*
Angle Problems	107	*5 pages*
Parallel and Perpendicular Lines	112	*5 pages*
Parallelograms	117	*3 pages*
Triangles	120	*4 pages*
Line Symmetry	124	*3 pages*
Mixed Review Chapter 6	127	*2 pages*
Review Chapter 6	129	*4 pages*

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

Helpful Resources on the Internet

AREA AND PERIMETER

Free Worksheets for Area and Perimeter
Create worksheets for the area and the perimeter of rectangles/squares with images, word problems, or problems where the student writes an expression for the area using the distributive property.
https://www.homeschoolmath.net/worksheets/area_perimeter_rectangles.php

Area and Perimeter Dominoes
Match your domino tiles with domino tiles on the "table" that have the same value in this fun, interactive two-player game
https://www.turtlediary.com/game/calculating-area-and-perimeter.html

Shape Explorer
Find the perimeter and area of odd shapes on a rectangular grid.
http://www.shodor.org/interactivate/activities/ShapeExplorer/

Math Playground: Party Designer
You need to design areas for the party, such as a crafts table, food table, seesaw, and so on, so that they have the given perimeters and areas.
https://www.mathplayground.com/PartyDesigner/index.html

Area and Perimeter Builder
Create your own rectangular shapes using colorful blocks and explore the relationship between perimeter and area. You can choose to show the side lengths to understand how a perimeter works. You can also use two work areas (grids) to compare the area and perimeter of two shapes side-by-side. Lastly, challenge yourself in the game screen to build shapes or find the area of various figures.
http://phet.colorado.edu/sims/html/area-builder/latest/area-builder_en.html

Geometry Area/Perimeter Quiz from ThatQuiz.org
An online quiz, about the area and perimeter of rectangles, triangles, and trapezoids. You can modify the quiz parameters to your liking, for example to omit a certain shape, or instead of solving for perimeter/area, you solve for an unknown side when the perimeter/area is given.
http://www.thatquiz.org/tq-4/?-j1200b-lc-p0

Area: Missing Side Length Quiz
Practice finding the value of the unknown side in this 10-question quiz.
http://www.thatquiz.org/tq-4/?-j8001-lc-p0

Area and Perimeter of Rectangles and Squares
A 10-question quiz with varying questions concerning the area and perimeter of rectangles and squares.
https://www.ck12.org/assessment/ui/?test/view/practice/geometry/square-and-rectangle-area-and-perimeter-practice

ANGLES

Angles and Their Measures Matching Game
Practice matching angles to their angle measures in this interactive online game.
https://www.mathmammoth.com/practice/angles-matching

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

Online Protractor
Investigate angles and the use of protractors.
https://web.archive.org/web/20180219193040/http://www.amblesideprimary.com/ambleweb/mentalmaths/protractor.html

Measuring Angles
Practice measuring angles with a protractor.
https://www.mathplayground.com/measuringangles.html

Draw Angles - Khan Academy
Use a protractor to construct angles.
https://www.khanacademy.org/math/on-sixth-grade-math/on-geometry-spatial-sense/on-angles-polygons/e/drawing-angles

Topmarks - Angles activity
Squirt the dog with water by dragging the correct angle onto the screen.
http://www.topmarks.co.uk/Flash.aspx?b=maths/angles

Fruit Picker
Try to pick 6 apples in 6 shots by turning at the correct angle.
http://www.fruitpicker.co.uk/activity/

Estimating Angles
Estimate the target angle. The closer you get to the target angle the more points you will score.
https://nrich.maths.org/1235

Draw Perpendicular and Parallel Lines - Interactive
Learn about perpendicular and parallel lines and practice drawing them.
https://www.mathsisfun.com/perpendicular-parallel.html

Parallel and Perpendicular Lines in Shapes Quiz
Classify the lines as parallel, perpendicular, or neither.
https://www.studyladder.com/games/activity/parallel-and-perpendicular-lines-in-shapes-28459

Turtle Pond
Guide a turtle to a pond using commands, which include turning him in certain angles or moving him a specific distance.
http://illuminations.nctm.org/Activity.aspx?id=3534

SHAPES / POLYGONS

Polygon Matching Game
Learn all the common polygons by playing this fun, timed matching game.
https://www.mathplayground.com/matching_shapes.html

Polygon Vocabulary
A matching game.
http://www.quia.com/cc/2758.html

Interactive Quadrilaterals
See all the different kinds of quadrilaterals "in action". You can drag the corners, see how the angles change, and observe what properties do not change.
https://www.mathsisfun.com/geometry/quadrilaterals-interactive.html

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

Interactive Parallelogram
Drag the parallelogram and learn about its properties, angles, and sides.
http://www.mathwarehouse.com/geometry/quadrilaterals/parallelograms/interactive-parallelogram.php

Interactive Triangles Tool
Read about triangles, and then play with them to become familiar with them from all angles.
https://www.mathsisfun.com/geometry/triangles-interactive.html

Triangles Splat
"Shoot" the triangles as their names appear on the screen. Choose "Right, Acute, Obtuse".
http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/triangles_shoot.htm

Classifying Triangles Drag-and-Drop Game
Drag each triangle in the correct basket before the time runs out!
http://www.math-play.com/classifying-triangles/Triangles-Drag-and-Drop-Game.html

Lines of Symmetry
Match the corresponding lines of symmetry.
http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/SymmetryLinesShapesShoot.htm

Symmetry Shapes Shoot
Practice identifying symmetrical shapes by clicking on them.
http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/SymmetryShapesShoot.htm

Line Shoot
Learn about lines of symmetry the fun way in this line-shoot geometry math game.
http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/line_shoot.htm

GENERAL

Interactivate! Tessellate
An online, interactive tool for creating your own tessellations. Choose a shape, then edit its corners or edges. The program automatically changes the shape so that it will tessellate (tile) the plane. Then push the tessellate button to see your creation!
http://www.shodor.org/interactivate/activities/Tessellate

Patch Tool
An online activity where the student designs a pattern using geometric shapes.
http://illuminations.nctm.org/Activity.aspx?id=3577

Polygon Playground
Drag various colorful polygons to the work area to make your own creations!
http://www.mathcats.com/explore/polygons.html

Geometry Worksheets
Worksheets about complementary and supplementary angles, parallel, perpendicular, and intersecting lines, types of angles, basic shapes, area and perimeter of rectangles, and parts of a circle.
http://www.dadsworksheets.com/worksheets/basic-geometry.html

Space Logic
Write a program that will guide the space rover to its target. Watch out for the boulders!
https://www.mathplayground.com/space_logic.html

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

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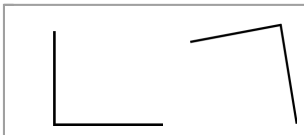
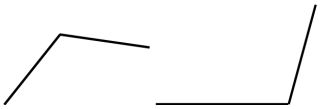
Sample worksheet from
https://www.mathmammoth.com

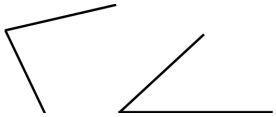
Triangles



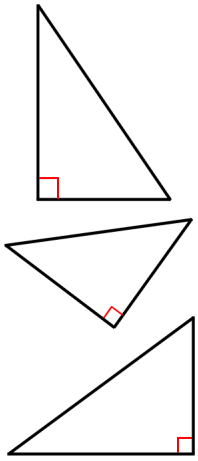
right angles
(exactly 90°)



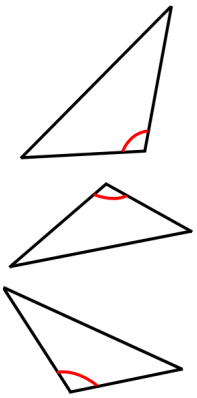
obtuse angles
(more than 90°, less than 180°)



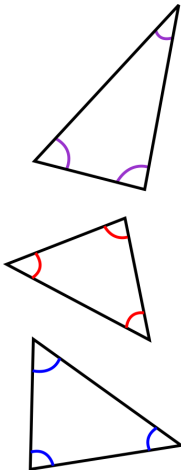
acute angles
(less than 90°)



Right triangles have exactly one right angle.



Obtuse triangles have exactly one obtuse angle.



Acute triangles have three acute angles. In other words, *all* the angles are acute.

1. **a.** Draw a right *angle*. Then make it into a right *triangle* by drawing in the third side.

   b. Draw another, different right triangle.

   c. A right triangle has one right angle. Are the other two angles in a right triangle acute, right, or obtuse?

A right triangle has one right angle. The other two angles are _____.

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

2. **a.** Draw an obtuse angle. Then make it into an obtuse triangle by drawing in the third side.

b. Draw another, different obtuse triangle.

c. An obtuse triangle has one obtuse angle. Are the other two angles in an obtuse triangle acute, right, or obtuse?

An obtuse triangle has one obtuse angle. The other two angles are _____.

3. **a.** Draw any acute triangle.

b. Measure its angles.

They measure _____°,

_____°, and _____°.

4. Observe all that you have done in this lesson thus far, and fill in the blanks below.

Right triangles have exactly one _____ _____,

and the other two angles are _____ .

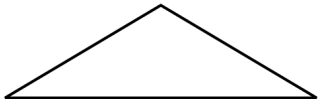
Obtuse triangles have exactly one _____ _____,

and the other two angles are _____ .

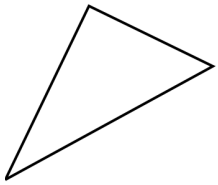
Acute triangles have ___ _____ angles.

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

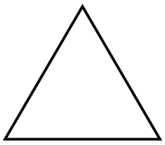
5. Label the triangles in the pictures as right, acute, or obtuse.



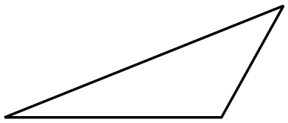
a.



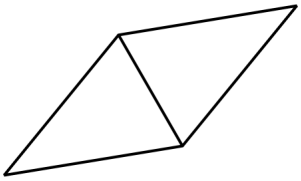
b.



c.



d.



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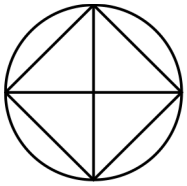
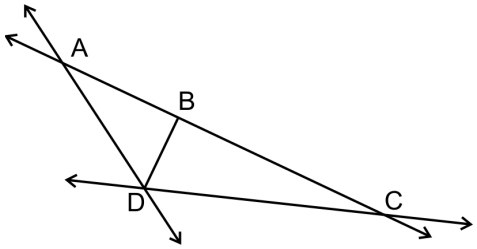


f.



g. triangle ABD:

triangle ACD:

triangle BCD:

6. Label the triangles in the pictures as right, acute, or obtuse.

a. National Museum of Marine Corps
Photo by Ron Cogswell

_____

b. The City Center of Woburn, MA
Photo by Randy Robertson

_____

c. The White House
Photo by Glyn Lower

_____

d. Waterlily
Photo by Francis Chung

_____

e. Warning of a steep hill ahead
Photo by www.flickr.com/photos/shirokazan/

The black triangle is _____

The red triangle is _____

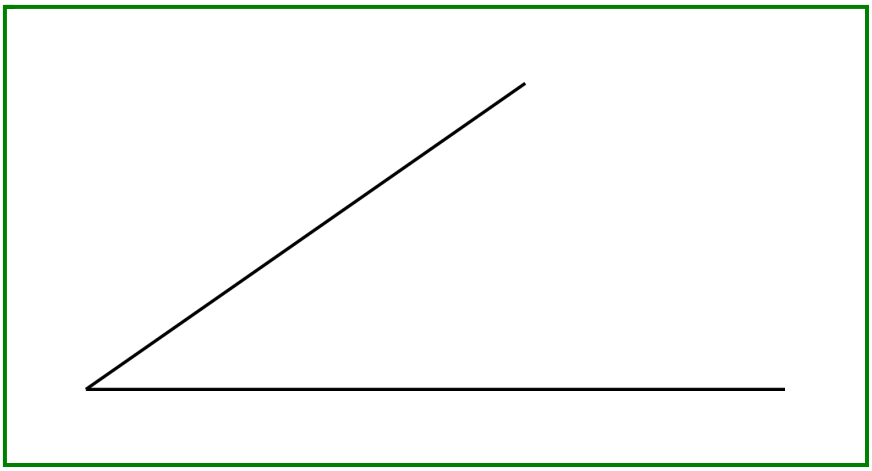
Find acute, obtuse, and right triangles outside in nature, in buildings, in signs, and so on!

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

7. **a.** Draw a triangle with 35° and 40° angles. The 35° angle is already drawn for you. .

   b. Measure the third angle. It is _____ degrees.

   c. What kind of triangle is it? (acute, right, obtuse)



8. **a.** Draw a triangle with 125° and 40° angles.

   b. Measure the third angle. It is _____ degrees.

   c. What kind of triangle is it? (acute, right, obtuse)

9. **a.** Draw a triangle with 55° and 35° angles.

   b. Measure the third angle. It is _____ degrees.

   c. What kind of triangle is it? (acute, right, obtuse)

New Terms	
• *an acute triangle*	• *an obtuse triangle*
• *a right triangle*	

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

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

Chapter 7: Fractions
Introduction

In third grade, students have studied equivalent fractions and compared some easy fractions. In fourth grade, it is time to expand their knowledge of fraction topics. We study:

- mixed numbers
- adding and subtracting like fractions and mixed numbers with like fractional parts (sums where the denominators are the same, such as 5/6 + 3/6 or 1 2/3 + 2 1/3)
- equivalent fractions (for example, 2/3 = 8/12)
- comparing fractions
- multiplying a fraction by a whole number (for example 5 × ½)

Then in fifth grade, students tackle *all* four operations with fractions. This chapter is laying groundwork for that. The lessons here are important also because they are the basis for understanding decimal numbers, which is the topic of the next chapter.

In this grade, we continue studying fractions and their operations with the help of visual models. In addition to the visuals in the lessons, you can optionally also use fraction manipulatives, but they are not required.

Visual models help children build a strong conceptual understanding of fraction operations. While we do study some actual rules of fraction arithmetic in this chapter, we also want to avoid presenting fraction math as a list of computational rules to be learned by rote memory. If students only memorize these rules, then they will also easily confuse them (eventually), because there are so many of them. The rules become *shortcuts* for ideas that are already understood, but we don't want to start with them. The goal is to let the ideas and concepts "sink in" first, and then study the shortcuts.

A friendly reminder: don't automatically assign all the exercises. As always, use your judgment.

The Lessons in Chapter 7

	page	span
One Whole and Its Fractional Parts	137	*3 pages*
Mixed Numbers	140	*4 pages*
Mixed Numbers and Fractions	144	*3 pages*
Adding Fractions	147	*2 pages*
Adding Mixed Numbers	149	*3 pages*
Equivalent Fractions	152	*5 pages*
Subtracting Fractions and Mixed Numbers	157	*4 pages*
Comparing Fractions	161	*4 pages*
Multiplying Fractions by Whole Numbers	165	*3 pages*
Practicing With Fractions	168	*2 pages*
Mixed Review Chapter 7	170	*2 pages*
Review Chapter 7	172	*2 pages*

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

Helpful Resources and Games on the Internet

FRACTIONS AND MIXED NUMBERS

Identifying Fractions at Conceptua Fractions
A tool that shows fractions or mixed numbers using a pie, a bar, dots, and a number line.
https://www.conceptuamath.com/app/tool/identifying-fractions

Number Bonds - Fractions
Combine balls whose fractions add to one.
https://www.mathplayground.com/number_bonds_fractions.html

Puzzle Pics Fractions
Reveal the mystery picture by dragging each puzzle piece to the number line that illustrates the fraction.
http://www.mathplayground.com/puzzle_pics_fractions.html

Animal Rescue: Fractions Number Line Game
Find and free the trapped animals by moving the arrow to the correct place on the number line.
http://www.sheppardsoftware.com/mathgames/fractions/AnimalRescueFractionsNumberLineGame.htm

Clara Fraction's Ice Cream Shop
Convert improper fractions into mixed numbers, and scoop the right amount of ice cream flavors onto the cone for your customers.
https://mrnussbaum.com/clara-fraction-s-ice-cream-shop-online-game

Mixed Numbers and Improper Fractions
Practice converting mixed numbers to improper fractions.
https://www.mathplayground.com/fractions_mixed.html

ADDITION AND SUBTRACTION

Adding of Like Fractions with Circle Models
Practice adding fractions with the help of a visual model.
http://www.visualfractions.com/AddEasyCircle/addcircles.html

Fractions Workshop
Choose "Add mixed fractions with like denominators" in order to practice adding mixed numbers.
https://mrnussbaum.com/fraction-workshop-online

Action Fraction
A racing game with several levels where you add and subtract fractions. The levels advance from using like fractions to using unlike fractions and eventually subtraction.
http://solvemymath.com/math_games/arithmetic_games/action_fraction/

Add Mixed Numbers: 10-Question Quiz
Practice adding mixed numbers. Express the answer as a mixed fraction in lowest terms.
http://www.thatquiz.org/tq-3/?-j301-l1-p0

Fraction Game
Move the markers on the fraction number line from left to right according to the given fraction cards.
http://illuminations.nctm.org/Activity.aspx?id=4148

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

Four-Sum Fractions Board Game
Practice adding and simplifying fractions with common denominators. Be the first player to score four in a row!
http://www.learn-with-math-games.com/fraction-math-games.html

Subtracting Mixed Numbers with Borrowing
Perform subtraction calculations using borrowing with mixed number fractions.
https://www.wisc-online.com/learn/formal-science/mathematics/abm701/subtracting-mixed-number-fractions-with-borro

Subtracting Mixed Fractions Quiz
Practice subtracting mixed fractions in this multiple-choice quiz. Drag and drop corresponding answers.
http://www.fractions4kids.com/subtracting-mixed-fractions-quiz/

Fruit Shoot Fractions Addition
Click the fruit with the correct answer. To match the topics students learn in this section, choose adding 2 or 3 fractions with like denominators. You can also choose your mode (untimed or timed) and speed (slow versus fast fruit).
http://www.sheppardsoftware.com/mathgames/fractions/FruitShootFractionsAddition.htm

Fraction Worksheets: Addition and Subtraction
Create custom-made worksheets for the four operations with fractions and mixed numbers. Choose "Like Fractions" for this level.
https://www.homeschoolmath.net/worksheets/fraction.php

EQUIVALENT FRACTIONS

Equivalent Fractions
Draw two equivalent fractions for the given fraction. Choose either a square or a circle for the shape.
http://illuminations.nctm.org/Activity.aspx?id=3510

Fresh Baked Fractions
Practice equivalent fractions by clicking on a fraction that is not equal to the others.
http://www.funbrain.com/fract/index.html

Fishy Fractions
Feed Ulani the pelican by choosing the fish with the correct equivalent fraction.
https://web.archive.org/web/20190901123002/http://streaming.discoveryeducation.com/braingames/iknowthat/Fractions/FractionGame.cfm?Topic=namematch

Free Equivalent Fractions Worksheets
Create custom-made worksheets for equivalent fractions that can either include pie images or not.
https://www.homeschoolmath.net/worksheets/equivalent_fractions.php

COMPARING FRACTIONS

Comparison Shoot Out
Choose level 2 or 3 to compare fractions and shoot the soccer ball to the goal.
http://www.fuelthebrain.com/games/comparison-shootout/

Comparing Fractions—XP Math
Simple timed practice for comparing two fractions.
http://xpmath.com/forums/arcade.php?do=play&gameid=8

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

Ordering Fractions at Conceptua Fractions
An interactive tool where students place numbers, visual models, and decimals on a number line.
https://www.conceptuamath.com/app/tool/comparing-fractions

Ordering Fractions
Drag the fractions into the right order, from lowest to highest.
http://www.topmarks.co.uk/Flash.aspx?b=maths/fractions

Dirt Bike Comparing Fractions
Play tug of war while practicing comparing fractions in this interactive online game.
https://www.arcademics.com/games/dirt-bike-comparing-fractions

MULTIPLYING FRACTIONS

Multiplying Fractions with Circle Models
This page illustrates fraction multiplication with circle models.
http://www.visualfractions.com/MultiplyCircle/

Multiply Fractions by Whole Numbers
Practice multiplying fractions by whole numbers in this simple online exercise.
http://www.mathgames.com/skill/4.67-multiply-fractions-by-whole-numbers

Multiplying Fractions Concentration
Practice multiplying fractions by whole numbers with this interactive online matching game.
https://www.quia.com/cc/2740524.html

GENERAL

Visual Fractions
Great site for studying all aspects of fractions: identifying, renaming, comparing, addition, subtraction, multiplication, division. Each topic is illustrated with a visual model. Also includes a couple of games.
http://www.visualfractions.com/

Conceptua Math Fraction Tools
Interactive fraction tools for identifying fractions, adding and subtracting, estimating, comparing, equivalent fractions, finding common denominators and more. Each activity uses several visual models, such as fraction circles, horizontal and vertical bars, number lines, etc.
https://www.conceptuamath.com/app/tool-library

Who Wants Pizza?
This site explains the concept of fractions, addition, and multiplication with a pizza example, then has some interactive exercises.
http://math.rice.edu/~lanius/fractions/index.html

Fractioncity
Make “fraction streets” and help children with comparing fractions, equivalent fractions, addition of fractions of like and unlike denominators while they drive toy cars on the streets. This is not an online activity but has instructions of how to do it at home or at school.
http://www.teachnet.com/lesson/math/fractioncity.html

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

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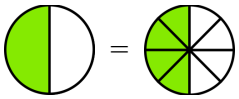
Sample worksheet from
https://www.mathmammoth.com

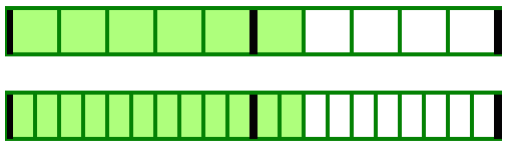
Equivalent Fractions

If you eat half of a pizza, or if you eat 4/8 of a pizza, you have eaten the same amount.



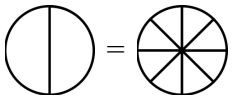
$\frac{1}{2} = \frac{4}{8}$

1/2 and 4/8 are **equivalent fractions**.

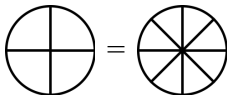


The two fraction strips show an equal amount. So, we can write an equal sign between the two mixed numbers: $1\frac{1}{5} = 1\frac{2}{10}$.

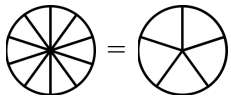
1. Color the first fraction. Shade the same amount of pie in the second picture. Write the second fraction.



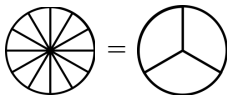
a. $\frac{1}{2} =$



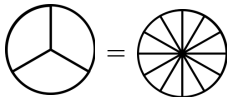
b. $\frac{3}{4} =$



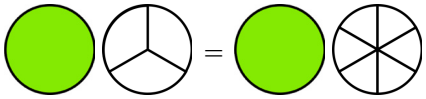
c. $\frac{6}{10} =$



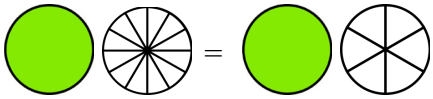
d. $\frac{8}{12} =$



e. $\frac{1}{3} =$

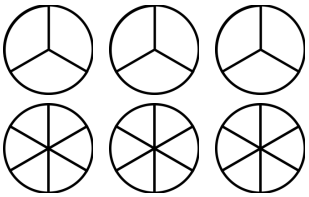


f. $1\frac{2}{3} =$



g. $1\frac{10}{12} =$

2. Write the fractions that have thirds using sixths instead. You can shade parts in the pictures.



a. $\frac{3}{3} =$

b. $\frac{4}{3} =$

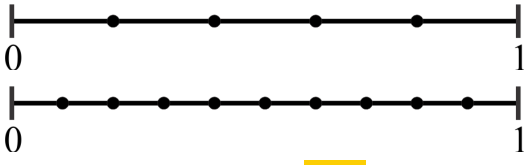
c. $\frac{7}{3} =$

d. $2\frac{1}{3} =$

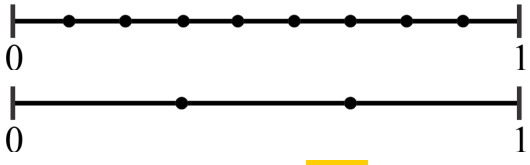
e. $1\frac{2}{3} =$

f. $2\frac{2}{3} =$

3. Mark the equivalent fractions on the number lines.



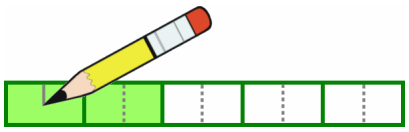
a. $\frac{4}{5} =$



b. $\frac{3}{9} =$

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

Example 1. The fraction strip illustrates $\frac{2}{5}$. If you split each piece (both the colored and white pieces) into *two* new pieces, what fraction do you get?



You get $\frac{4}{10}$: four colored pieces, and ten pieces total.

You have *two* times as many colored pieces, and *two* times as many total pieces as before.

4. Split both the colored and white pieces as instructed. Write the fraction after you change it.

a. Split all the pieces into two new ones.

$\frac{1}{2} = \frac{\quad}{\quad}$

b. Split all the pieces into four new ones.

$\frac{1}{2} = \frac{\quad}{\quad}$

c. Split all the pieces into three new ones.

$\frac{1}{4} = \frac{\quad}{\quad}$

d. Split all the pieces into three new ones.

$\frac{1}{3} = \frac{\quad}{\quad}$

e. Split all the pieces into two new ones.

$\frac{5}{6} = \frac{\quad}{\quad}$

f. Split all the pieces into three new ones.

$\frac{2}{5} = \frac{\quad}{\quad}$

Do you notice a *shortcut* for finding the second fraction?

g. Split all the pieces into four new ones.

$\frac{\quad}{\quad} = \frac{\quad}{\quad}$

h. Split all the pieces into two new ones.

$\frac{\quad}{\quad} = \frac{\quad}{\quad}$

i. Split all the pieces into three new ones.

$\frac{\quad}{\quad} = \frac{\quad}{\quad}$

If you found the shortcut, explain how it works in these problems:

Split all the pieces into three new ones.

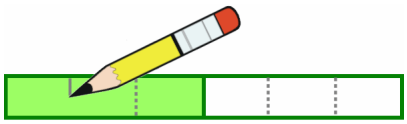
$\frac{1}{3} = \frac{\quad}{\quad}$

Split all the pieces into two new ones.

$\frac{3}{5} = \frac{\quad}{\quad}$

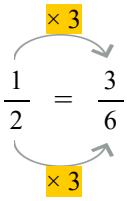
Sample worksheet from https://www.mathmammoth.com

Example 2. The fraction strip illustrates $\frac{1}{2}$. If we split each piece into *three* new pieces, we get $\frac{3}{6}$.



Now we have *three* times as many colored pieces, and *three* times as many pieces in total as we had before. Look at the right side of this box, to see how we can illustrate it this way →

We multiply both the top and bottom number in a fraction by 3. We get an equivalent fraction—it is the same amount, just cut into more pieces. *This does not mean we multiply the whole fraction by 3.*



5. Split the pieces. Fill in the missing parts.

a. This is $\frac{3}{4}$. Make it $\frac{9}{12}$.

Each piece is split into ____ new ones.

$\frac{3}{4} = \frac{9}{12}$ (× ____ / × ____)

b. This is $\frac{1}{3}$. Make it $\frac{4}{12}$.

Each piece is split into ____ new ones.

$\frac{1}{3} = \frac{4}{12}$ (× ____ / × ____)

c. This is $\frac{1}{2}$. Make it $\frac{5}{10}$.

Each piece is split into ____ new ones.

$\frac{1}{2} = \frac{5}{10}$ (× ____ / × ____)

d. This is $\frac{1}{4}$. Make it $\frac{4}{16}$.

$\frac{1}{4} = \frac{4}{16}$ (× ____ / × ____)

e. This is $\frac{2}{3}$. Make it $\frac{6}{9}$.

$\frac{2}{3} = \frac{6}{9}$ (× ____ / × ____)

f. This is $\frac{2}{3}$. Make it $\frac{8}{12}$.

$\frac{2}{3} = \frac{8}{12}$ (× ____ / × ____)

g.

$\frac{4}{5} = \frac{\square}{10}$ (× ____ / × ____)

h.

$\frac{2}{3} = \frac{\square}{15}$ (× ____ / × ____)

i.

$\frac{2}{5} = \frac{\square}{15}$ (× ____ / × ____)

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

6. Write the equivalent fraction. Use multiplication.

a. Split all the pieces into three new ones.	**b.** Split all the pieces into five new ones.	**c.** Split all the pieces into four new ones.	**d.** Split all the pieces into ten new ones.
$\frac{5}{6} = \frac{\square}{\square}$	$\frac{3}{4} = \frac{\square}{\square}$	$\frac{2}{5} = \frac{\square}{\square}$	$\frac{9}{10} = \frac{\square}{\square}$

7. Figure out how many new pieces the existing pieces were split into. Fill in the missing parts.

a. Pieces were split into ____ new ones.	**b.** Pieces were split into ____ new ones.	**c.** Pieces were split into ____ new ones.	**d.** Pieces were split into ____ new ones.
$\frac{1}{2} = \frac{\square}{6}$	$\frac{3}{10} = \frac{30}{\square}$	$\frac{2}{5} = \frac{\square}{30}$	$\frac{7}{8} = \frac{35}{\square}$
e. $\frac{2}{3} = \frac{\square}{6}$	**f.** $\frac{3}{5} = \frac{9}{\square}$	**g.** $\frac{5}{6} = \frac{\square}{12}$	**h.** $\frac{1}{3} = \frac{\square}{9}$

8. Write the fractions that have tenths with hundredths instead.

a. $\frac{1}{10} = \frac{\square}{100}$	**b.** $\frac{3}{10} =$	**c.** $\frac{6}{10} =$	**d.** $\frac{4}{10} =$	**e.** $\frac{13}{10} =$

9. Connect the equivalent fractions with a line.

a.		**b.**		**c.**	
$\frac{2}{3}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{2}{10}$	$\frac{3}{6}$	$\frac{3}{12}$
$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{2}$
$\frac{5}{10}$	$\frac{2}{8}$	$\frac{1}{5}$	$\frac{6}{12}$	$\frac{1}{3}$	$\frac{8}{12}$
$\frac{2}{6}$	$\frac{6}{9}$	$\frac{4}{12}$	$\frac{9}{12}$	$\frac{2}{3}$	$\frac{4}{12}$

10. Write chains of equivalent fractions!

a. $\frac{1}{2} = \frac{\square}{4} = \frac{\square}{6} = \frac{\square}{8} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$	**b.** $\frac{1}{3} = \frac{\square}{6} = \frac{\square}{9} = \frac{\square}{12} = \frac{\square}{\square}$

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We can use equivalent fractions to add fractions that have different denominators.

Example 3. Add $\frac{2}{10} + \frac{17}{100}$. First, write 2/10 as 20/100 (an equivalent fraction).

Then you can add, because the fractions now have the same denominator: $\frac{20}{100} + \frac{17}{100} = \frac{37}{100}$.

11. Add.

a. $\frac{1}{10} + \frac{8}{100}$ $\downarrow \quad \downarrow$ $\frac{\square}{100} + \frac{8}{100} =$	**b.** $\frac{7}{10} + \frac{3}{100}$ $\downarrow \quad \downarrow$ $\frac{\square}{100} + \frac{\square}{100} =$	**c.** $\frac{45}{100} + \frac{3}{10}$
d. $\frac{9}{10} + \frac{9}{100}$	**e.** $\frac{7}{10} + \frac{23}{100}$	**f.** $\frac{24}{100} + \frac{9}{10}$
g. $\frac{7}{100} + 1\frac{4}{10}$	**h.** $2\frac{28}{100} + 1\frac{5}{10}$	**i.** $\frac{6}{10} + \frac{35}{100} + \frac{7}{100}$

12. Draw a picture showing that 1/3 and 4/12 are equivalent fractions.

Puzzle Corner

Add. This is challenging. *Hint: You cannot simply add the top numbers and the bottom numbers. Use equivalent fractions.*

a. $\frac{3}{4} + \frac{1}{2}$	**b.** $\frac{1}{5} + \frac{3}{10}$	**c.** $\frac{2}{3} + \frac{2}{9}$

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Chapter 8: Decimals
Introduction

In fourth grade, students learn about decimal numbers that have one or two decimal digits, and they learn to add and subtract them. It is important to grasp these simple topics well because we are laying a groundwork for fifth and sixth grades where decimal operations take "center stage."

The focus is, first of all, on understanding that decimals are simply fractions with a denominator of 10 or 100. Then with that in mind, we study comparing, adding, and subtracting them.

Take note of this common misconception that students have. Many students add 0.5 + 0.9 = 0.14. The correct way to view 0.5 + 0.9 is as 5 tenths plus 9 tenths, which is 14 tenths = 1.4.

An example of another misconception is when a student adds 0.5 + 0.11 = 0.16. This student is thinking of the decimal parts as if they were "whole numbers" and adding 5 + 11 = 16. To solve 0.5 + 0.11 correctly, students can rewrite 0.5 as 0.50, and then the problem becomes 0.50 + 0.11 = 0.61.

In the lesson *Using Decimals with Measuring Units*, students encounter decimals in connection with metric units, such as 0.1 km or 2.4 kg, and they also convert between the units, such as writing 0.5 km as 500 m. This topic will be studied further in 5th grade.

The Lessons in Chapter 8

	page	span
Decimal Numbers—Tenths	177	*2 pages*
Adding and Subtracting with Tenths	179	*2 pages*
Two Decimal Digits—Hundredths	181	*4 pages*
Add and Subtract Decimals in Columns	185	*3 pages*
Add and Subtract Decimals Mentally	188	*4 pages*
Using Decimals with Measuring Units	192	*2 pages*
Mixed Review Chapter 8	194	*2 pages*
Review Chapter 8	196	*2 pages*

Helpful Resources on the Internet

Fractions & Decimals Matching Game
Practice converting fractions to decimals while also uncovering a hidden picture in this fun matching game!
https://www.mathmammoth.com/practice/fractions-decimals

Decimal Place Value - Hundredths
Practice identifying numbers that have two decimal digits with this interactive multiple-choice quiz.
http://www.henryanker.com/Math/Number_Sense/Writing_Numbers/Writing_Decimals_100ths.swf

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

Modeling Decimals (Area and Grid Models)
An interactive "gizmo" for modeling decimals in a grid or on a number line. It is by subscription, but you can try the gizmo for 5 minutes for free.
http://www.explorelearning.com/index.cfm?method=cResource.dspDetail&ResourceID=1007

Decimals on a Number Line
This multiple-choice quiz asks questions about the position of letters on the number line.
http://www.henryanker.com/Math/Fractions/Number_Line_Fractions_Decimals/Decimals_on_Number_Line_1.swf

Printable Math Puzzles
This page has several brain teasers and puzzles which will help the student apply and practice their math skills to solve a range of challenges and number problems.
https://www.math-salamanders.com/printable-math-puzzles.html

Decimal Challenge
Guess the decimal number between 0 and 10. Each time you get a response that tells whether your guess was too high or too low.
http://www.interactivestuff.org/sums4fun/decchall.html

Switch
Switch the decimals around until they are in ascending order. Refresh the page from your browser to get another problem to solve.
http://www.interactivestuff.org/sums4fun/switch.html

Scales
Move the pointer to match the decimal number given to you. Refresh the page from your browser to get another problem to solve.
http://www.interactivestuff.org/sums4fun/scales.html

Fraction/Decimal Worksheets
Change fractions to decimal numbers or decimal numbers to fractions.
http://www.homeschoolmath.net/worksheets/fraction-decimal.php

Fraction Snake Game
Arrange the numbers on the snake in order from the largest on the head to the smallest at the tail.
http://www.transum.org/software/SW/fracorder/fraction_order.asp

Rock Hopper
Help the frog reach the other side of the pond by clicking on the rocks that add up to the correct answer.
http://www.eduplace.com/kids/mw/swfs/rockhopper_grade4.html

Bubble Burst
Burst the bubble that has the correct answer to the decimal addition.
http://www.mathnook.com/math/bubbleburst.html

Decimals Quiz
Practice adding and subtracting decimals in this 10-question quiz.
https://www.thatquiz.org/tq-3/?-j163-l5-p0

Decimal Subtraction - Matching
Match each decimal subtraction with the correct answer.
http://www.mathplayground.com/mathgames/decimals/matchingDecimalsMinus.htm

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

Decimal Mania - Addition and subtraction
Practice decimal addition and subtraction with this interactive exercise.
http://cemc2.math.uwaterloo.ca/mathfrog/english/kidz/addsubdec.shtml

Adding Decimals: Hundredths
Practice adding numbers that have two decimal digits in this interactive online activity.
https://www.khanacademy.org/math/arithmetic/arith-decimals/arith-review-add-decimals/e/adding_decimals

Get to the (Decimal) Point Addition and Subtraction card games (pp. 60-63 of the PDF file)
This is a card game with four different variations that practice decimal addition and subtraction.
http://www.pepnonprofit.org/uploads/2/7/7/2/2772238/acing_math.pdf

Decimals Magic Square
Add and subtract decimals to make a "magic square". Add to find a magic sum and subtract to find the missing addends.
http://www.hbschool.com/activity/elab2004/gr4/14.html

Convert units (metrics)
Practice converting between metric units of measurement in this interactive online exercise.
https://www.khanacademy.org/math/cc-fifth-grade-math/imp-measurement-and-data-3/imp-unit-conversion/e/converting-units

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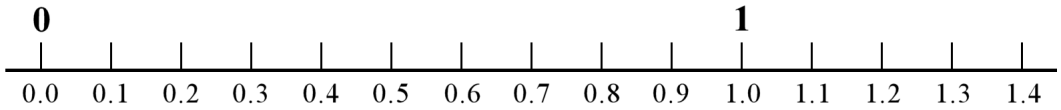
Adding and Subtracting with Tenths

You already know how to add or subtract decimals that have tenths, such as 0.8 + 0.5. They are just fractions with a denominator of 10. Compare the two additions in each box. One of them is written with decimals and the other with fractions.	$0.1 + 0.5 = 0.6$ $\frac{1}{10} + \frac{5}{10} = \frac{6}{10}$	$8.4 - 2.3 = 6.1$ $8\frac{4}{10} - 2\frac{3}{10} = 6\frac{1}{10}$
There is one tricky thing: 0.6 + 0.7 *is* **NOT** 0.13! To see why, add the corresponding fractions. Notice that six-tenths and seven-tenths makes thirteen-tenths, which is more than one!	$0.6 + 0.7 = 1.3$ $\frac{6}{10} + \frac{7}{10} = \frac{13}{10} = 1\frac{3}{10}$	$1.5 + 0.9 = 2.4$ $1\frac{5}{10} + \frac{9}{10} = 2\frac{4}{10}$

1. Write an addition *or* subtraction sentence for each "number-line jump.



a. You are at 0.7, and you jump *five tenths* to the right. _____

b. You are at 0.6, and you jump *eight tenths* to the right. _____

c. You are at 1.1, and you jump *eight tenths* to the left. _____

d. You are at 1.3, and you jump *four tenths* to the left. _____

e. You are at 0.2, and you jump *eleven tenths* to the right. _____

2. Solve the fraction additions, and then write them using decimals.

a. $\frac{2}{10} + \frac{7}{10} =$ *0.2 +*	**b.** $\frac{5}{10} + \frac{6}{10} =$	**c.** $\frac{9}{10} + \frac{8}{10} =$

3. Add or subtract.

a.	**b.**	**c.**	**d.**
0.9 + 0.2 = _____	0.5 + 0.7 = _____	0.8 + 0.7 = _____	1.8 − 0.9 = _____
1.0 + 0.2 = _____	3.5 + 0.7 = _____	0.8 + 2.7 = _____	5.8 − 0.9 = _____

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4. Calculate.

a.	**b.**	**c.**	**d.**
2.3 + 0.9 = _____	1.5 + 0.7 = _____	6.6 − 0.5 = _____	4.7 − 1.7 = _____

5. Write the numbers.

a. 3 tenths, 5 ones

b. 7 tens, 8 ones, 4 tenths

c. 4 tenths, 3 ones, 6 tens

T	O		te
4	**7**	**.**	**5**

In this place value chart, "T" means tens, "O" means ones, and "te" means tenths.

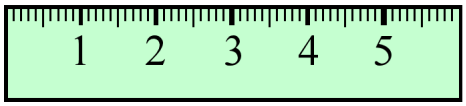
We can see that the number 47.5 has 4 tens, 7 ones, and 5 tenths.

6. Continue the patterns by adding or subtracting the same number repeatedly.

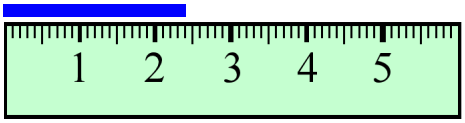
a. 0.1	**b.** 1.1	**c.** 2.5	**d.** 3.6
+ 0.2 = _____	+ 0.5 = _____	+ 0.3 = _____	− 0.4 = _____
+ 0.2 = _____	+ 0.5 = _____	+ 0.3 = _____	− 0.4 = _____
+ 0.2 = _____	+ 0.5 = _____	+ 0.3 = _____	− 0.4 = _____
+ 0.2 = _____	+ 0.5 = _____	+ 0.3 = _____	− 0.4 = _____
+ 0.2 = _____	+ 0.5 = _____	+ 0.3 = _____	− 0.4 = _____
+ 0.2 = _____	+ 0.5 = _____	+ 0.3 = _____	− 0.4 = _____

7. Remember: **1 millimeter is one-tenth of a centimeter.** Or, 1 mm = 0.1 cm.

a. Draw a line that is 4.7 cm long.



b. Measure the line in centimeters. Use a decimal.



8. In (a) and (b), convert. In (c), add and give your answer in centimeters.

a. 0.5 cm = _____ mm

1.2 cm = _____ mm

b. 7 mm = _____ cm

35 mm = _____ cm

c. 5 mm + 0.9 cm = _____ cm

4 cm + 3.4 cm = _____ cm

9. The two sides of a rectangle measure 6.5 cm and 3.6 cm. Draw the rectangle on blank paper. What is its perimeter?

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