math MAMMOTH

Grade 3-A Worktext International Version

Addition and subtraction

Multiplication concept

Multiplication tables

Telling time

Money

Light Blue Series

By Maria Miller

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Foreword

Math Mammoth Grade International Version 3-A and Grade 3-B worktexts comprise a complete maths curriculum for the third grade mathematics studies.

This curriculum is essentially the same as the version of *Math Mammoth Grade 3* sold in the United States (US version), only customised for international use. The US version is aligned to the "Common Core" Standards, so it may not be properly aligned to the second grade standards in your country. However, you can probably find material for any missing topics in neighbouring grades. For example, let's say multiplication tables are studied in grade or year 4 in your country. They are not found in Math Mammoth Grade 4. Instead, you will need to use Math Mammoth Grade 3-A to study them.

The International version of Math Mammoth differs from the US version in these aspects:

- The currency used in the money chapters in grades 1-3 is the Australian dollar. (The download version of this curriculum for grades 1-3 include the chapter on money for British, Canadian, European, New Zealand, South African, and US currencies.)
- The curriculum teaches the metric measurement units. Imperial units, such as inches and pounds, are not used.
- The spelling conforms to British international standards.
- The margins are adjusted for printing on A4-sized paper.

Third grade is a time for learning and mastering two (mostly new) operations: multiplication and division within 100. The student also deepens his understanding of addition and subtraction, and uses those in many different contexts, such as with money, time, and geometry.

The main areas of study in *Math Mammoth Grade 3* are:

1. Students develop an understanding of multiplication and division of whole numbers through problems involving equal-sized groups, arrays, and area models. They learn the relationship between multiplication and division, and solve many word problems involving multiplication and division (chapters 2, 3, and 9).

2. Students develop an understanding of fractions, beginning with unit fractions. They use visual fraction models and study fractions on a number line. Students also compare fractions by using visual fraction models and strategies based on noticing equal numerators or denominators (chapter 10).

3. Students learn the concepts of area and perimeter. They relate area to multiplication and to addition, recognise perimeter as a linear measure (in contrast with area), and solve problems involving area and perimeter (chapter 7).

4. Students fluently add and subtract within 1 000, both mentally and in columns (with regrouping). They learn to add and subtract 4-digit numbers, and use addition and subtraction in problem solving (chapters 1 and 6).

Additional topics we study are time (chapter 4), money (chapter 5), measuring (chapter 8), and bar graphs and picture graphs (in various chapters).

This book, 3-A, covers addition and subtraction (chapter 1), multiplication concept (chapter 2), multiplication tables (chapter 3), time (chapter 4), and money (chapter 5). The rest of the topics are covered in the 3-B student worktext.

When you use these two books as your only or main mathematics curriculum, they are like a "framework," but you still have a lot of liberty in planning your child's studies. While multiplication and division chapters are best studied in the order they are presented, feel free to go through the geometry, clock, measuring, and fraction sections in a different order. For the chapter on geometry, the student should already know the multiplication tables. This might even be advisable if your child is "stuck" on some concept, or is getting bored. Sometimes the concept the student was stuck on can become clear after a break.

Math Mammoth aims to concentrate on a few major topics at a time, and study them in depth. This is totally opposite to the continually spiralling step-by-step curricula, in which each lesson typically is about a different topic from the previous or next lesson, and includes a lot of revision problems from past topics.

This does not mean that your child would not need occasional revision. However, when each major topic is presented in its own chapter, this gives you more freedom to plan the course of study *and* choose the revision times yourself. In fact, I totally encourage you to plan your mathematics school year as a set of certain topics, instead of a certain book or certain pages from a book.

For revision, the download version includes an html page called *Make_extra_worksheets_grade3.htm* (in US English) that you can use to make additional worksheets for computation or for number charts. You can also reprint some previously studied pages.

I wish you success in teaching maths!

Maria Miller, the author

Chapter 1: Addition and Subtraction
Introduction

This first chapter of *Math Mammoth Grade 3-A* covers a lot of territory. We revise and learn more about mental addition and subtraction strategies, revise regrouping in addition and subtraction, learn to regroup twice in subtraction, and then study Roman numerals, rounding, the order of operations, and graphs.

Through it all, students solve lots of word problems and practise some algebra in disguise, where they use a symbol or a " ? " for the unknown thing in the problem.

I have included several lessons on mental maths, including revision of many of the strategies from second grade, so that even students who perhaps did not study mental maths strategies in earlier grades can now catch up.

Also, children learn and practise regrouping in addition and subtraction. In subtraction, the focus is on regrouping twice and regrouping with zero tens when subtracting three-digit numbers. The lessons illustrate the processes with the help of pictures that relate to base-ten blocks. You can also use physical manipulatives (such as base 10 blocks) if you prefer. The basic idea of regrouping in subtraction is that a unit gets broken into 10 smaller units: a hundred into 10 tens or a ten into 10 ones, and that is what allows you to subtract. Make sure the student masters this topic.

This chapter also introduces rounding to the nearest ten and brackets with the order of operations as new topics. Then we study the connection between addition and subtraction with bigger numbers, which also aims to help students think algebraically.

Lastly, students get to practise their adding and subtracting skills in a practical way through reading a distance table and other types of graphs.

The Lessons

Helpful Resources on the Internet

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

Disclaimer: *These links were valid at the time of writing of this book, and to the best of our knowledge we believe these websites to have what is described. However, we cannot guarantee that the links have not changed. Parental supervision is recommended.*

Number Puzzles
Place the numbers in the puzzle so that each side adds up to a given sum. Practises mental addition and logical thinking.
http://nlvm.usu.edu/en/nav/frames_asid_157_g_2_t_1.html

Callum's Addition Pyramid
Add the pairs of numbers to get a number on the next level and finally the top number.
Three difficulty levels.
http://www.amblesideprimary.com/ambleweb/mentalmaths/pyramid.html

Button Beach Challenge
Figure out what number the various coloured buttons represent.
http://www.amblesideprimary.com/ambleweb/mentalmaths/buttons.html

Thinking Blocks
Thinking Blocks is an interactive maths tool that lets students build diagrams similar to the bar diagrams used in this chapter. Choose the Addition and Subtraction section.
http://www.mathplayground.com/thinkingblocks.html

Base Blocks Addition
A virtual manipulative that shows regrouping in addition. You can either solve addition problems that are provided, or create your own. "Lasso" with a mouse ten units, ten tens, or ten hundreds to regroup them. Choose "Columns = 2" to restrict the work to two-digit numbers.
http://nlvm.usu.edu/en/nav/frames_asid_154_g_1_t_1.html?from=category_g_1_t_1.html

Base Blocks Subtraction
A virtual manipulative that helps teach borrowing in subtraction. Choose "Create Problem", then click on the red and blue blocks to create a problem. The number to be subtracted (the subtrahend) is illustrated by the RED blocks whereas the minuend is by the BLUE blocks. Click BEGIN problem to start solving. Drag a red block on top of a blue to "subtract" —they cancel each other. Drag bigger place values to the column on their right to "break them up"—in other words regroup or borrow.
http://nlvm.usu.edu/en/nav/frames_asid_155_g_1_t_1.html?from=category_g_1_t_1.html

Mr. Martini's Classroom: Long Addition
Practise regrouping in addition online. Click the x's to set the number of digits in the problems.
http://www.thegreatmartinicompany.com/longarithmetic/longaddition.html

Speed Grid Addition
Find numbers on the grid that add up to the given number. This uses both single-digit and two-digit numbers.
http://www.oswego.org/ocsd-web/games/SpeedGrid/Addition/urikares.html

Roman Numerals Tutorial
Good explanations of how numbers are formed using Roman numerals, such as when to "add" or "subtract" the symbols. The page allows interactivity where the student can self-check his/her understanding.
http://www.beaconlearningcenter.com/weblessons/romannumerals/default.htm

Roman Numerals Worksheets
Generate worksheets for converting Roman numerals to normal (Arabic) ones, or normal numbers to Roman numerals, or do easy addition and subtraction problems with Roman numerals.
http://www.homeschoolmath.net/worksheets/roman_numerals.php

Roman Numerals - Wikipedia
An article explaining the usage, origin, and a chart of Roman numerals.
http://en.wikipedia.org/wiki/Roman_numerals

Quia: Easy Roman Numerals
Translate Roman numerals into Arabic (covers I, V, and X only). Matching game, concentration, or word search.
http://www.quia.com/jg/66123.html

Roman Numerals - A Maths Webquest
A set of web pages where you can learn all about Roman numerals: how they originated, how to read and write the numerals, and places where we still use the Roman number system today.
http://www.greatmathsgames.com/roman_numerals/roman_numerals.htm

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Revision: Mental Subtraction

1. Practise basic subtraction facts with this drill! Point to the problem and think of the answer.

a.	b.	c.	d.	e.
12 – 5	13 – 8	14 – 5	15 – 6	16 – 7
12 – 7	13 – 4	14 – 7	15 – 8	16 – 9
12 – 8	13 – 5	14 – 9	15 – 9	16 – 8
12 – 6	13 – 6	14 – 6	15 – 7	
12 – 4	13 – 9	14 – 8		f.
12 – 9	13 – 7			17 – 8
12 – 3				17 – 9

<u>Strategy 1:</u> Use known subtraction facts

Since 14 – 6 = 8, we know that the answer to 74 – 6 will end in 8, but it will be in the sixties (sixty-something). So it is 68.

Since 15 – 8 = 7, we know that the answer to 55 – 8 will end in 7, but it will be in the forties (forty-something). So it is 47.

2. Subtract.

a.	b.	c.
14 − 5 = _____	12 − 8 = _____	15 − 6 = _____
54 − 5 = _____	92 − 8 = _____	35 − 6 = _____

3. Subtract and compare the results!

a.	b.	c.	d.
14 − 7 = _____	12 − 8 = _____	16 − 7 = _____	15 − 7 = _____
34 − 7 = _____	42 − 8 = _____	56 − 7 = _____	75 − 7 = _____
64 − 7 = _____	82 − 8 = _____	156 − 7 = _____	675 − 7 = _____

Strategy 2: First subtract to the *previous whole ten*, then subtract the rest.	
$62 - 8$ $= 62 - 2 - 6$ $= 60 - 6 = 54$ Subtract 8 in two parts: first 2, then 6.	$72 - 6$ $= 72 - 2 - 4$ $= 70 - 4 = 66$ Subtract 6 in two parts: first 2, then 4.

4. Subtract part-by-part: first to the previous whole ten, and then the rest.

a. $64 - 7$ $64 - 4 - 3 =$ _____	**b.** $72 - 8$	**c.** $54 - 8$
d. $75 - 7$	**e.** $27 - 9$	**f.** $43 - 5$

Strategy 3: Subtract in parts: tens and ones	
Break up the number being subtracted into its tens and ones. Subtract in parts.	
$75 - 21$ $= 75 - 20 - 1$ $= 55 - 1 = 54$ First subtract 20, then 1.	$87 - 46$ $= 87 - 40 - 6$ $= 47 - 6 = 41$ First subtract 40, then 6.

5. Subtract in parts: Break up the second number into its tens and ones.

a. $89 - 26$ $89 - 20 - 6$ $=$ _____	**b.** $56 - 35$ $56 -$ ____ $-$ ____ $=$ _____	**c.** $75 - 51$ $75-$ ____ $-$ ____ $=$ _____
d. $69 - 19$	**e.** $67 - 36$	**f.** $64 - 33$

Strategy 4: Add.	
You can "add backwards". This works well if the two numbers are close to each other. Instead of subtracting, think how much you need to add to the number being subtracted (the subtrahend) in order to get the number you are subtracting from (the minuend).	
71 − 67 = ? Think: 67 + ____ = 71	558 − 556 = ? Think: 556 + ____ = 558

6. Subtract.

a. 78 − 75 = _____ 61 − 58 = _____	**b.** 112 − 108 = _____ 692 − 688 = _____	**c.** 505 − 499 = _____ 1 000 − 994 = _____

7. You had $50. You purchased two toys for $13 each.
How much did you have left after the purchase?

8. What if you bought three toys for $13 each with your $50?
How much would you have left after the purchase?

9. Fifteen children were playing on the playground. Seven of them left.
Then, ten more children came. How many are playing on the playground now?

10. A lion chased an antelope for 400 metres, then another 200 metres, and lastly 200 metres more. Then the lion pounced on the antelope.
What was the total number of metres that the lion chased the antelope?

Puzzle Corner

What is this three-digit number? The tens digit is half of 10. The hundreds digit is double the ones digit. And the ones digit is half the amount of letters in the word "June."

That was the easy puzzle. Now comes the real one.

What is this three-digit number?
Here are the clues for the digits: September, October, November.

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Chapter 2: Multiplication Concept
Introduction

The second chapter of *Math Mammoth Grade 3-A* covers the concept of multiplication. (However, memorising and drilling "times tables" is postponed until chapter 3.)

The first lessons introduce the concept of multiplication as repeated addition of groups of the same size. *Multiplication on a Number Line* illustrates repeated addition as consecutive jumps or skips on a number line. The child learns to connect skip-counting with multiplication.

Then, the lesson *Multiplication as an Array* shows a different model for multiplication: objects arranged in rows and columns. This lesson teaches the student to think of the rows as groups, showing the fundamental unity of the two models. The whole lesson is presented in pictures.

Order of operations is studied in two lessons. In the first one, students learn that multiplication is to be done before addition or subtraction and that addition and subtraction are to be done from left to right. Later, in the second lesson, we also use brackets.

Understanding Word Problems shows how problems that involve multiplication have the idea of "each," "every," or "all." For example, *each* item does or has the same number of something. If students find these problems difficult, they can draw pictures to help, such as drawing flowers in pots, slices of pizza, *etc*.

Understanding Word Problems, Part 2 gives problems that are more challenging. The word problems in traditional school texts are often so easy that children learn just to take the numbers in the problem and mechanically apply the operation that the lesson is about without really understanding what they are doing. If this lesson is too difficult, skip it for the time being and come back to it later. You can help your student to draw a picture for each problem.

Multiplication in Two Ways concentrates on the fact that it does not matter in which order the factors appear (the *commutative property* of multiplication). Objects in an array illustrate this fact nicely: either the row or the column can be taken as the group being multiplied. This lesson also deals with jumping on the number line.

Multiplying by Zero is illustrated both with the group model (either several groups of zero size or zero groups of any size) and with the jump-on-a-number-line model (either several jumps of zero distance or zero jumps of any distance).

The Lessons

Helpful Resources on the Internet

Use these free online resources to supplement the "bookwork" as you see fit.
Disclaimer: *These links were valid at the time of writing of this book, and to the best of our knowledge we believe these websites to have what is described. However, we cannot guarantee that the links have not changed. Parental supervision is recommended.*

Math Dice Game for Addition and Multiplication
Instructions for three simple games with dice: one to learn the concept of multiplication, another to practise the times tables, and one more for addition facts.
http://www.teachingwithtlc.blogspot.com/2007/09/math-dice-games-for-addition-and.html

Explore the Multiplication Table
This applet visualises multiplication as a rectangle.
http://www.mathcats.com/explore/multiplicationtable.html

Multiplication Number Lines
First choose a tile from the 10×10 grid to pose a problem, then you will see it illustrated on a number line.
http://www.ictgames.com/multinumberlines.html

Multiplication Mystery
Drag the answer tiles to right places in the grid as they are given, and a picture is revealed
http://www.harcourtschool.com/activity/mult/mult.html

Multiplication.com Interactive Games
A bunch of online games just for the times tables.
http://www.multiplication.com/interactive_games.htm

Button Beach Challenge
Figure out what number the various coloured buttons represent.
http://www.amblesideprimary.com/ambleweb/mentalmaths/buttons.html

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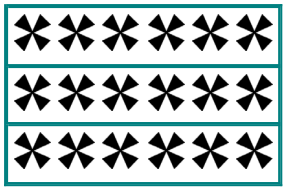
Multiplication as an Array

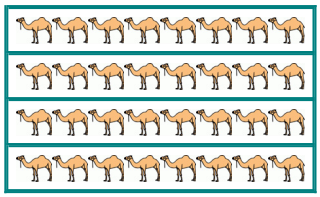
An **array** is an orderly arrangement of things in rows and columns.
When things are neatly aligned in an array, we can think of the *rows as groups*, so an array still pictures multiplication as repeated addition.



3 rows, 6 crosses in each row.

$6 + 6 + 6 =$

$3 \times 6 = 18$

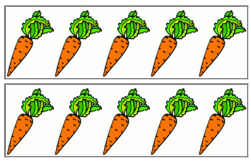


4 rows, 8 camels in each row.

$8 + 8 + 8 + 8 =$

$4 \times 8 = 32$

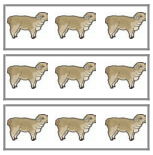
1. Fill in the missing numbers.



a. _____ rows, _____ carrots in each row.

_____ + _____

_____ × _____ = _____ carrots.



b. _____ rows, _____ rams in each row.

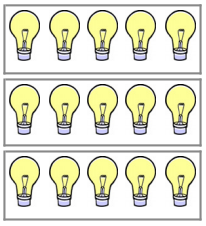
_____ + _____ + _____

_____ ×_____ = _____ rams.

c. _____ rows, _____ bear in each row.

_____ + _____

_____ × _____ = _____ bears.



d. _____ rows, _____ bulbs in each row.

_____ + _____+ _____

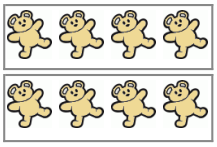
_____ × _____ = _____ bulbs.

2. Write the addition and multiplication facts that the pictures are illustrating.
The box with a "T" is a ten.

a.

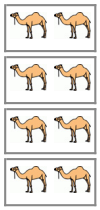
$4 + 4 =$ _____

$2 \times 4 =$ _____

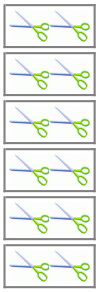


b.

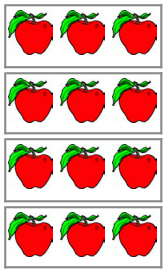
c.



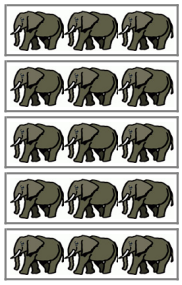
d.



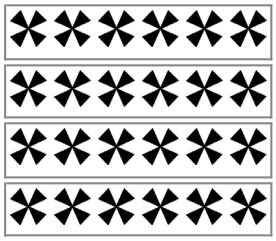
e.



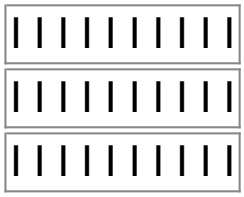
f.



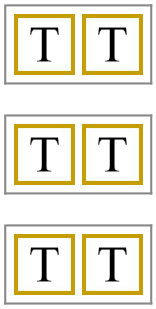
g.



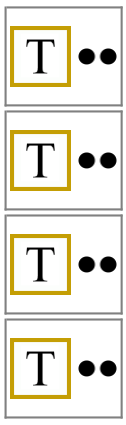
h.



i.



j.



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Chapter 3: Multiplication Tables
Introduction

In the third chapter we concentrate on memorising the times tables.

Tips for Effective Oral Drilling

When you are doing memorisation drills, be sure to explain to the student that the goal is to *memorise* the facts—to recall them from memory—and not to get the answers by counting or any other method. Just as your child has probably already memorised your address and phone number, now she or he is going to memorise some maths facts. You can easily see if the student is trying to count, because producing the answer by counting takes much more time. You should expect the child to answer fairly quickly when you are drilling. If the child does not know the answer by heart, then tell the child the right answer.

Short drill sessions are usually best. For example, you might drill for five or ten minutes at a time, depending on the attention span of the child.

However, try to have at least two sessions during the day as your schedule permits. Research on how the brain learns has shown that new memories are forgotten soon and that new information is best retained when it is revised *within 4-6 hours* of the time it is initially learned. (This principle applies to *anything* new a person is learning.)

Pencil and paper activities alone do not work well for memorising facts because the child can get the answers by counting and not from memory. Proper drill requires an investment in time from the instructor. If you can, utilise older siblings, too, in the task of drilling. Moreover, computers are great drillmasters; they never get tired or bored and you can usually choose a timed session in which the child must produce the answers quickly. Computer-based drilling can be very rewarding to children when they notice that they are truly learning the facts and are able to complete the drills successfully. They can actually come to enjoy the process of memorisation. I have included a list of free online multiplication activities at the end of this introduction.

Here is a five-step method for memorisation. Normally only a few of the steps would be included in any one session, depending on the child's concentration and ability.

Structured Drilling of the Table of 3 — in steps

Have the times table to be learned already written on paper or board. We will use the table of 3 as an example. You can view a video explaining the main points of the drill here:
http://www.mathmammoth.com/lessons/multiplication_tables.php

$1 \times 3 = 3$
$2 \times 3 = 6$
$3 \times 3 = 9$
$4 \times 3 = 12$
$5 \times 3 = 15$
$6 \times 3 = 18$
$7 \times 3 = 21$
$8 \times 3 = 24$
$9 \times 3 = 27$
$10 \times 3 = 30$
$11 \times 3 = 33$
$12 \times 3 = 36$

1. The first task is to memorise the list of answers. Have your child study the first half of the skip-counting list (3, 6, 9, 12, 15, 18), saying the numbers aloud while pointing to the answers one by one with a finger or a pen. You may also use a number line. This technique uses the senses of seeing, hearing and touch simultaneously to fix the information in the brain. After the student has gone through the list a few times, ask the student to repeat it from memory.

   Expect your child to answer, and do not give him the answers too easily, because ONLY by putting forth an effort will he memorise the facts. Just like the muscles, the mind needs exercise to become stronger.

   Require him to memorise the skip-counting list both forwards and backwards. Keep practising until he can "rattle off" the first list of 3, 6, 9, 12, 15, 18. With some tables, like the tables of 2, 5, and 10, it helps to point out the pattern in them. The pattern in the table of 9 is more subtle but still useful.

2. Tackle the last half of the list: 21, 24, 27, 30, 33, 36. Do the same things you did with the first half of the list.
3. Next, work with the whole list of answers. Practise the list counting up *and* down until it goes smoothly and easily. These steps may be enough for one session, but *be sure to revise* again later in the day.
4. In this stage, the goal is to associate each answer 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, with a certain multiplication fact (such as 7 × 3). So, keep the whole table visible (just without the answers) and practise individual problems randomly by pointing to them. Ask orally ("What is 5 times 3?"), while pointing to the problem —again, using both hearing and seeing (multiple senses).
5. The next step is to do this the other way around. Now *you* say the answer ("21"), and the student has to produce the problem ("3 × 7"). Keep the table handy, but hide the *problems* from sight, and point to the answers in a random order.

   This technique can also work the other way around, where the student says the answers, and you produce the problems. Be sure to give wrong multiplication facts occasionally to check the student's accuracy.

   As an optional extension, you can say answers from several tables that you have studied, and the student gives the corresponding problem. Sometimes there are several answers. For example, 36, 30, 24, and 20 are in several different times tables. This is an especially good exercise as it prepares for the concepts of division and factoring.
6. The last step is totally random drilling using flash cards, oral problems, or computer programs.

The memorisation will not happen overnight. On subsequent days, you can mix drills 1-5 (it is my hope that you will not need to revise steps 1 and 2). This kind of structured drilling takes time and effort from the teacher, but it can be very effective. You can also do some of it while travelling in the car, going about household tasks, *etc*.

You can also try to teach the process to your child, so that he will learn how to do the memorisation himself. He can hide the answers and try to reproduce the list in his mind.

Other helpful ideas

- Hang a **poster** with the 12×12 or 10×10 table on the wall. Remind your child to glance at it a few times a day. It can work wonders for visual students!
- Hang beside it another poster, with an empty grid, in which the child fills in those facts he has mastered.
- Recite the skip-counting lists or multiplication facts aloud just before going to bed. This can turn them into mastered facts by the next morning.

Are timed drills necessary?

I feel that timed drills are a tool among many. Some children will "thrive" on them because perhaps they like racing against the clock or like the challenge, but some children will detest them.

There are a number of timed computer games that can work very well for drilling facts. Here are two online ones:

- **http://www.oswego.org/ocsd-web/games/Mathmagician/cathymath.html**
  This site has a simple 1-minute countdown, and if you answer 20 questions in that time, you get an award.
- **http://www.sheppardsoftware.com/math.htm**
  Sheppard Software is filled with several types of games just for math facts practice, including timed practice. Some of the games there don't time you but give you more points the faster you go.

For other children, timed drills may be counterproductive and end up in tears and frustration. Try the drills and see how it goes. Use your your judgment as to its usefulness as a learning tool.

Should one table be memorised before going on to the next?

The basic idea is to stay on one table until it is mastered. That can take a varying amount of days depending on the child, the number of practise sessions, and other constraints on the child's time. It is best to practice each table at least two times a day (because the brain will memorise things much quicker that way), but each session doesn't have to take a long time.

However, the child can also study other maths concepts, such as geometry, measuring, addition, or clock, at the same time, as long as these other topics do not rely heavily on multiplication tables (for example, division does).

Also, incorporate games to keep the learned facts fresh. The old idiom "use it or lose it" comes into play here. As the student masters more facts, he or she will probably enjoy playing multiplication games, whether online, on the computer, or card and board games.

The Lessons

Helpful Resources on the Internet

Use these free online resources to supplement the "bookwork" as you see fit. As you can see, there are many resources available for drilling and practising the tables online.

Disclaimer: *These links were valid at the time of the writing of this book, and to the best of our knowledge we believe these websites to have what is described. However, we cannot guarantee that the links have not changed. Parental supervision is recommended.*

Multiplication worksheets
Regular, printable multiplication worksheets for the multiplication tables.
http://www.homeschoolmath.net/worksheets/grade3/multiplication.php

Multiplication Grid
Drag the scrambled answer tiles into the right places in the grid as fast as you can!
http://www.mathcats.com/microworlds/multiplication_grid.html

Raging Rectangles and Multiple Madness (PDF)
Two fun printable board games for multiplication; Raging Rectangles is on page 2 and Multiple Madness is on page 6 of the download.
http://mathlearnnc.sharpschool.com/UserFiles/Servers/Server_4507209/File/Instructional%20Resources/G3WW21-24.pdf

Multiplication.com Interactive Games
A bunch of online games just for the times tables.
http://www.multiplication.com/interactive_games.htm

Math Trainer - Multiplication
Multiplication table training online that responds to your answers and will improve your skills.
http://www.mathsisfun.com/games/math-trainer-multiply.html

Table Mountain
Climb the mountain with 20 questions from a selected table.
http://www.teachingtables.co.uk/tm/tmgame/tgame2.html

Multiplication Table Challenge
100 questions, timed.
http://www.programmingart.com/free/games/multiply/

Multiplication Mystery
Drag the answer tiles to the right places in the grid as they are given, and a picture is revealed
http://www.harcourtschool.com/activity/mult/mult.html

Mr. Taylor's Multiplication Facts Drill
Simple practice (click on the right answer) for the easy ones, the hard ones, the monsters, or all of them.
http://mltfx.com/

Times Tables from BBC Skillswise
Has printable factsheets, online quizzes, two grid games, and five printable worksheets.
http://www.bbc.co.uk/skillswise/numbers/wholenumbers/multiplication/timestables/index.shtml

Math Dice Game for Addition and Multiplication
Instructions for three simple games with dice; one to learn the concept of multiplication, another to practise the times tables and one more for addition facts.
http://www.teachingwithtlc.blogspot.com/2007/09/math-dice-games-for-addition-and.html

Two Minute Warning
Solve as many problems as you can in two minutes.
http://www.primarygames.com/flashcards/multiplication/start.htm

Button Beach Challenge
Figure out what number the various coloured buttons represent.
http://www.amblesideprimary.com/ambleweb/mentalmaths/buttons.html

Acing Math
A large collection of math games for grades K-6 that you can play with a standard deck of cards.
http://www.pepnonprofit.org/uploads/2/7/7/2/2772238/acing_math.pdf

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Multiplication Table of 3

1. Skip-count by threes. Practise this pattern until you can say it from memory. Also practise it backwards (up-down). You may practise one-half of it at first, and the other half later.

0, 3, ____, ____, ____, ____, ____, ____, ____, ____, ____, ____, 36

2. **a.** Fill in the table of 3. **b.** Fill in the missing factors. Then cover the answers. Choose problems in random order and practise. You may first practise only the part from 1 × 3 to 6 × 3, and the rest at a later time, such as the next day.

a.

1 × 3 = ____	7 × 3 = ____
2 × 3 = ____	8 × 3 = ____
3 × 3 = ____	9 × 3 = ____
4 × 3 = ____	10 × 3 = ____
5 × 3 = ____	11 × 3 = ____
6 × 3 = ____	12 × 3 = ____

b.

____ × 3 = 3	____ × 3 = 21
____ × 3 = 6	____ × 3 = 24
____ × 3 = 9	____ × 3 = 27
____ × 3 = 12	____ × 3 = 30
____ × 3 = 15	____ × 3 = 33
____ × 3 = 18	____ × 3 = 36

Note: the fact 2 × 3 = 6 or 3 × 2 = 6 is in both the table of three and the table of two.

3. Do not write the answers down. Use these problems for random drill practice.

6 × 3	7 × 3	3 × 3	3 × 7	3 × 8
9 × 3	2 × 3	3 × 11	3 × 4	3 × 3
4 × 3	8 × 3	3 × 9	3 × 6	3 × 5
3 × 1	12 × 3	3 × 12	8 × 3	10 × 3

4. Do not write the answers down. Use these problems for random drill practice.

☐ × 3 = 15	☐ × 3 = 12	☐ × 3 = 27	☐ × 3 = 36	☐ × 3 = 30
☐ × 3 = 33	☐ × 3 = 36	☐ × 3 = 33	☐ × 3 = 3	☐ × 3 = 6
☐ × 3 = 9	☐ × 3 = 24	☐ × 3 = 27	☐ × 3 = 18	☐ × 3 = 21

5. Continue the patterns.

a.

12	×	2	=	_____
13	×	2	=	_____
14	×	2	=	_____
_____	×	_____	=	_____
_____	×	_____	=	_____
_____	×	_____	=	_____
_____	×	_____	=	_____
_____	×	_____	=	_____
_____	×	_____	=	_____
_____	×	_____	=	_____

b.

1	×	2	–	1	=	_____
2	×	2	–	2	=	_____
3	×	2	–	3	=	_____
_____	×	_____	–	_____	=	_____
_____	×	_____	–	_____	=	_____
_____	×	_____	–	_____	=	_____
_____	×	_____	–	_____	=	_____
_____	×	_____	–	_____	=	_____
_____	×	_____	–	_____	=	_____
_____	×	_____	–	_____	=	_____

6. Solve the word problems.

a. John takes care of his neighbour’s cat when the neighbour is away. He earns $3 each day. John wants to buy a toy train that costs $14. How many days will he have to work so he can buy it?

b. John took care of the cat for five days. Then his grandfather gave him $5 as a present. How much money does John have now?

So, he bought the train for 14 dollars. How much money does he have left now?

c. John has $6. Then he takes care of the neighbour’s cat for four days. Does he have enough money now to buy a book about nesting birds that costs $16?

d. Roses are sold in bunches of three. Dad bought eleven bunches and one extra rose for Mum's birthday—a rose for each year. How old is Mum?

e. How many bunches of roses and extra roses would Dad need to buy if Mum was 31 years old?

f. How about *your* mum? How many bunches of roses and extra roses would you need to buy for your mum?

7. Fill in the parts of the multiplication table that we have studied.

×	0	1	2	3	4	5	6	7	8	9	10	11	12
0													
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													

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Chapter 4: Telling Time
Introduction

This chapter covers reading the clock to the minute, finding time intervals (elapsed time), using the calendar and making simple conversions between units of time.

We revise the topic of reading the clock to the five-minute intervals, first using numbers in telling the time, such as 6:45 or 12:15. Then, children learn about quarter hours, such as a quarter to 6 or a quarter past 9. We also revise the topic of using "past" and "to", such as in 20 to 6 or 10 past 11. Next, we study elapsed time in more detail in the lesson "How Many Minutes Pass."

The lesson "Reading the Clock to the Minute" completes the topic (begun in earlier grades) of reading the clock, because the student will now be able to tell the complete time. From that point on, the focus switches to finding time intervals and other time-related calculations.

The next two lessons about calculating elapsed time emphasise dividing the time interval into easily-calculated parts: For example, to find the time elapsed from 10:30 AM to 7:00 PM, the child learns to find the elapsed time from 10:30 AM to 12:00 noon and then from 12:00 noon to 7 PM. The same principle is followed when the time-interval looks more complex. This chapter does not yet introduce the idea of adding or subtracting hours and minutes vertically in columns.

We also study using the calendar, and converting between time units, such as changing 2 hours to 120 minutes or changing 340 minutes to 5 hours and 40 minutes.

The Lessons

Helpful Resources on the Internet

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

Disclaimer: *These links were valid at the time of the writing of this book, and to the best of our knowledge we believe these websites to have what is described. However, we cannot guarantee that the links have not changed. Parental supervision is recommended.*

What Time Will it Be?
Move the hands on the clock to show what time it will be after a certain amount of minutes.
http://nlvm.usu.edu/en/nav/frames_asid_318_g_2_t_4.html

Match Clocks
Make the digital clock show the time given on an analogue clock.
http://nlvm.usu.edu/en/nav/frames_asid_317_g_2_t_4.html

Analogue and Digital Clocks
These clocks show you the current time, side by side. Useful for illustration.
http://nlvm.usu.edu/en/nav/frames_asid_316_g_2_t_4.html

Stop the Clock
Drag the five digital times to the correct analogue clocks.
http://www.oswego.org/ocsd-web/games/stoptheclock/sthec4.html

Elapsed Time Worksheets
Generate printable worksheets for elapsed time. You can practise the elapsed time, finding the starting time, or finding the ending time. The time interval can be to the accuracy of 1 minute, 5 minutes, 10 minutes, 15 minutes, 30 minutes, or whole hours.
http://www.mathnook.com/elapsedtimegen.html

Flashcard Clock
Read the analogue and type in the time in digital. Very clear clock and good fast response!
http://www.teachingtreasures.com.au/maths/FlashcardClock/flashcard_clock.htm

Teaching Time
Analogue/digital clock games and worksheets. An interactive "class clock" to demonstrate time.
http://www.teachingtime.co.uk/

Time-for-time
Resource site to learn about time: worksheets, games, quizzes, time zones.
http://www.time-for-time.com/default.htm

Clockwise
Plug in a time, and the clock runs until it, or the clock runs to a time and you type in.
http://www.shodor.org/interactivate/activities/clock2/index.html

What Time Is It?
Look at the analogue clock and pick the digital clock that shows the same time.
http://www.primarygames.com/time/start.htm

Calculating Time from BBC SkillsWise
Factsheets, worksheets and an online game to practise time calculations.
http://www.bbc.co.uk/skillswise/numbers/measuring/time/calculatingtime/

That Quiz: Time
Online quizzes for all time-related topics: reading the clock, time passed, adding/subtracting with time, conversion of time units, and time zone practice. The quizzes have many levels, can be timed or not and include lots of options for customisation. Easy to use and set up.
www.thatquiz.org/tq-g/math/time

On Time
Set the clock's hands to the given time. Four different levels.
http://www.sheppardsoftware.com/mathgames/earlymath/on_time_game1.htm

Clock Shoot
A game where you need to click on the clock with the matching time (analogue/digital). Three different levels: whole hours, half hours, or quarter hours.
http://www.sheppardsoftware.com/mathgames/earlymath/clock_shoot.htm

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/

Time Difference
Demonstrate elapsed time. Set the start and end times on the two clocks. Then, click the step-counters (marked as "1 hr", "5 mins", and "1 min") and the program will make the first clock to go ahead and keep track of elapsed time.
http://mathszone.webspace.virginmedia.com/mw/time/Time%20Difference.swf

Clock
This is for demonstrative purposes - the activity shows digital/analogue time and/or time in words. You can make the clock advanced by a specified amount.
http://mrcrammond.com/games/clock.swf

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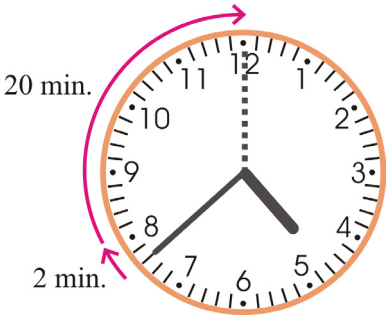
Elapsed Time

How many minutes is it to the next whole hour?

It is 4:38. The minute hand needs to go 2 minutes to the 40-minute point (number 8), and then 20 more minutes to the next whole hour. So it is 22 minutes to 5 o'clock.

Or, you can subtract 38 minutes from 60 minutes:
60 − 38 = 22. Remember, a complete hour is 60 minutes.

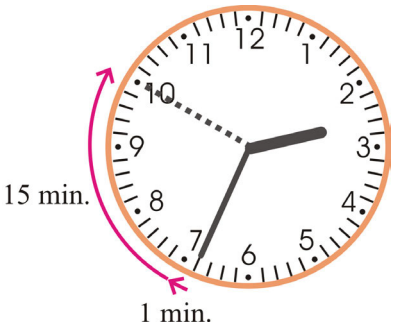


It is 2:34. How many minutes is it to 2:50?

The hour is the same (2 hours) in both times, you can simply subtract the minutes: 50 − 34 = 16 minutes.

Or, add up from 34 to 50:
34 + **6** = 40
40 + **10** = 50.
You added 16 minutes.

Or, imagine the minute hand moving on the clock face: it moves 1 minute, and then another 15 minutes — a total of 16 minutes.



1. How many minutes is it to the next whole hour?

a. _____ minutes

b. _____ minutes

c. _____ minutes

d. _____ minutes

e. _____ minutes

f. _____ minutes

g. _____ minutes

h. _____ minutes

2. How many minutes is it from the time on the clock face to the given time?

 to 12:40 **a.** _____ minutes	 to 7:30 **b.** _____ minutes	 to 10:45 **c.** _____ minutes	 to 3:58 **d.** _____ minutes
 to 1:00 **e.** _____ minutes	 to 5:55 **f.** _____ minutes	 to 12:50 **g.** _____ minutes	 to 4:55 **h.** _____ minutes

3. How many minutes is it?

a. From 5:06 to 5:28	**b.** From 2:05 to 2:54	**c.** From 3:12 to 3:47
d. From 12:11 to 12:55	**e.** From 7:27 to 7:48	**f.** From 9:06 to 10:00

4. **a.** The pie needs to bake half an hour. Rachel's clock showed 4:22 when she put it into the oven. When should she take it out?

b. Vince notices: "The soccer game ends in 14 minutes!" If the game ends at 2 PM, what time is it now?

c. The sun rises at 5:49 AM. Melanie wants to wake up 15 minutes before that. When should she wake up?

d. Stephanie was 8 minutes late to maths class, and came at 1:53 PM. When did the class start?

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Chapter 5: Money
Introduction

This chapter of *Math Mammoth Grade 3-A* teaches counting coins, working out the change and solving simple problems about money.

We start out by revising counting Australian coins and banknotes.

The lesson *Working Out the Change* explains two basic ways of working out the change: (1) counting up and (2) subtracting (finding the difference). This is all done with mental maths. The following lesson, *Mental Maths and Money Problems*, also uses mental maths, this time in solving simple money problems.

The lesson *Solving Money Problems* introduces the concept of adding and subtracting amounts of money vertically in columns.

We also learn to add money amounts in columns.

The Lessons

Helpful Resources on the Internet

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

Disclaimer: *These links were valid at the time of the writing of this book, and to the best of our knowledge we believe these websites to have what is described. However, we cannot guarantee that the links have not changed. Parental supervision is recommended.*

Counting Coins Worksheets
Create free worksheets for counting all Australian coins and some banknotes. You can choose the number of coins, the maximum total amount and the number of problems.
http://www.homeschoolmath.net/worksheets/australian-money.php

Change Maker
Get as much money in your piggy bank as possible by working out the correct change.
Easy, Medium, hard and super brain levels. Playable in five currencies, including Australian.
http://www.funbrain.com/cashreg/

Money Memory Game
Match coins/notes with money amounts. You can choose your currency and the size of the memory game.
http://www.dr-mikes-math-games-for-kids.com/money-memory-game.html?cur=aud

Money Master
Drag coins to the work area to match the given amount, or give change.
http://www.mathsisfun.com/money/money-master.html

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Working Out the Change

1. To give change, or to check the change you are given, you can count up from the price of the item until you reach the amount the customer gives. First count up to the next whole dollar using the 5-c, 10-c, 20-c and 50-c coins. Then use the 1 and 2-dollar coins and banknotes.

a.

Price: $3.50

Customer gives $5.00

Count up →

$4.00

$5.00

The change is

$_____

b.

Price: $270

Customer gives $300

Count up →

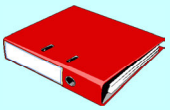
$280

$300

The change is

$_____

c.



Price: $24.35

Customer gives $30.00

Count up →

The change is

$_____

d.

Price: $4.25

Customer gives $10.00

Count up →

The change is

$_____

e.

Price: $130

Customer gives $200

Count up →

The change is

$_____

2. Work out the change. You can draw coins and banknotes to help.

a. 

Price: $43.55

Customer gives $50.00

The change is

$_____

b. 

Price: $86

Customer gives $100

The change is

$_____

c. 

Price: $47.70

Customer gives $50.00

The change is

$_____

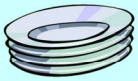
d. 

Price: $125

Customer gives $200

The change is

$_____

e. 

Price: $35.25

Customer gives $50.00

The change is

$_____

f. 

Price: $14.15

Customer gives $20.00

The change is

$_____

Working out change is finding the difference. You can also work out the change by subtracting the item price from the money amount the customer gives. You are just finding the *difference* between the price and the money given.	**Example:** A book costs $6. You give $10. Your change: $10 − $6 = **$4**.
You can add up to work out the change. Another method is to first add up to the next whole dollar to work out the cents. Then work out the dollar-amount by subtracting. Again, you are finding the difference between the price and the money given, but you are finding that in two parts.	An item costs $3.30. You give $10. First work out how many cents there are to the next whole dollar: $3.30 + **$0.70** = $4.00. Then find the difference between $4.00 and $10.00, which is **$6.00**. The total change is $6.70.

3. Work out the change.

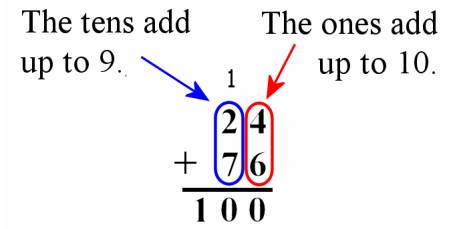
a. A book costs $17.00. You give $20.00. Change: $_____	**b.** A basket costs $24.00. You give $30.00. Change: $_____	**c.** A train costs $46.50. You give $50.00. Change: $_____
d. A magazine costs $12.40. You give $15.00. Change: $_____	**e.** A meal costs $42.60. You give $45.00. Change: $_____	**f.** Water costs $11.30. You give $15.00. Change: $_____
g. Crayons cost $13.80. You give $50.00. Change: $_____	**h.** Staples cost $21.40. You give $25.00. Change: $_____	**i.** Paper costs $37.20. You give $40.00. Change: $_____

4. Did these people receive the correct change? If not, correct it.

a. Mary bought a few items that cost $47.80. She paid with a $50 banknote. She got back 2 dollars and two 5-cent coins.

b. Seth bought a toy car for $12.75 and gave $15.00 for it. The shop assistant handed back to him a 20-cent coin and 2 dollars.

Here is a little trick for finding two 2-digit numbers that add up to 100:



The ones add up to 10.
The tens add up to 9...

...plus there is one ten that is "carried" from the ones — total 10 tens or a hundred.

5. Try it yourself! Find the two-digit number so the sum is 100.

a.
$$\begin{array}{r} 5\,6 \\ +\quad\quad \\ \hline 1\,0\,0 \end{array}$$

b.
$$\begin{array}{r} 1\,9 \\ +\quad\quad \\ \hline 1\,0\,0 \end{array}$$

c.
$$\begin{array}{r} 7\,2 \\ +\quad\quad \\ \hline 1\,0\,0 \end{array}$$

d.
$$\begin{array}{r} 4\,4 \\ +\quad\quad \\ \hline 1\,0\,0 \end{array}$$

e.
$$\begin{array}{r} 3\,4 \\ +\quad\quad \\ \hline 1\,0\,0 \end{array}$$

6. Fill in the missing cent-amount. You can use the "trick" explained above.

a. 55c + _____c = 100c	**b.** 35c + _____c = $1	**c.** 85c + _____c = $1
75c + _____c = 100c	$1.15 + _____c = $2	$4.30 + _____c = $5
25c + _____c = 100c	$3.80 + _____c = $4	$9.35 + _____c = $10

7. Work out the change. Find also what coins could be used to make the change.

a. A book costs $13.55. You give $15.00. *Change: $1.45. Use a 5-cent coin, two 20-cent coins and a 1-dollar coin.*	**b.** A pencil costs $2.80. You give $5.00.
c. A shirt costs $37.75. You give $40.00.	**d.** Toy sunglasses cost $8.95. You give $10.00.
e. A sandwich costs $14.25. You give $15.00.	**f.** Flowers cost $26.20. You give $30.00.

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math MAMMOTH

Grade 3-B Worktext International Version

Light Blue Series

- Place value with thousands
- Geometry
- Measuring
- Division
- Fractions

By Maria Miller

Contents

Chapter 8: Measuring

Chapter 9: Division

Chapter 10: Fractions

Foreword

Math Mammoth Grade International Version 3-A and Grade 3-B worktexts comprise a complete maths curriculum for the third grade mathematics studies.

This curriculum is essentially the same as the version of *Math Mammoth Grade 3* sold in the United States (US version), only customised for international use. The US version is aligned to the "Common Core" Standards, so it may not be properly aligned to the second grade standards in your country. However, you can probably find material for any missing topics in neighbouring grades. For example, let's say multiplication tables are studied in grade or year 4 in your country. They are not found in Math Mammoth Grade 4. Instead, you will need to use Math Mammoth Grade 3-A to study them.

The International version of Math Mammoth differs from the US version in these aspects:

- The currency used in the money chapters in grades 1-3 is the Australian dollar. (The download version of this curriculum for grades 1-3 include the chapter on money for British, Canadian, European, New Zealand, South African, and US, currencies.)
- The curriculum teaches the metric measurement units. Imperial units, such as inches and pounds, are not used.
- The spelling conforms to British international standards.
- The margin settings are aligned for printing with A4.

Third grade is a time for learning and mastering two (mostly new) operations: multiplication and division within 100. The student also deepens his understanding of addition and subtraction, and uses those in many different contexts, such as with money, time, and geometry.

The main areas of study in *Math Mammoth Grade 3* are:

1. Students develop an understanding of multiplication and division of whole numbers through problems involving equal-sized groups, arrays, and area models. They learn the relationship between multiplication and division, and solve many word problems involving multiplication and division (chapters 2, 3, and 9).

2. Students develop an understanding of fractions, beginning with unit fractions. They use visual fraction models and study fractions on a number line. Students also compare fractions by using visual fraction models and strategies based on noticing equal numerators or denominators (chapter 10).

3. Students learn the concepts of area and perimeter. They relate area to multiplication and to addition, recognise perimeter as a linear measure (in contrast with area), and solve problems involving area and perimeter (chapter 7).

4. Students fluently add and subtract within 1 000, both mentally and in columns (with regrouping). They learn to add and subtract 4-digit numbers, and use addition and subtraction in problem solving (chapters 1 and 6).

Additional topics we study are time (chapter 4), money (chapter 5), measuring (chapter 8), and bar graphs and picture graphs (in various chapters).

This book, 3-A, covers addition and subtraction (chapter 1), multiplication concept (chapter 2), multiplication tables (chapter 3), time (chapter 4), and money (chapter 5). The rest of the topics are covered in the 3-B student worktext.

When you use these two books as your only or main mathematics curriculum, they are like a "framework," but you still have a lot of liberty in planning your child's studies. While multiplication and division chapters are best studied in the order they are presented, feel free to go through the geometry, clock, measuring, and fraction sections in a different order. For the chapter on geometry, the student should already know the multiplication tables. This might even be advisable if your child is "stuck" on some concept, or is getting bored. Sometimes the concept the student was stuck on can become clear after a break.

Math Mammoth aims to concentrate on a few major topics at a time, and study them in depth. This is totally opposite to the continually spiralling step-by-step curricula, in which each lesson typically is about a different topic from the previous or next lesson, and includes a lot of revision problems from past topics.

This does not mean that your child would not need occasional revision. However, when each major topic is presented in its own chapter, this gives you more freedom to plan the course of study *and* choose the revision times yourself. In fact, I totally encourage you to plan your mathematics school year as a set of certain topics, instead of a certain book or certain pages from a book.

For revision, the download version includes an html page called *Make_extra_worksheets_grade3.htm* that you can use to make additional worksheets for computation or for number charts. You can also reprint some previously studied pages.

I wish you success in teaching maths!

Maria Miller, the author

Chapter 6: Place Value with Thousands
Introduction

This chapter of *Math Mammoth Grade 3* covers 4-digit numbers (numbers with thousands), and adding and subtracting them. We also study rounding and estimating, which are very important skills for everyday life.

First, children learn 4-digit numbers, place value—breaking up numbers such as 3 498 into thousands, hundreds, tens and ones—and comparing 4-digit numbers. Next, they practise some mental addition and subtraction with 4-digit numbers. The lesson stresses the similarities between adding and subtracting 4-digit numbers and adding and subtracting smaller numbers. Practising mental maths also helps to build number sense.

We also study regrouping in addition and subtraction, using 4-digit numbers. If you purchased the download version, you can make more worksheets for addition and subtraction using the accompanying worksheet maker.

The last major topics in this chapter are rounding numbers to the nearest hundred and estimating. Students also get to do some more word problems in one lesson.

The Lessons

Helpful Resources on the Internet

Use these free online resources to supplement the "bookwork" as you see fit.
Disclaimer: *These links were valid at the time of the writing of this book, and to the best of our knowledge we believe these websites to have what is described. However, we cannot guarantee that the links have not changed. Parental supervision is recommended.*

Base Blocks from National Library of Virtual Manipulatives
Place enough thousand cubes, hundred-flats, ten-sticks and one-blocks in the work area to show the given numbers. Choose "Columns = 4" to restrict the program to four-digit numbers.
http://nlvm.usu.edu/en/nav/frames_asid_152_g_1_t_1.html?from=category_g_1_t_1.html

Cookie Dough
Practise naming big numbers.
http://www.funbrain.com/numwords/index.html

Can you say really big numbers?
Enter a really big number, try to say it out loud, and see it written.
http://www.mathcats.com/explore/reallybignumbers.html

Line Dry Game
Fill in a missing number on the clothesline based on different skip-counting patterns.
http://www.fuelthebrain.com/games/line-dry/

Maximum Capacity
Drag as many gorillas as you can into the elevator without exceeding the weight capacity of the elevator. You will have to use your quick addition, estimation and number sense skills.
http://www.mrnussbaum.com/maximumcapacity.htm

Place Value Puzzler
Place value or rounding game. Choose "easy" place value or "easy" rounding for this level. You will need to click on the required place value in a number, or type in the answer for rounding.
http://www.funbrain.com/tens/index.html

Rounding Sharks
You will be asked to round numbers in the thousands to the nearest hundred. Click on the shark that has the number rounded correctly.
http://www.aaamath.com/B/est.htm

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Four-Digit Numbers and Place Value

Here the numbers 2 467, 1 090 and 5 602 are written as a *sum* of their different place values.

It is like writing each part of the number out in full: the thousands, the hundreds, the tens, and the ones. **Notice the zeros!** When there are *no* hundreds, or tens, or ones, we write a zero.

thou-sands	hund-reds	tens	ones
2	4	6	7

2 000 + 400 + 60 + 7

thou-sands	hund-reds	tens	ones
1	0	9	0

1 000 + 0 + 90 + 0

thou-sands	hund-reds	tens	ones
5	6	0	2

5 000 + 600 + 0 + 2

1. Fill in the blanks, and write the numbers as a sum of the different place values.

a. 1 034 = ____ thousand ____ hundreds ____ tens ____ ones

= 1 000 + ___0___ + __3 0__ + _4_

b. 5 670 = ____ thousand ____ hundreds ____ tens ____ ones

= 5 000 + _____ + _____ + ____

c. 3 508 = ____ thousand ____ hundreds ____ tens ____ ones

= _____ + _____ + _____ + ____

d. 8 389 = ____ thousand ____ hundreds ____ tens ____ ones

= _____ + _____ + _____ + ____

e. 9 007 = ____ thousand ____ hundreds ____ tens ____ ones

= _____ + _____ + _____ + ____

f. 7 214 = ____ thousand ____ hundreds ____ tens ____ ones

= _____ + _____ + _____ + ____

2. Fill in the table.

a. Five thousand nine hundred and ninety T H T O [ ][ ][ ][ ]	**b.** Six thousand and sixteen T H T O [ ][ ][ ][ ]	**c.** Six thousand three hundred and three T H T O [ ][ ][ ][ ]
d. Eight thousand seven hundred T H T O [ ][ ][ ][ ]	**e.** Nine thousand two hundred and forty-five T H T O [ ][ ][ ][ ]	**f.** Ten thousand ten thou-sands T H T O 1 0 0 0 0

3. These numbers are written as sums. Write them in the normal way.

a. 2 000 + 90 = _____ 3 000 + 200 = _____	**b.** 8 000 + 5 = _____ 1 000 + 80 + 7 = _____
c. 8 000 + 200 + 20 = _____ 2 000 + 500 + 90 + 8 = _____	**d.** 4 000 + 50 = _____ 2 000 + 800 + 7 = _____

4. What part of these numbers is missing?

a. 5 000 + 80 + _____ = 5 083	**b.** 7 000 + _____ + 5 = 7 605
c. _____ + 3 000 = 3 050	**d.** _____ + 700 + 1 = 2 701

5. Write the numbers immediately after and before the given number.

a. _____ , 6 049 , _____

b. _____ , 2 324 , _____

c. _____ , 1 800 , _____

d. _____ , 8 809 , _____

e. _____ , 7 385 , _____

f. _____ , 9 244 , _____

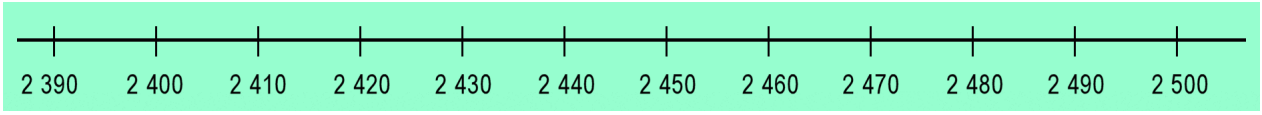
6. These numbers are written as sums, but in a scrambled order! Write them as normal numbers.

a. 4 000 + 900 + 7 = _____	**b.** 80 + 500 + 8 000 + 6 = _____
c. 2 thousand 7 ones 4 tens	**d.** 2 tens 6 hundred 4 thousand
e. 7 thousand 8 hundred 8 ones	**f.** 5 thousand 6 tens
g. 3 thousand 4 ones	**h.** 5 hundred 9 thousand

7. What part of these numbers is missing?

a. 900 + 2 + _____ = 8 902	**b.** 5 000 + 40 + _____ = 5 046
c. _____ + 6 000 + 40 = 6 540	**d.** _____ + 4 000 + 300 = 4 340

8. Here is a number line from 2 390 to 2 500 with tick-marks for every 10.

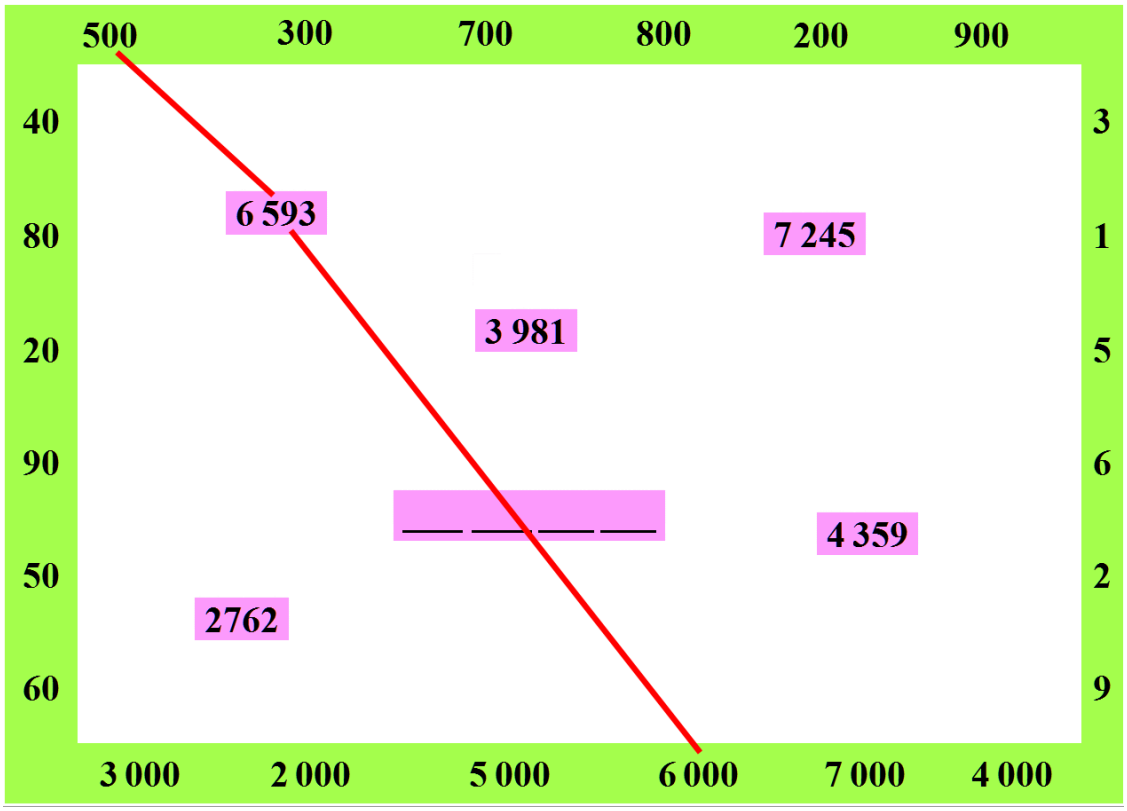


Mark these numbers on the number line (approximately):
2 415 2 398 2 441 2 476 2 483 2 499.

9. Draw a number line from 7 650 to 7 800 with tick marks at every 10.

Mark these numbers on the number line (approximately):
7 659, 7 672, 7 745, 7 758, 7 777, 7 796

10. Connect each number inside the puzzle to its whole thousands, hundreds, tens and ones that it contains. For example, 6 593 is connected to 6 000 and to 500 (for starters).
Add the unused numbers from the border to form the missing number inside.



11. Solve the puzzle. Think of breaking up the numbers into thousands, hundreds, tens and ones.

	+		+		+		=	5 206
+		+		+		+		
	+		+		+		=	3 078
+		+		+		+		
	+		+		+		=	1 925
+		+		+		+		
	+		+		+		=	432
=		=		=		=		
5 022		3 235		1 408		976		

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Chapter 7: Geometry
Introduction

The seventh chapter of *Math Mammoth Grade 3* deals with geometry. The emphasis is on two new concepts: area and perimeter.

First, we study and revise shapes where the student divides shapes into new ones, and also encounters some tilings (also known as tessellations). Next, we study in more detail about some quadrilaterals, namely squares, rectangles and rhombi (plural of rhombus).

Then comes the focus of this chapter: perimeter and area. Students find perimeters of polygons, including finding the perimeter when the side lengths are given, and finding an unknown side length when the perimeter is given. They learn about area, and how to measure it in square centimetres, square metres, or in just square units if no unit of length is specified. Students also relate area to the operations of multiplication and addition. They learn to find the area of a rectangle by multiplying the side lengths, and to find the area of rectilinear figures by dividing them into rectangles and adding the areas.

We also study the distributive property "in disguise." This means using an area model to represent $a \times (b + c)$ as being equal to $a \times b$ plus $a \times$ c. The expression $a \times (b + c)$ is the area of a rectangle with side lengths a and $(b + c)$, which is equal to the areas of two rectangles, one with sides a and b, and the other with sides a and c.

Multiplying by Whole Tens is a lesson about multiplication such as 3×40 or 90×7. It is put here so that students can then use their multiplication skills to calculate areas of bigger rectangles.

Then we solve many area and perimeter problems. That is necessary so that students are able to distinguish between these two concepts. They also get to see rectangles with the same perimeter and different areas or with the same area and different perimeters.

Lastly, we touch on solids, such as cubes, rectangular prisms, pyramids, cones, and cylinders, and study their faces, edges, and vertices. You can make paper models for them from the printouts provided in the download version of the curriculum. Alternatively you can buy them, usually made in plastic. Search on the internet for "geometric solids."

The Lessons

Helpful Resources on the Internet

Use these online resources as you see fit to supplement the main text.
Disclaimer: *These links were valid at the time of the writing of this book, and to the best of our knowledge we believe these websites to have what is described. However, we cannot guarantee that the links have not changed. Parental supervision is recommended.*

SHAPES

Shape Cutter
Draw any shape (polygon), cut it, and manipulate the cut pieces. You can have the computer mix them up, and then try to recreate the original shape.
http://illuminations.nctm.org/ActivityDetail.aspx?ID=72

Patch Tool
An online activity where the student designs a pattern using geometric shapes.
http://illuminations.nctm.org/ActivityDetail.aspx?ID=27

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

Interactive Quadrilaterals
Drag the corners to play with squares, rectangles, rhombi and more.
http://www.mathsisfun.com/geometry/quadrilaterals-interactive.html

Shapes Identification Quiz from ThatQuiz.org
An online quiz in a multiple-choice format, asking to identify common two-dimensional shapes. You can modify the quiz parameters to your liking.
http://www.thatquiz.org/tq-f/math/shapes/

Tangram puzzles for kids
Use the seven pieces of the Tangram to form the given puzzle.
Complete the puzzle by moving and rotating the seven shapes.
http://www.abcya.com/tangrams.htm

Interactive Tangram Puzzle
Place the tangram pieces so they form the given shape.
http://nlvm.usu.edu/en/nav/frames_asid_112_g_2_t_1.html

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

Online Kaleidoscope
Create your own kaleidoscope creation with this interactive tool.
http://www.zefrank.com/dtoy_vs_byokal/

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. Options also include area and perimeter problems for irregular rectangular areas, and more.
http://www.homeschoolmath.net/worksheets/area_perimeter_rectangles.php

Everything you wanted to know about area and perimeter
Short explanations of how to find the perimeter of simple shapes and the area of rectangles, followed by quizzes on three levels. In perimeter, level two, some side lengths are not given. In level three, you calculate the perimeter of compound shapes. In area of rectangles, level 1 has just rectangles, and levels 2 and 3 have compound shapes made of rectangles.
http://www.bgfl.org/custom/resources_ftp/client_ftp/ks2/maths/perimeter_and_area/index.html

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

Math Playground: Measuring the Area and Perimeter of Rectangles
Amy and her brother, Ben, explain how to find the area and perimeter of rectangles and show you how changing the perimeter of a rectangle affects its area. After the lesson, you will use an interactive ruler to measure the length and width of 10 rectangles, and to calculate the perimeter and area of each.
http://www.mathplayground.com/area_perimeter.html

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.
http://www.mathplayground.com/PartyDesigner/PartyDesigner.html

BBC Bitesize - Perimeter
Perimeter activity ad quiz.
http://www.bbc.co.uk/education/topics/zrf3cdm

Geometry Area/Perimeter Quiz from ThatQuiz.org
An online quiz, asking either the area or perimeter of rectangles, triangles, and circles. You can modify the quiz parameters to your liking, for example to omit the circle, or instead of solving for area, you solve for an unknown side when the perimeter/area is given.
http://www.thatquiz.org/tq-4/?-j201v-lc-m2kc0-na-p0

FunBrain: Shape Surveyor Geometry Game
A simple and easy game that practises finding either the perimeter or area of rectangles.
http://www.funbrain.com/poly/index.html

Area of Rectangle
Drag the corners of the rectangle and see how the side lengths and areas change.
http://illuminations.nctm.org/ActivityDetail.aspx?ID=46

XP Math: Find Perimeters of Parallelograms
This online quiz shows you parallelograms and rectangles, and you need to calculate the perimeter, including typing in the right unit, and not using the altitude of the parallelogram.
http://www.xpmath.com/forums/arcade.php?do=play&gameid=10

SOLIDS

Identify Solids
Select the name and drop it on the correct solid.
http://www.softschools.com/math/geometry/shapes/solids/games/

Geometric Solids
Manipulate various geometric solids. Colour in the solid to investigate properties such as the number of faces, edges, and vertices.
http://illuminations.nctm.org/ActivityDetail.aspx?ID=70

2-D and 3-D Shapes
Learn about different solids and see them rotate.
http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/3d/index.htm

Identify solids
Click to identify the partially buried 3-dimensional shapes.
http://www.primaryresources.co.uk/online/longshape3d.html

Space Blocks
Build with blocks to illustrate three-dimensional shapes.
http://nlvm.usu.edu/en/nav/frames_asid_195_g_2_t_2.html

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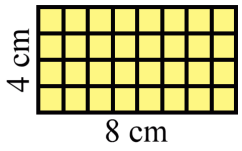
Area and Perimeter Problems

Sometimes it is easy to confuse perimeter and area.

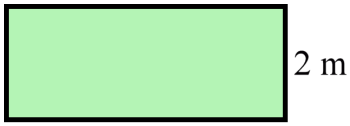
- AREA has to do with covering the shape with squares. Your answer will be in square centimetres, square metres, or just square units.
- PERIMETER has to do with "going all the way around." Your answer will be in some unit of length, such as centimetres or metres.



Area: 4 cm × 8 cm = 32 cm^2.

Perimeter:
4 cm + 8 cm + 4 cm + 8 cm = 24 cm

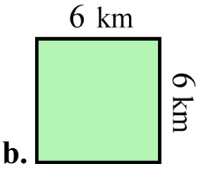
1. Find the area and perimeter of the rectangles.



a.

Perimeter = _____

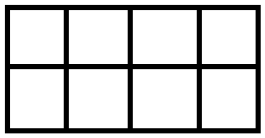
Area = _____



b.

Perimeter = _____

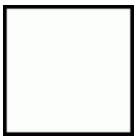
Area = _____



c. 4 m wide, 2 m tall

Perimeter = _____

Area = _____



d. A square with 3 cm sides

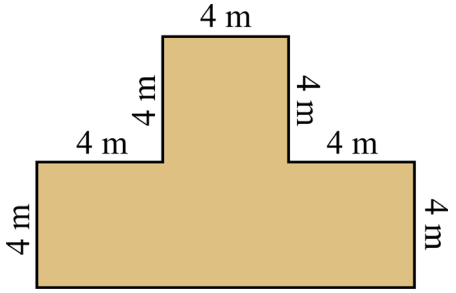
Perimeter = _____

Area = _____

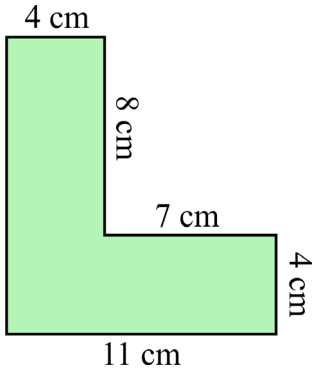
2. Find the area and perimeter of this shape.
Notice that one side length is not given.
You need to figure that out.

Area:

Perimeter:



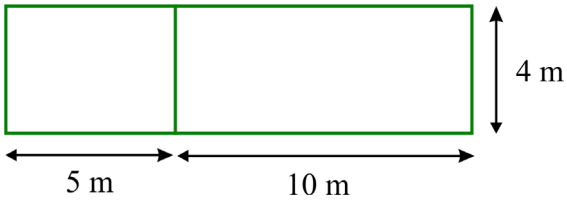
3. Find the area and perimeter of this shape.
Notice that one side length is not given.
You need to figure that out.



Area:

Perimeter:

4. This is a two-part lawn.



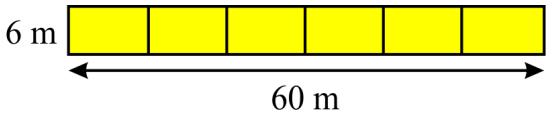
a. Find the areas of the two parts.

_____ and _____

b. Find the total area.

c. Find the perimeter.

5. Find the total area of this rectangle,
and also the area of each little part.

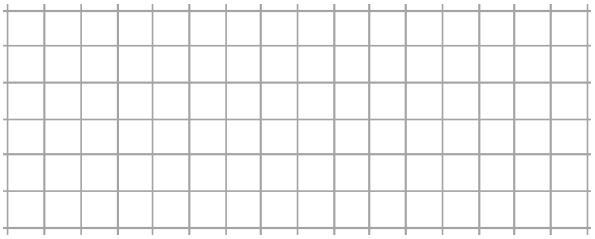


Area of each part:

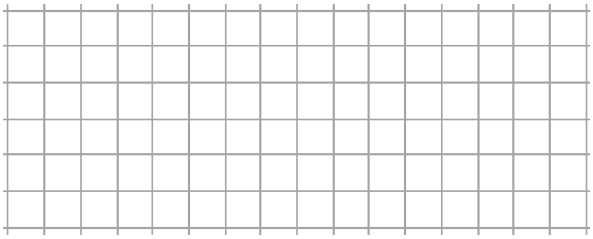
Total area:

Puzzle Corner

Can you draw these rectangles? Guess and check!



a. Draw a rectangle with an area of 39 squares, and a perimeter of 32 units.



b. Draw a rectangle with an area of 56 squares, and a perimeter of 36 units.

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Chapter 8: Measuring
Introduction

The eighth chapter of *Math Mammoth Grade 3* covers measuring-related topics.

If you have the downloadable version of this book (PDF file), you need to print this file as 100%, not "shrink to fit," "print to fit," or similar. If you print "shrink to fit," some exercises about measuring in centimetres will not come out right, but will be "shrunk" compared to reality.

First, children learn about units of length in the metric system. Then, in the following lesson, they measure using centimetres and millimetres.

Later, students study line plots and get more practice measuring objects at home or in the classroom.

The next lesson helps students become familiar with metres and kilometres—the units for measuring medium and long distances.

Then it is time to measure weight. The lesson deals with grams and kilograms. It is very helpful if you can use a kitchen scales for this lesson, perhaps borrowing one if you do not own one.

Lastly, we study the metric units of liquid volume (litre and millilitre). The emphasis is on becoming familiar with measuring volume in millilitres.

Many of the lessons in this chapter also have an optional section about conversions between measuring units, such as changing three metres into centimetres. Converting between units is beyond the Common Core standards for third grade (it is actually included in the 4th and 5th grade standards), but I have included some easy conversion problems here because I feel many third graders are ready for them.

We all use various measuring units in our everyday lives, and using them is the key to remembering what they are, how big they are and what the conversion factors are. The units your child is not using are likely to be forgotten easily. So encourage the student(s) to have free play time with measuring devices such as a scales, measuring cups, measuring tapes, and rulers.

The Lessons

Helpful Resources on the Internet

Disclaimer: *These links were valid at the time of the writing of this book, and to the best of our knowledge we believe these websites to have what is described. However, we cannot guarantee that the links have not changed. Parental supervision is needed.*

Measuring - Find Lengths with a Ruler
Drag the ruler to measure the length of the given lines. Choose "Tenths" for this grade level, then enter the length using a decimal, such as 0.3 cm.
http://www.abcya.com/measuring.htm

Measure It!
Practise measuring lines with either centimetres or inches. Multiple choice questions.
http://www.funbrain.com/measure

Measuring activity
Measure the given lines with a centimetre-ruler, including lines you draw on your own, with this interactive activity.
http://www.taw.org.uk/lic/itp/itps/ruler_1_2.swf

Measurement Game for Kids
Measure the length and weight of various parcels using the interactive scale and ruler so you can give them a stamp with the correct postage rate.
http://www.kidsmathgamesonline.com/geometry/measurement.html

Reading Scales
Illustrate a variety of measuring devices, such as scales, measuring cup, thermometer, and speedometer, and how to read them. Generate examples using different scales on different devices at the press of a button.
http://www.teacherled.com/2008/01/28/reading-scales

Measuring scales
An interactive scales for the purpose of demonstrating how a scales works. You can add weights to the scales and choose to show or hide the total weight.
http://www.taw.org.uk/lic/itp/itps/measuringScales_1_8.swf

Reading Scales
Weigh objects on this virtual balance scale, using weights of 10 g, 50 g, 250 g and 500 g.
http://www.teacherled.com/resources/oldscales/oldscalesload.html

Scales Reader
Simple online practise of reading the scales. Choose "up to 500 g" or "up to 1 kg" for this level, so as to practice reading the scales to the accuracy of 10 or 20 grams.
http://www.ictgames.com/weight.html

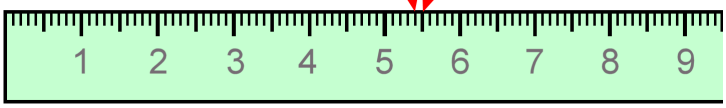
Mostly Postie!
Choose "grams". Place a letter on the scale, and enter the reading, and click "check."
http://www.ictgames.com/mostlyPostie.html

Measures
An online activity about metric measuring units and how to read scales, a measuring cup, and a ruler.
http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/measures

Centimetres and Millimetres

This ruler measures in centimetres.
The numbers signify whole centimetres.
All the shorter lines between those are for *millimetres*.

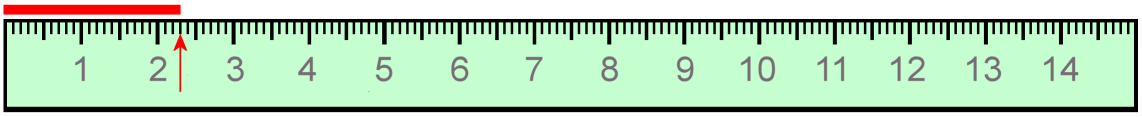
The distance between these two is 1 mm.



The distance from one short line to the next line is *1 millimetre*. We write 1 mm. Millimetres are very tiny!

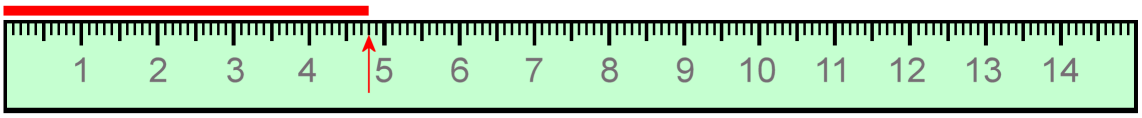
Look at the ruler: **there are 10 millimetres in each centimetre.**

Measuring lines: First see how many whole centimetres long the line is. Then count how many little millimetre-lines beyond that it reaches.



This line is 2 cm 3 mm long. At the same time, it is 23 mm long. Why?

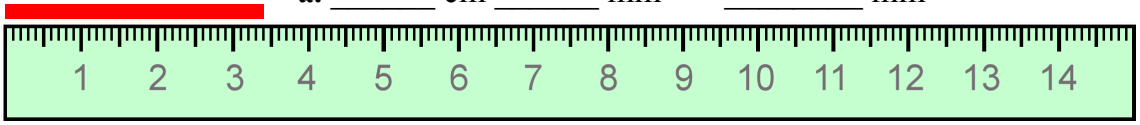
Each centimetre is 10 mm, so 2 cm is 20 mm. That means 2 cm 3 mm makes 23 mm in total.



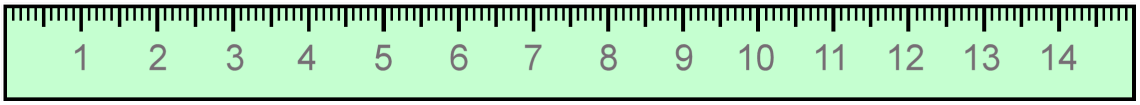
This line is 4 cm 8 mm long. At the same time, it is 48 mm long.

1. Measure the lines using the ruler, first in whole centimetres and millimetres. Then write their lengths using millimetres only.

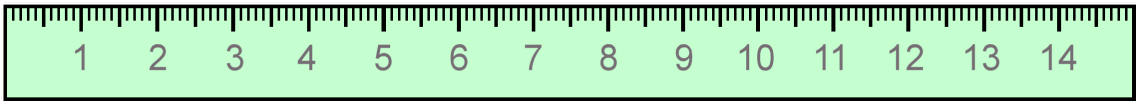
a. _____ cm _____ mm = _____ mm

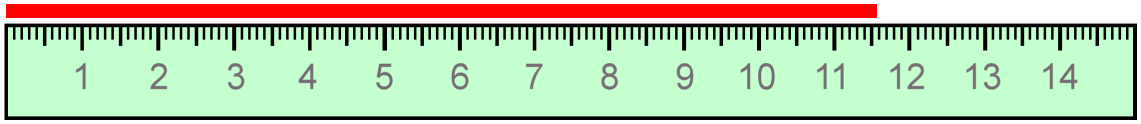


b. _____ cm _____ mm = _____ mm

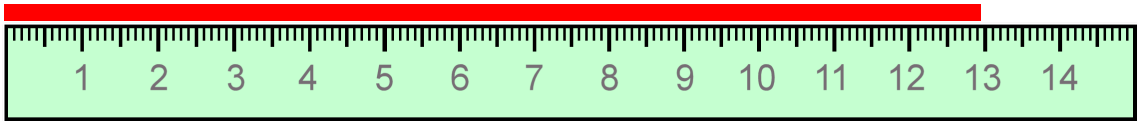


c. _____ cm _____ mm = _____ mm

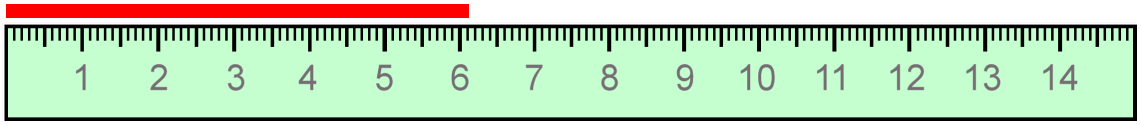




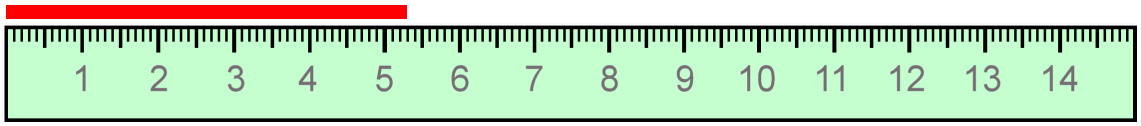
d. _____ cm _____ mm = _____ mm



e. _____ cm _____ mm = _____ mm



f. _____ cm _____ mm = _____ mm



g. _____ cm _____ mm = _____ mm

2. Draw lines using a ruler.

a. 7 cm 8 mm

b. 10 cm 5 mm

c. 14 mm

d. 55 mm

e. 126 mm

3. Measure items you can find at home, using a centimetre-millimetre ruler.
If the item is not exactly as long as the markers on the ruler, choose the nearest mark.

Item	Length

4. Change between centimetres and millimetres.

a.	b.	c.
1 cm = _____ mm	1 cm 1 mm = *11* mm	4 cm 5 mm = _____ mm
2 cm = _____ mm	1 cm 2 mm = _____ mm	2 cm 5 mm = _____ mm
5 cm = _____ mm	1 cm 8 mm = _____ mm	7 cm 8 mm = _____ mm
8 cm = _____ mm	2 cm 3 mm = _____ mm	10 cm 4 mm = _____ mm

5. Change between millimetres and centimetres.

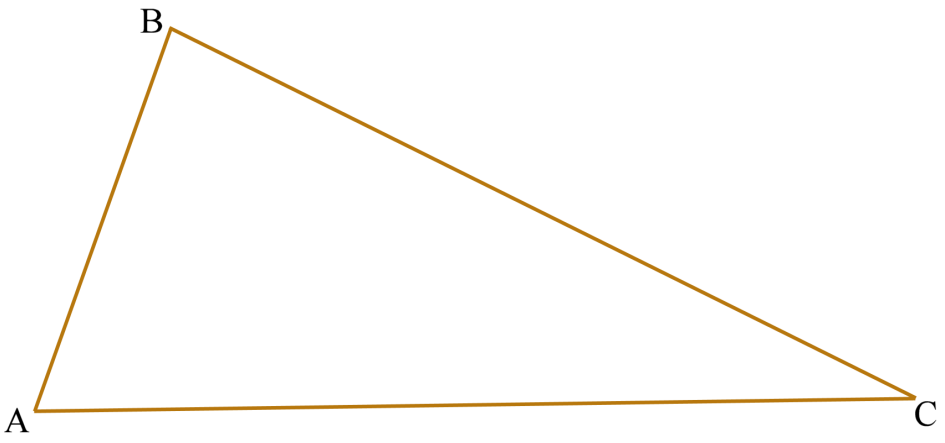
a.	b.	c.
70 mm = _____ cm	12 mm = ____ cm _____ mm	89 mm = ____ cm _____ mm
100 mm = _____ cm	45 mm = ____ cm _____ mm	102 mm = ____ cm _____ mm

6. Measure the sides of this triangle in millimetres.

Side AB _____ mm

Side BC _____ mm

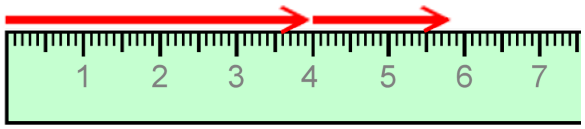
Side CA _____ mm



7. Find the perimeter of the triangle in the previous exercise.

8. Draw the third side of this triangle.
Then measure its sides.
Lastly, find its perimeter in millimetres.

The first arrow is 4 cm. The second arrow is 1 cm 8 mm. How long are they together? Add, giving your answer in millimetres.



4 cm + 1 cm 8 mm = 5 cm 8 mm = 58 mm

Add centimetres with centimetres, and millimetres with millimetres.
Remember that 10 millimetres makes 1 centimetre.

9 mm + 6 cm + 2 mm = 6 cm 11 mm = 7 cm 1 mm = 71 mm

If you have both millimetres and centimetres, change the centimetres to millimetres first:

84 mm + 3 cm + 9 mm = 84 mm + 30 mm + 9 mm = 123 mm (which is also 12 cm 3 mm)

9. Work out these "line additions." Give your answers in millimetres.

a. 1 cm 5 mm + 5 mm	**b.** 28 mm + 7 cm
c. 5 mm + 5 cm 8 mm	**d.** 2 cm 4 mm + 4 cm 5 mm
e. 52 mm + 2 cm 4 mm	**f.** 6 cm + 8 mm + 17 mm
g. 9 mm + 17 mm + 2 cm	**h.** 139 mm + 50 cm + 2 mm

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Chapter 9: Division
Introduction

The ninth chapter of *Math Mammoth Grade 3* covers the concept of division, basic division facts that are based on the multiplication tables, and the concept of remainder. The aim is to lay a good foundation for the concept of division, cementing the link between multiplication and division.

The concept of division in itself is not difficult—after all, it is like backwards multiplication. The student needs to know the multiplication tables well as a prerequisite for this chapter. The student can start studying the lessons in this chapter even if he still needs some practice with the multiplication tables, but if he is a long way from mastering them, he should not study this chapter yet.

There are basically two ways to illustrate division with concrete objects. The first way is equal sharing: we divide or share items equally among people. For example, the problem 12 ÷ 3 would mean, "If you share 12 bananas equally among 3 people, how many bananas does each one get?"

The second way has to do with grouping. The problem 12 ÷ 3 would be, "If you have 12 items, how many groups of three items can you make?" These two interpretations of division are important to understand so that the student can solve real-life and mathematical problems involving division.

We also study division by zero. From studying that lesson, students should recognise that division by zero "does not work." I realise that in higher forms of mathematics, division by zero may be defined (such as 1 ÷ 0 = infinity). For now, this is the understanding that a third grader should get.

Lastly, students study the concept of remainder, or division that is not exact. We start by letting the students find the remainder using visual models (you could also use manipulatives). Then they learn how to find the remainder by calculating. This concept will be studied again in fourth grade.

The Lessons

Helpful Resources on the Internet

Rectangle Division
Practise division with remainders using a rectangle model.
http://nlvm.usu.edu/en/nav/frames_asid_193_g_2_t_1.html

Mr. Martini's Classroom: Multiplication and Division Inequalities
Compare expressions involving basic multiplication and division. The first number from the left (below the screen) lets you control the maximum number in the problems.
http://www.thegreatmartinicompany.com/inequalities/multiplicationdivinequality.html

Mystery Picture Game
Using division and addition.
http://www.dositey.com/2008/math/m/mystery2AD.htm

Fun 4 the Brain
Practise your basic facts with these simple games that appeal to students.
http://www.fun4thebrain.com/division.html

Math Magician Games
Flashcard problems in all four operations. Answer 20 questions in one minute.
http://www.oswego.org/ocsd-web/games/Mathmagician/cathymath.html

Cross the Swamp
Help Little Ron move from log to log across the swamp and practise multiplication/division or addition/subtraction.
http://www.bbc.co.uk/schools/starship/maths/crosstheswamp.shtml

Arithme-Tiles
Use the four operations and numbers on neighbouring tiles to make target numbers.
http://www.primarygames.com/math/arithmetiles/index.htm

Math Games at Sheppard Software
A bunch of different games to practise addition, subtraction, multiplication, and division facts: Fruit Shoot, Pop Up Math, Math MahJong, Matching games, Make 24, and many more. The site also has games for place value, coins, fractions, and other topics.
http://www.sheppardsoftware.com/math.htm

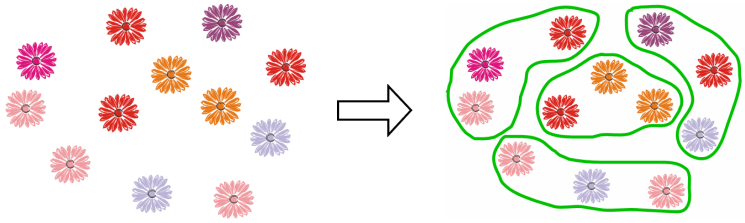
Arcademic Skill Builders
Website with fun, arcade-type games to practise the four basic operations. Both single- and multi-user games.
http://www.arcademics.com/

MathCar Racing
Keep ahead of the computer car by thinking logically, and practise any of the four operations at the same time.
http://www.funbrain.com/osa/index.html

Tux Math
A free software. This is a versatile arcade game for maths facts with many options. Includes all operations. You need to shoot falling comets that can damage penguins' igloos.
http://sourceforge.net/projects/tuxmath
Read also my review at **http://www.homeschoolmath.net/reviews/tux_math.php**

Division as Making Groups

There are 12 daisies. Make groups of 3.

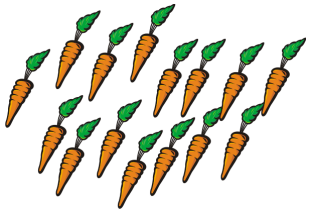


How many groups? *Four groups.*

How many 3's are there in 12? *Four.*

1. Divide into groups.

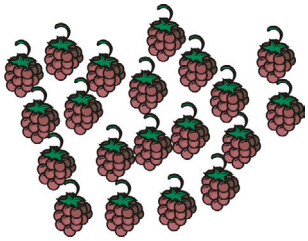
a. There are 15 carrots. Make groups of 5.



How many groups? _____

How many 5's are there in 15? _____

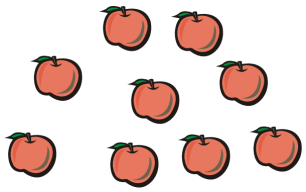
b. There are _____ berries. Make groups of 4.



How many groups? _____

How many 4's are there in _____? _____

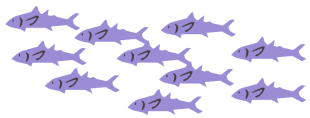
c. There are _____ apples. Make groups of 3.



How many groups? _____

How many 3's are there in _____? _____

d. There are _____ fish. Make groups of 2.



How many groups? _____

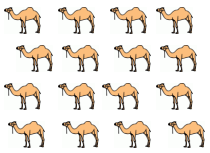
How many 2's are there in _____? _____

e. There are _____ daisies. Make groups of 6.

How many groups? _____

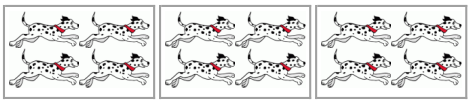
How many 6's are there in _____? _____

f. There are _____ camels. Make groups of 4.



How many groups? _____

How many 4's are there in _____? _____



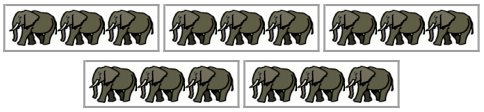
DIVIDE... 12 dogs into groups of **four**.

How many groups? *Three*

How many 4's in 12? _____

$12 \div 4 = 3$

"Twelve divided by four is three."



DIVIDE... 15 elephants into groups of **three**.

How many groups? _____

How many 3's in 15? _____

$15 \div 3 = 5$

"Fifteen divided by three is five."

18 ÷ 6 = ? *Think*: If you DIVIDE 18 into groups of six, how many groups are there? How many groups of six are there in 18? How many sixes are there in 18?

Since 6 + 6 + 6 = 18, there are THREE sixes in 18. So, 18 ÷ 6 = 3.

2. Write a division sentence to fit the pictures in exercise 1.

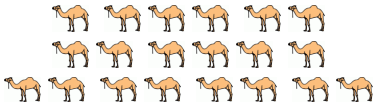
a. _____ ÷ _____ = _____	**b.** _____ ÷ _____ = _____	**c.** _____ ÷ _____ = _____
d. _____ ÷ _____ = _____	**e.** _____ ÷ _____ = _____	**f.** _____ ÷ _____ = _____

3. Make a division sentence.

a. Divide 10 rams into groups of two. How many groups?

_____ ÷ _____ = _____

b. Divide _____ camels into groups of four. How many groups?

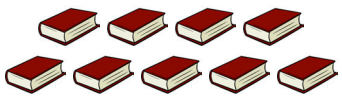


_____ ÷ _____ = _____

c. Divide _____ apples into groups of six. How many groups?

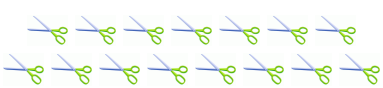
_____ ÷ _____ = _____

d. Divide _____ books into groups of three. How many groups?



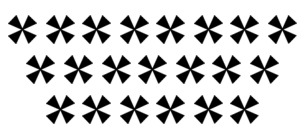
_____ ÷ _____ = _____

e. Divide _____ pairs of scissors into groups of five. How many groups?



_____ ÷ _____ = _____

f. Divide _____ crosses into groups of three. How many groups?

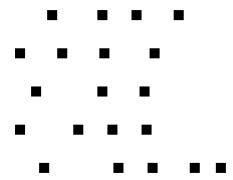
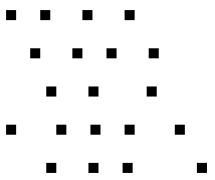
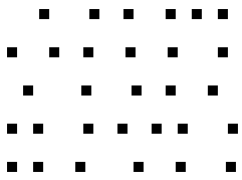
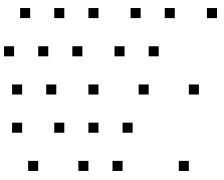
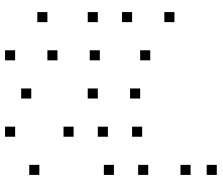
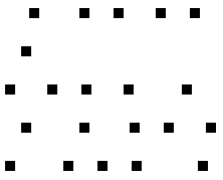
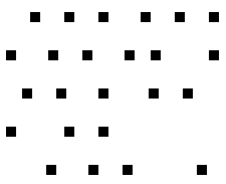
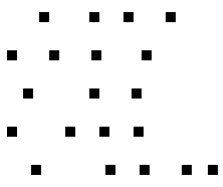


_____ ÷ _____ = _____

4. Draw sticks. Divide them into groups to fit the division sentence.

a. 18 ÷ 3 = _____	**b.** 24 ÷ 2 = _____
c. 21 ÷ 3 = _____	**d.** 25 ÷ 5 = _____
e. 15 ÷ 5 = _____	**f.** 24 ÷ 8 = _____

5. Make groups by circling dots and write a division sentence.

a. Make groups of 4  _____ ÷ 4 = _____	**b.** Make groups of 2  _____ ÷ 2 = _____	**c.** Make groups of 6  _____ ÷ 6 = _____	**d.** Make groups of 3  _____ ÷ 3 = _____
e. Make groups of 5  _____ ÷ 5 = _____	**f.** Make groups of 7  _____ ÷ 7 = _____	**g.** Make groups of 6  _____ ÷ 6 = _____	**h.** Make groups of 10  _____ ÷ 10 = _____

6. Solve the word problems. Write a division or a multiplication for each problem.
The box ☐ is for the × or ÷ symbol.

a. The class has 20 children. Each minibus will hold five children. How many minibuses are needed for the class? _____ ☐ _____ = _____	**b.** Keith placed 30 marbles in rows of 5. How many rows did he get? _____ ☐ _____ = _____
c. Ellie packed hairpins in bags. She put 20 pins in each bag and filled four bags. How many pins were there? _____ ☐ _____ = _____	**d.** Karen packed 28 T-shirts in bags. She put four shirts in each bag. How many bags did she use? _____ ☐ _____ = _____
e. Bill has 16 poster boards. He needs four of them to make a big poster. How many big ones can he make? _____ ☐ _____ = _____	**f.** Molly studied three hours each day for seven days. How many hours did she spend studying in total? _____ ☐ _____ = _____

7. Solve. You can draw to help. Can you find a pattern?

a.	**b.**	**c.**
4 ÷ 2 = _____	20 ÷ 10 = _____	10 ÷ 5 = _____
6 ÷ 2 = _____	30 ÷ 10 = _____	15 ÷ 5 = _____
8 ÷ 2 = _____	40 ÷ 10 = _____	20 ÷ 5 = _____
10 ÷ 2 = _____	50 ÷ 10 = _____	25 ÷ 5 = _____
12 ÷ 2 = _____	_____ ÷ 10 = _____	_____ ÷ 5 = _____
14 ÷ 2 = _____	_____ ÷ 10 = _____	_____ ÷ 5 = _____
16 ÷ 2 = _____	_____ ÷ 10 = _____	_____ ÷ 5 = _____
_____ ÷ 2 = _____	_____ ÷ 10 = _____	_____ ÷ 5 = _____
_____ ÷ 2 = _____	_____ ÷ 10 = _____	_____ ÷ 5 = _____

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Chapter 10: Fractions
Introduction

The last chapter of *Math Mammoth Grade 3* deals with a few elementary fraction concepts: the concepts of a fraction and of a mixed number, fractions on a number line, equivalent fractions, and comparing fractions.

First, the child learns to identify fractions in visual models, and to draw "pie models" for some common fractions. You can also use manipulatives or the fraction cut-outs provided. In the download version, they are found in their separate folder, and in the printed version, they are appended to the answer key.

Next, students represent fractions on a number-line diagram by partitioning the interval from 0 to 1 into equal parts. They also study fractions on number lines that go up to 3 and learn to write whole numbers as fractions.

The lesson about mixed numbers relies on visual models and number lines. I strongly feel that students first need to understand fraction operations and concepts with the help of visual models or manipulatives, and not introducing the various rules for calculations too soon. Students match fractions and mixed numbers, and even convert mixed numbers back into fractions using visual models. The actual rule for the conversion is not introduced on this level.

Next, we study equivalent fractions. Students recognise and generate simple equivalent fractions using visual models and number lines.

Lastly, students compare fractions in special cases, such as when they have the same numerator or the same denominator, or when the comparison can be made from visual models. They also learn that comparisons are valid only when the two fractions refer to the same whole.

The Lessons

Helpful Resources on the Internet

Disclaimer: *These links were valid at the time of the writing of this book, and to the best of our knowledge we believe these websites to have what is described. However, we cannot guarantee that the links have not changed. Parental supervision is needed.*

Conceptua Fractions: Identify Fractions
A visual tool that shows fractions or mixed numbers using a pie, a bar, dots, and a number line.
https://www.conceptuamath.com/app/tool-library#IdentifyingFractions

Visualizing Fractions
This tool shows you a fraction, and you divide the pie and colour in the pieces.
http://nlvm.usu.edu/en/nav/frames_asid_103_g_2_t_1.html

Pattern Blocks - Parts as Wholes
Click on the "Activities" in the top menu, and click on arrows until you find the "Parts as Wholes" activity.
http://nlvm.usu.edu/en/nav/frames_asid_170_g_2_t_3.html

Fraction Models
Adjust the the numerator and the denominator, and the applet shows the fraction as a pie/rectangle/set model, as a decimal, and as a percent.
http://illuminations.nctm.org/Activity.aspx?id=3519

Clara Fraction's Ice Cream Shop
Convert improper fractions into mixed numbers and scoop the right amount of ice cream flavours onto the cone.
http://www.mrnussbaum.com/icecream/index.html

Equivalent Fractions from National Library of Virtual Manipulatives (NLVM)
See the equivalency of two fractions as the applet divides the whole into more pieces.
http://nlvm.usu.edu/en/nav/frames_asid_105_g_2_t_1.html

Equivalent Fractions
Construct two other, equivalent fractions to the given fraction using a circle or a square. Use the sliders to divide your shape into a certain amount of parts, then click on the parts to colour in some of them. Click the check mark to check if you got the equivalent fractions right. The fractions are also shown on the number line.
http://illuminations.nctm.org/Activity.aspx?id=3510

Conceptua Math: Equivalent Fractions
A visual tool to illustrate the equivalency of fractions. You can use pie, rectangular, or number line model. Divide each shape into parts using the sliders. Click on parts to colour in or remove the colour from them. Use two or three fractions. Free registration required.
https://www.conceptuamath.com/app/tool/equivalent-fractions

Conceptua Math: Order Fractions on a Number Line
First create fractions using the button on the top right, then lock them. Use the "dot" button to see them placed on the number line. Then you can use the buttons on the left to see the fractions represented in different ways. Lastly, drag the fractions under the number line dots, and press the check mark.
https://www.conceptuamath.com/app/tool/place-fractions-on-a-number-line

Fraction Games at Sheppard Software
Many games for fraction maths. For this level, use the first four games: simple fractions matching, mixed fractions matching, equivalent fractions matching, and comparing fractions balloon pop.
http://www.sheppardsoftware.com/math.htm#fractions

Visual Fractions
Great site for studying all aspects of fractions: identifying, renaming, comparing, addition, subtraction, multiplication, division. Each topic is illustrated by either a number line or a circle with a Java applet. Also a couple of games, for example: make cookies for Grampy.
http://www.visualfractions.com/

Who Wants pizza?
Explains the concept of a fraction, teaches 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 students 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

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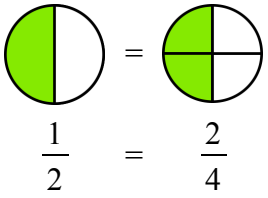
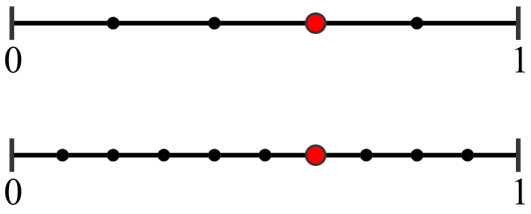
Equivalent Fractions

If you eat half of a pizza, or 2/4 of a pizza, you have eaten the same amount. The two fractions are ***equivalent***.

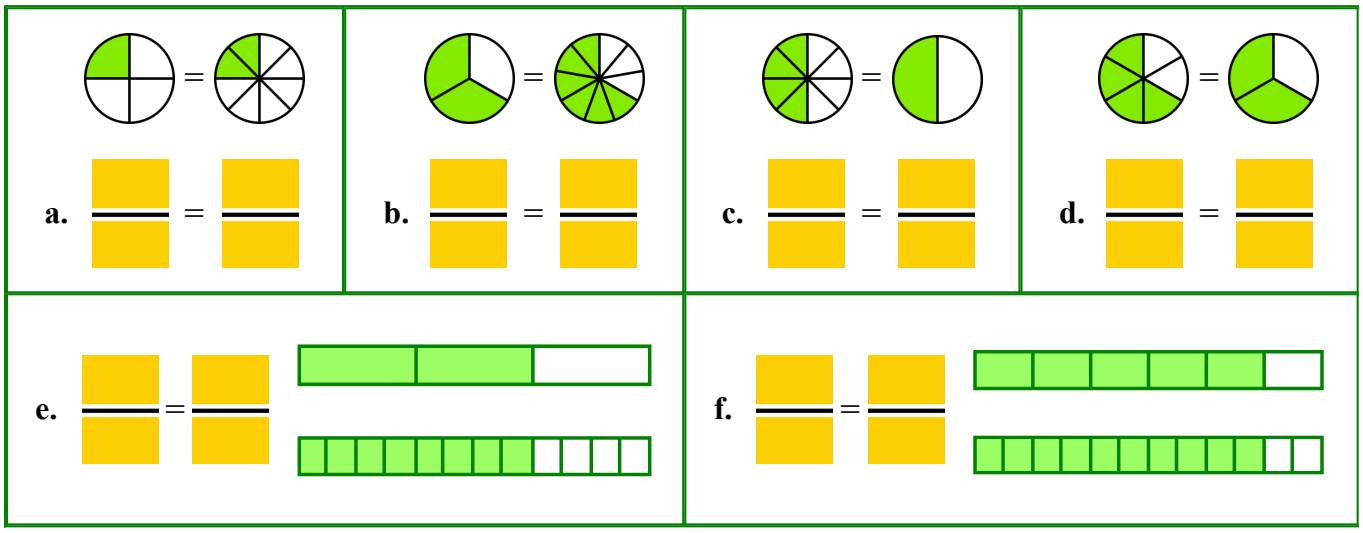
We write an equal sign between them: $\frac{1}{2} = \frac{2}{4}$.



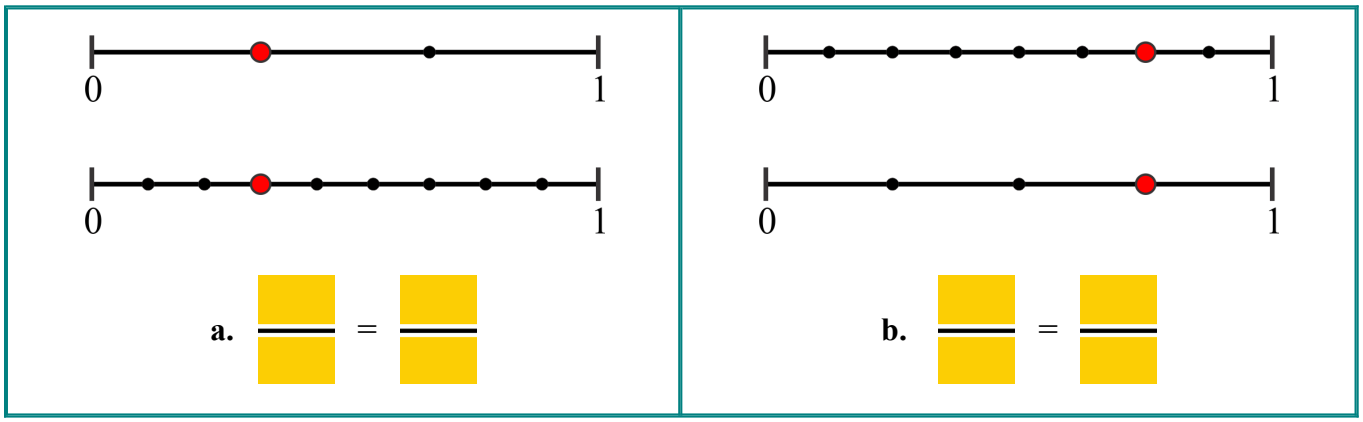
The dot for $\frac{3}{5}$ is in the same place on the number line as the dot for $\frac{6}{10}$. Again, the two fractions are *equivalent*. We can write $\frac{3}{5} = \frac{6}{10}$.



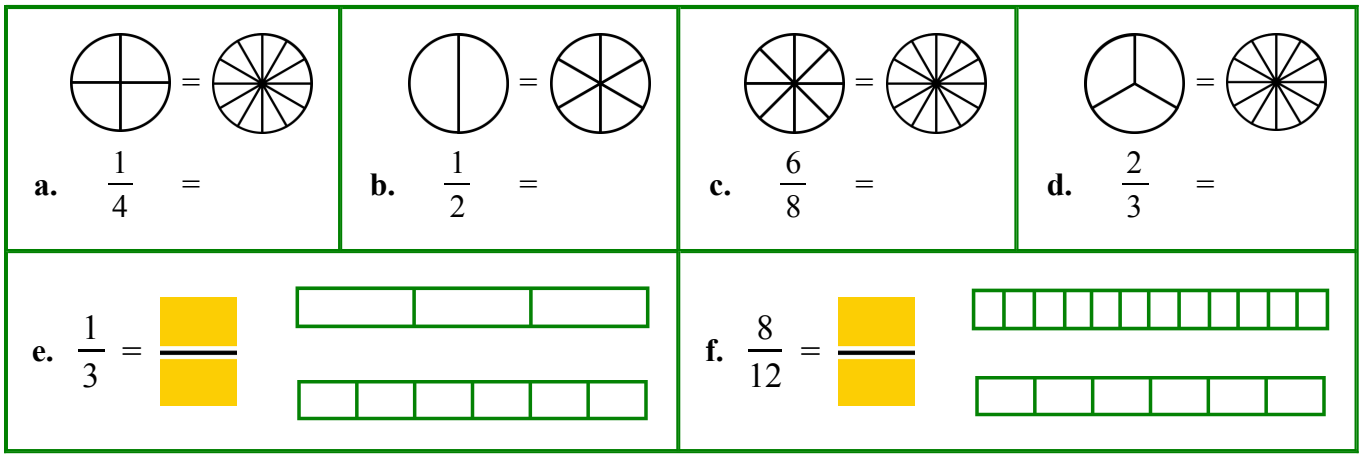
1. Write the equivalent fractions.



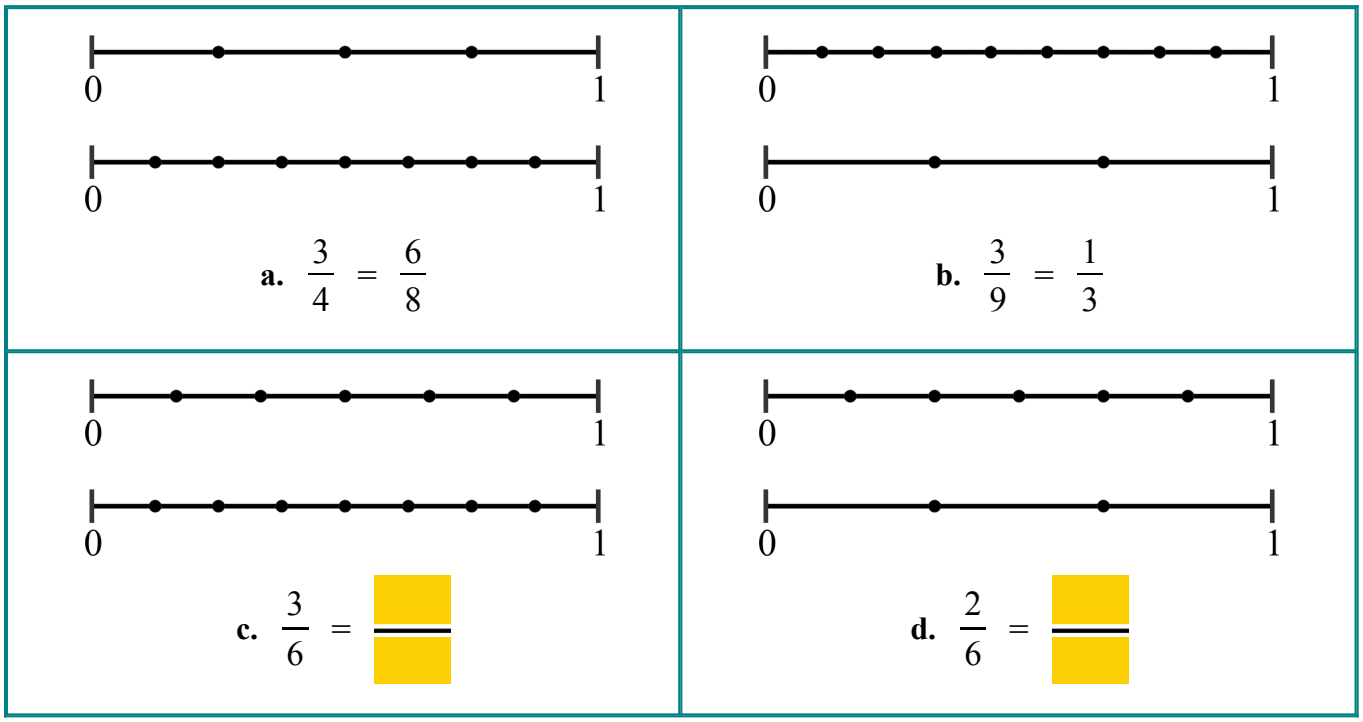
2. Write the equivalent fractions.



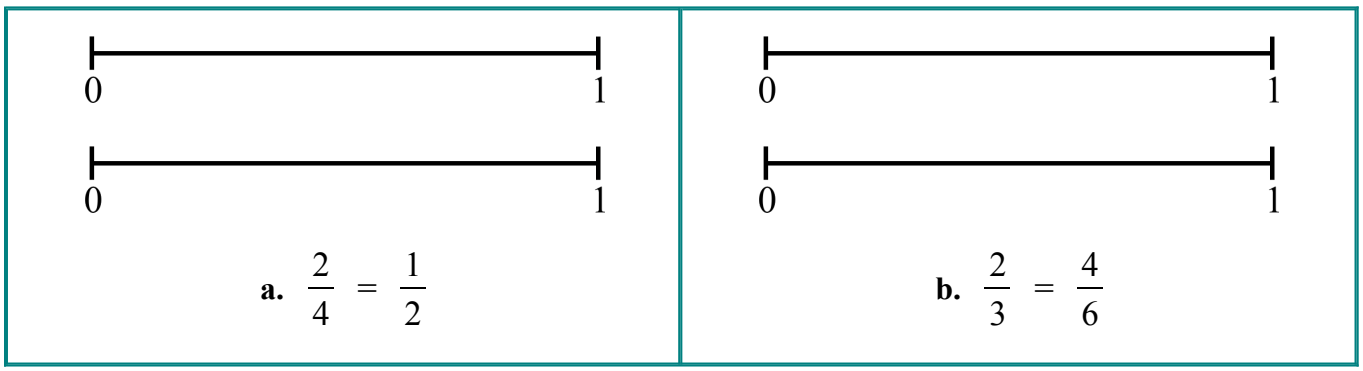
3. Shade the parts for the first fraction. Shade the same *amount* in the second picture. Write the second fraction.



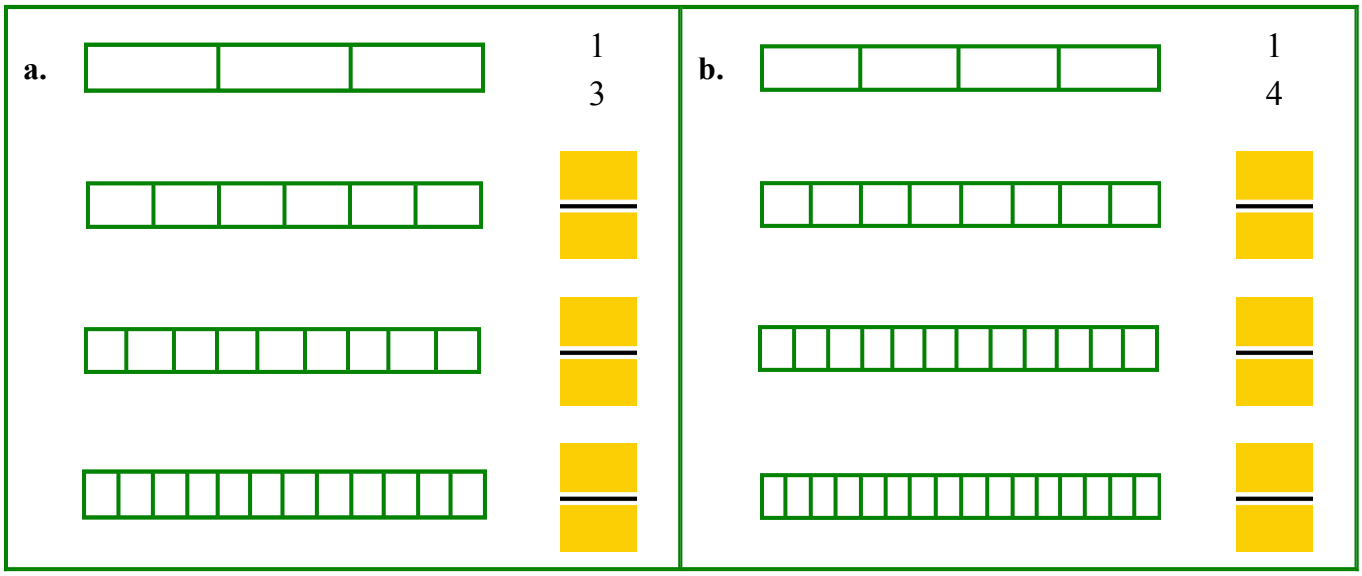
4. Mark the equivalent fractions on the number lines.



5. Mark the equivalent fractions on the number lines. This time, you need to first divide each number line into equal parts.



6. Colour in and write many fractions that are equivalent to the first fraction.



7. Four children have a chocolate bar to share. Luke says, "Let's divide it into four equal pieces, and everybody gets one piece." Ashley says, "No, let's divide it into twelve equal pieces and everybody gets three pieces." Whose idea lets everybody get a fair share?

8. Draw a picture to show that 1/2 = 4/8.

9. **a.** Half of the pie is left. Show in the picture how three persons can share it equally.

b. What two equivalent fractions can you write from your "cutting"?

10. Are 5/5 and 4/4 equivalent fractions?
Why or why not?

Puzzle Corner

Which is longer, a rope that is 3 1/2 metres long or a rope that is 3 1/4 metres long?
How much longer is it?