math MAMMOTH

Grade 3-A Worktext
South African Version

Light Blue Series

- **A**ddition and subtraction
- **M**ultiplication concept
- **M**ultiplication tables
- **T**elling time
- **M**oney

By Maria Miller

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Foreword

Math Mammoth Grade 3-A and Grade 3-B worktexts comprise a complete maths curriculum for the third grade mathematics studies. This South African version has been **customised to South Africa** in the following manners:

- The names used are South African names (instead of Jack and Jill, there are Ansie and Mampho).
- The currency used in word problems is rand. The money chapter teaches both rand and cents.
- The material is "all metric." In other words, the US customary measuring units are not used.
- Spelling is British English instead of American English.
- Paper size is A4.
- Geographic locations used emphasise South African locations (such as Pretoria, Johannesburg).

Please note that the curriculum is not following the South African official syllabus for 3rd grade maths. Instead, it simply is a copy of the US version of Math Mammoth Grade 3, aligned to the US Common Core Standards. This decision was made because of the great amount of work that would be involved in writing new lessons and reorganising old ones to match all the standards in the South African syllabus. For the most part, Math Mammoth is exceeding South African standards. Some standards may not be covered.

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 brain "mulls it over" in the background, and 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 your maths teaching!

Maria Miller, the author

Chapter 1: Addition and Subtraction
Introduction

This first chapter of *Math Mammoth Grade 3-A South African Version* 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

	page	span
Mental Addition	10	*3 pages*
Revision: Mental Subtraction	13	*3 pages*
More Mental Subtraction	16	*3 pages*
Ordinal Numbers and Roman Numerals	19	*3 pages*
More Mental Addition	22	*3 pages*
Mental Subtraction with Three-Digit Numbers	25	*3 pages*
Regrouping in Addition	28	*4 pages*
Revision: Regrouping in Subtraction	32	*3 pages*
Regrouping Twice in Subtraction	35	*4 pages*
Regrouping Twice in Subtraction, Part 2	39	*3 pages*
Regrouping with Zero Tens	42	*3 pages*
Regrouping with Zero Tens, Part 2	45	*3 pages*
Rounding 2-Digit Numbers to the Nearest Ten	48	*2 pages*

Rounding 3-Digit Numbers to the Nearest Ten	50	*3 pages*
The Connection with Addition and Subtraction	53	*4 pages*
Order of Operations	57	*2 pages*
Distance Table	59	*2 pages*
Graphs	61	*3 pages*
Revision, Chapter 1	64	*2 pages*

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.*

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 Matching Game
Drag the Roman numerals to the corresponding Arabic numerals. If you win, the next game will be faster. See if you can beat the clock!
http://sln.fi.edu/time/keepers/Silverman/html/RomanMatch.html

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.
www.greatmathsgames.com/roman_numerals/roman_numerals.htm

Roman Sequence Game
See how fast you can put these Roman numerals in the correct sequence.
http://www.fi.edu/time/keepers/Silverman/html/RomanSequence.html

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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. 14 − 5 = _____	**b.** 12 − 8 = _____	**c.** 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 R50. You purchased two note pads for R13 each.
How much do you have left after the purchase?

8. What if you bought <u>three</u> note pads for R13 each with your R50?
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

	page	span
Many Times the Same Group	68	*1 page*
Multiplication and Addition	69	*3 pages*
Multiplication on a Number Line	72	*3 pages*
Multiplication as an Array	75	*2 pages*
Order of Operations 1	77	*1 page*
Understanding Word Problems, Part 1	78	*3 pages*
Understanding Word Problems, Part 2	81	*2 pages*

Multiplication in Two Ways	83	*4 pages*
Order of Operations 2	87	*2 pages*
Multiplying by Zero	89	*2 pages*
Mixed Revision, Chapters 1 - 2	91	*2 pages*
Revision, Chapter 2	93	*2 pages*

Helpful Resources on the Internet

Use these free online resources to supplement the "bookwork" as you see fit.
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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 visualizes 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 Memory Game
Click on corresponding pairs (the problem and its answer).
http://www.dositey.com/2008/addsub/memorymult.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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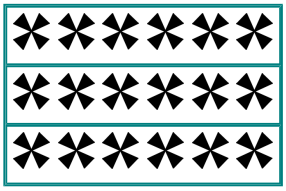
Multiplication as an Array

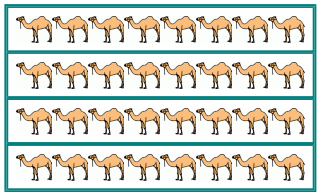
An **array** is an orderly arrangement of things in rows and columns.
When things are neatly aligned in an array, we can think of the *rows as groups*, so an array still pictures multiplication as repeated addition.



3 rows, 6 crosses in each row.

$6 + 6 + 6 =$

$3 \times 6 = 18$

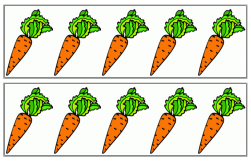


4 rows, 8 camels in each row.

$8 + 8 + 8 + 8 =$

$4 \times 8 = 32$

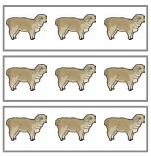
1. Fill in the missing numbers.



a. _____ rows, _____ carrots in each row.

_____ + _____

_____ × _____ = _____ carrots.



b. _____ rows, _____ rams in each row.

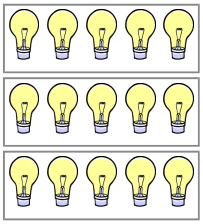
_____ + _____ + _____

_____ ×_____ = _____ rams.

c. _____ rows, _____ bear in each row.

_____ + _____

_____ × _____ = _____ bears



d. _____ rows, _____ bulbs in each row.

_____ + _____+ _____

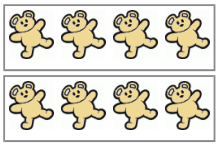
_____ × _____ = _____ bulbs

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

a.

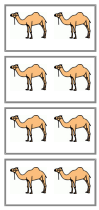
4 + 4 = _____

2 × 4 = _____

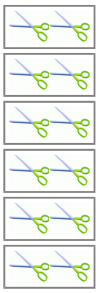


b.

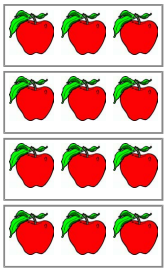
c.



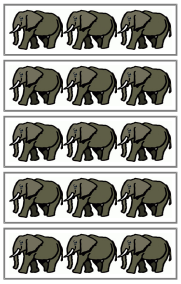
d.



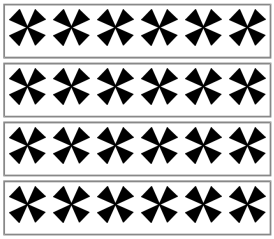
e.



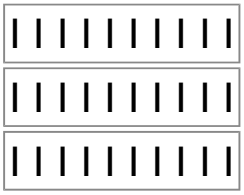
f.



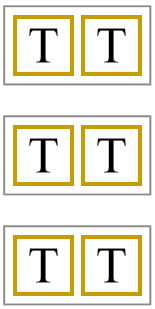
g.



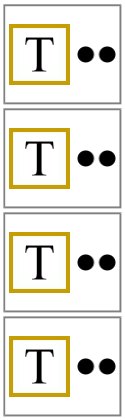
h.



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 like 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.youtube.com/watch?v=4bpq3Mqbwv0

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

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 review* 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 review 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 timed computer games that can work very well for drilling facts. For example, Math Magician games has a simple 1-minute countdown, and if you answer 20 questions in that time, you get an award. **http://www.oswego.org/ocsd-web/games/Mathmagician/cathymath.html**

Some of the games at the link below do not time you but give you more points the faster you go. That site is actually filled with several types of games just for maths facts practice.
http://www.sheppardsoftware.com/math.htm

Yet 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?

Yes, the basic idea is to stay on the table until it is mastered. That can take a varying amount of days depending on the child, the number of practice sessions, and other constraints on the child's time. It is best to practise each table at least 2 times a day (because our brains will memorise things much quicker that way), but each session does not have to take a long time.

However, you can also study other maths concepts simultaneously, such as geometry, measuring, addition, or clock, as long as these other topics do not rely heavily on multiplication tables (such as division would). So, you could in effect be studying in two chapters at the same time.

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, the student will probably enjoy playing multiplication games, whether online, on the computer, or other types of games like card and board games.

The Lessons

	page	span
Multiplication Table of 2	100	*3 pages*
Multiplication Table of 4	103	*2 pages*
Multiplication Table of 10	107	*2 pages*
Multiplication Table of 5	107	*3 pages*
More Practice and Revision (Tables of 2, 4, 5, and 10)	110	*3 pages*
Multiplication Table of 3	113	*3 pages*
Multiplication Table of 6	116	*2 pages*
Multiplication Table of 11	118	*3 pages*
Multiplication Table of 9	121	*4 pages*
Multiplication Table of 7	125	*2 pages*
Multiplication Table of 8	127	*3 pages*
Multiplication Table of 12	130	*2 pages*
Mixed Revision, Chapters 1-3	132	*2 pages*
Revision, Chapter 3	134	*3 pages*

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 Tables Structured Drill - video
This video of mine explains how to do a "structured drill" for multiplication tables, which is much more effective than a random drill.
www.youtube.com/watch?v=4bpq3Mqbwv0

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

The Times Tables at Resourceroom.net
Fill in the multiplication chart—part of it or the whole thing—or take quizzes and get graded.
http://www.resourceroom.net/Math/1timestables.asp

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://www.geocities.com/multiplicationfacts

Multiplication Memory Game
Click on corresponding pairs (problem-answer).
http://www.dositey.com/2008/addsub/memorymult.html

Quiz Hub - Multiplication game
Click on corresponding pairs (problem-answer).
http://quizhub.com/quiz/f-multiplication.cfm

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

Product Game
A fun, interactive two-player game that exercises your skill with factors and multiples.
http://illuminations.nctm.org/ActivityDetail.aspx?ID=29

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

Multiplication Table of 2

1. Skip-count in twos. 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. Notice these are *the even numbers*!

0, 2, ____, ____, ____, ____, ____, ____, ____, ____, ____, ____, 24

2. **a.** Fill in the table of 2. **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 × 2 to 6 × 2, and the rest at a later time, such as the next day.

a.

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

b.

____ × 2 = 2	____ × 2 = 14
____ × 2 = 4	____ × 2 = 16
____ × 2 = 6	____ × 2 = 18
____ × 2 = 8	____ × 2 = 20
____ × 2 = 10	____ × 2 = 22
____ × 2 = 12	____ × 2 = 24

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

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

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

☐ × 2 = 14	☐ × 2 = 12	☐ × 2 = 6	☐ × 2 = 12	☐ × 2 = 22
☐ × 2 = 18	☐ × 2 = 16	☐ × 2 = 18	☐ × 2 = 8	☐ × 2 = 10
☐ × 2 = 8	☐ × 2 = 24	☐ × 2 = 14	☐ × 2 = 20	☐ × 2 = 24
☐ × 2 = 16	☐ × 2 = 2	☐ × 2 = 22	☐ × 2 = 4	☐ × 2 = 6

5. Multiply.

a. 2 × 12 = _____ 7 × 1 = _____ 1 × 8 = _____	**b.** 8 × 2 = _____ 2 × 5 = _____ 6 × 2 = _____	**c.** 9 × 2 = _____ 3 × 0 = _____ 1 × 2 = _____	**d.** 2 × 11 = _____ 10 × 2 = _____ 0 × 7 = _____

6. Multiplying by two is the same as **doubling**. Write an addition sentence and multiply by two to double the number in each problem.

a. Double 8 8 + 8 = _____ 2 × 8 = _____	**b.** Double 13 ____ + ____ = _____ ____ × ____ = _____	**c.** Double 15 ____ + ____ = _____ ____ × ____ = _____
d. Double 25 ____ + ____ = _____ ____ × ____ = _____	**e.** Double 32 ____ + ____ = _____ ____ × ____ = _____	**f.** Double 45 ____ + ____ = _____ ____ × ____ = _____

7. Continue the multiplication table of 2 a little bit further. Notice that all the answers in the multiplication table of 2 are **even** numbers.

2 × 12 = _____	2 × 15 = _____	2 × 18 = _____	2 × 21 = _____
2 × 13 = _____	2 × 16 = _____	2 × 19 = _____	2 × 22 = _____
2 × 14 = _____	2 × 17 = _____	2 × 20 = _____	2 × 23 = _____

8. Underline or circle whether the number is even or odd. If the number is even, write it as "two times the number that was doubled." If the number is odd, do nothing.

a. **14** is even/odd 2 × _____	**b.** **7** is even/odd 2 × _____	**c.** **18** is even/odd 2 × _____
d. **21** is even/odd 2 × _____	**e.** **30** is even/odd 2 × _____	**f.** **34** is even/odd 2 × _____

9. Solve. Write a multiplication *or* a multiplication and addition for each problem.

a. How many feet do seven chickens have?

_____ × _____ = _____

b. How many feet do five chickens and one cow have?

_____ × _____ + _____ = _____

c. How many feet do two cows and one chicken have?

_____ × _____ + _____ = _____

d. How many feet do three cows and five chickens have?

_____ × _____ + _____ × _____ = _____

10. Write an animal feet problem to match this addition and multiplication:

$8 \times 2 + 2 \times 4 = 24$

You can also make animal feet problems for your friend/classmate!

11. Solve the word problems. Write a multiplication, addition, or a subtraction, or perhaps a combination of them, for each problem.

a. There were two trees with seven birds in each tree. Three of them flew away. How many birds stayed in the trees?

_____ × _____ − _____ = _____

b. Johan earns R2 every time he helps with the yard work. He did yard work six times and saved all his money. Then he bought a toy that cost R8. How much money did he have left?

Frikkie already had R11 in his piggy bank. Each week, for eight weeks, he saved R2 from the money he earned. Afterwards, he had just enough money to buy a kite. How much did the kite cost?

Puzzle Corner

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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

	page	span
Revision: Reading the Clock	140	*2 pages*
Half and Quarter Hours	142	*2 pages*
Revision: To and Past	144	*2 pages*
How Many Minutes Pass?	146	*3 pages*
Practice	149	*1 page*
Clock to the Minute	150	*3 pages*
Elapsed Time	153	*2 pages*
More on Elapsed Time	155	*4 pages*
Using the Calendar	159	*2 pages*
Mixed Revision, Chapters 1-4	161	*2 pages*
Revision, Chapter 4	163	*1 page*

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

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

Telling Time Practice
Interactive online practice: you drag the hands of the clock to show the correct time.
http://www.worsleyschool.net/socialarts/telling/time.html

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

A Matter of Time
Lesson plans for telling time, interactive activities, and some materials to print.
http://www.fi.edu/time/Journey/JustInTime/contents.html

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

The Right Time
A couple of interactive exercises about reading the clock.
http://www.pitara.com/activities/math/time/time.asp?QNum=3

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

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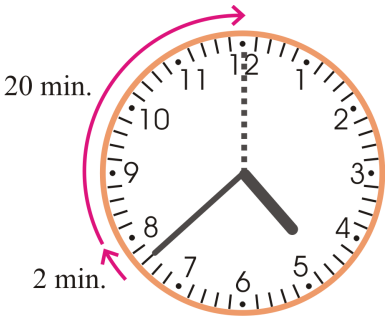
Elapsed Time

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.

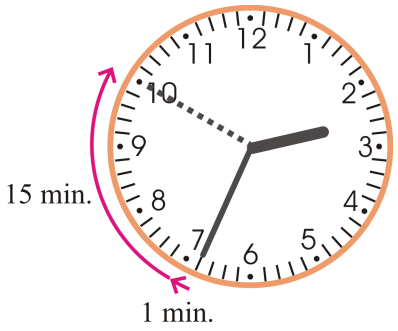


It is 2:34. How many minutes is it to 2:50?

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. Randzo's clock showed 4:22 when she put it into the oven. When should she take it out?

b. Vongani 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. Mashudu wants to wake up 15 minutes before that. When should she wake up?

d. Samkele 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 South African Version* teaches counting coins, making change, and solving simple problems about money.

We start out by revising counting South African 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

	page	span
Revision: Count Coins and Banknotes	165	*2 pages*
Working out the Change	167	*4 pages*
Mental Maths and Money Problems	171	*3 pages*
Adding Money Amounts	174	*2 pages*
Solving Money Problems	176	*4 pages*
Mixed Revision, Chapters 1 - 5	180	*2 pages*
Revision, Chapter 5	182	*1 page*

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 South African coins worksheets
Create free worksheets for counting all South African coins and some notes. You can choose the number of coins, the maximum total amount, and the number of problems.
http://www.homeschoolmath.net/worksheets/south-african-money.php

South African Mint
See specially minted collector coins, such as the 2010 Natura Coin series with black rhinoceros, the Krugerrand Series, the Protea Series with Nadine Gordimer, and others. You will also find information about coin making and the current circulation coins.
http://www.samint.co.za

Revision: Count Coins and Banknotes

5 cents 10 cents 20 cents 50 cents 1 rand 2 rand 5 rand

10 rand

20 rand

50 rand

100 rand

200 rand

Write "R" in front of rand-amounts. A comma separates the rand-amounts from the cents.

= R20,25

= R100,10

1. How much money is shown in the picture? Write the amount.

a. R_____

b. R_____

c. R_____

d. R_____

e. R_____

f. R_____

g. R_____

h. R_____

2. Add mentally the banknotes and coins in each box; then find the total.

a.

R_____ + R_____ = R_____

b.

R_____ + R_____ = R_____

c.

R_____ + R_____ = R_____

d.

R_____ + R_____ = R_____

e.

R_____ + R_____ = R_____

f.

R_____ + R_____ = R_____

3. Three numbers complete a hundred. One is missing. Write the missing number.

a. 25 + 25 = 100	**b.** 15 + 15 = 100	**c.** 35 + 15 = 100	**d.** 45 + 45 = 100	**e.** 60 + 15 = 100