



Marlborough Primary School
Achievement for All

MATHS

POLICY

September 2016

Approved 7.12.16 C&S

Marlborough Primary School Maths Vision Statement

A number based approach to allow for fluent recall, accurate use of terminology and confident problem solving across the curriculum.

Introduction

This policy outlines the teaching, organisation and aims of mathematics teaching and learning at Marlborough Primary School. The policy is based on the expectations of the 2014 National Curriculum Programmes of Study and the Early Years 'Development Matters' EYFS document.

Purpose

Mathematics is a creative and highly inter-connected discipline providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

Aims

The 2014 national curriculum for mathematics aims to ensure that all pupils:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

Computing

Calculators are not used as a substitute for good written and mental arithmetic. They are introduced near the end of Key Stage 2 to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure. Teachers use their judgement about when Computing tools should be used. The school provides pupils' with a Mathematics login so mental arithmetic skills can be practiced at home online.

Spoken language

The national curriculum for mathematics reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically.

The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. Pupils' are assisted in making their thinking clear to themselves as well as others and teachers ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

Early Years Curriculum

The Foundation Stage curriculum is guided by the requirements and recommendations set out in the Early Years 'Development Matters' EYFS document. All children are given opportunities to develop their understanding of mathematics through lessons which use varied activities that allow children to use, enjoy, explore, practise and talk confidently about mathematics.

Key Stage 1 Curriculum

The principal focus of mathematics teaching in Key Stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This involves working with numerals, words and the four operations, including with practical resources [for example, concrete objects and measuring tools].

At this stage, pupils develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching involves using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.

By the end of Year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.

Pupils should be able read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at Key Stage 1.

Lower Key Stage 2 Curriculum

The principal focus of mathematics teaching in lower Key Stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This ensures that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage, pupils develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It also ensures that they can use measuring instruments with accuracy and make connections between measure and number.

By the end of Year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their learning.

Pupils should be able to read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.

Upper Key Stage 2 Curriculum

The principal focus of mathematics teaching in upper Key Stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This develops the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

At this stage, pupils develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures consolidates and extends knowledge developed in number. Teaching also ensures that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.

By the end of Year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.

Pupils should be able to read, spell and pronounce mathematical vocabulary correctly.

Progression of Calculation Methods

A Calculation Policy is in place to ensure continuity and consistency throughout the school.

Timetable

We believe in a timetable that reflects the necessary emphasis on number and calculation as a foundation for all areas of maths, alongside the explicit teaching of problem solving strategies to enable the children to effectively apply their knowledge. As a result, we follow a timetable that is consistently delivered throughout the school.

On Mondays (or once a week), the whole school is required to teach a lesson based on either; Measurement, Statistics or Geometry. There is also one week at the end of each term dedicated to these areas of Maths.

On Tuesdays, Wednesdays and Thursdays, the whole school teaches lessons based on place value, number and calculation. Each lesson follows the PEER Model of Mastery, giving children the opportunity to broaden their understanding of a concept and apply the skills learnt.

Once a week, the whole school *explicitly* teaches problem solving, following the 8 *Problem Solving Strategies*. The school uses the S.T.O.P.S Problem Solving resource among many others, see www.stopsproblemsolving.co.uk

Example Timetable

Mon	Registration	Test Teaser	Maths (MSG) Can I?	Alternate weeks focused on Measure/Statistics/Geometry With One week each term dedicated to Measure/Geometry PEER MODEL
		Starter Linked to Previous Learning		
Tues		Test Teaser	Maths (N&C) Can I?	Number/Calculations/Place Value PEER MODEL
		Starter Linked to Previous Learning		
Wed		Test Teaser	Maths (N&C) Can I?	Number/Calculations/Place Value PEER MODEL
	Starter Linked to Previous Learning			
Thurs	Mental Test Maths Passports	Maths (N&C) Can I?	Number/Calculations/Place Value PEER MODEL	
Fri	Test Teaser	Maths (U&A) Can I?	Using and Applying Explicit teaching of problem solving strategies using 8 <i>Problem Solving Strategies</i> PEER MODEL	
	Starter Linked to Previous Learning			

Mental Maths

Starters:

At Marlborough teachers begin each Maths lesson with a Test Teaser and mental starter. Pupils' are given mental maths objectives based on their Maths Passports and practise their objectives at home and during mental starters and have a mental arithmetic test once a week.

Maths Passports:

At Marlborough we teach mental maths using an approach based on Ray Maher's Numeracy Passports. The key focus of this approach is to encourage the children to take an active and positive role in becoming faster and more confident with mental recall.

What is it?

Each child is given a passport which they will take with them through school. The passport tracks progression in basic number skills. The children develop instant recall skills in all the objectives – they should not be taking time to work out the answer to each question, they need to know it instantly.

When to do it?

Class teachers work with their class once a week, checking progress and setting the passport skill to practice for 10 minutes each night. This is the math's homelearning for the week.

Where to start?

All children start at their attainment level and progress through the passports at their own pace. The aim is to have completed the passports when they get to Year 6.

Homelearning

We ask parents to spend 10 minutes each evening practising their child's passport skills with them. This could be in the car, at teatime, before bed – it doesn't need to be a sit down, formal time. For most of the skills, they could try the same procedures:

Example: Number Bonds

e.g. number bonds to 10, you say 6, your child says 4

e.g.2. 3 x times table, you say 3, your child says 9

e.g.3 $4+3=?$ $?+4=7$ $3+?=7$

Computers - Children use Mathletics or other number computer games.

Number and Calculation

Place Value

At Marlborough, we have a desire to make sure that all children feel confident with place value and are secure with the understanding of place value before other calculations are taught. Therefore, at the beginning of each academic year teachers spend the first few weeks focussed on teaching place value. Once the teacher feels that the children have a good understanding then they move on to the four number operations.

Calculation Policy

Marlborough Primary School has a consistent approach towards the teaching of mental and written calculations. There is a calculation policy followed by all staff to guarantee that children are being taught an accurate and consistent progression of mental and written calculation strategies throughout their time at Marlborough. We aim to reduce the amount of strategies that children are taught so that they can develop a firm grasp of a few select strategies for each operation which they feel confident in using.

Problem Solving

Timetable

Every Friday (or once a week), throughout the school, children are *explicitly* taught strategies to solve problems using the 8 Problem Solving Strategies:

1. Act It Out
2. Trial and Error
3. Trial by Improvement
4. List or Table
5. Pattern
6. Simplify
7. Work Backwards
8. Algebraic

Alongside these Friday sessions are the 'word problem' focussed activities which use the RUCSAC method (). These are given to children at the beginning of every maths lesson in the form of a 'Test Teaser'.

Marlborough place an emphasis on providing the skills and strategies necessary to solve more logic and reasoning based problems. As a result, children need to be explicitly taught the different strategies to solve such problems and be able to recognise when to use each strategy.

S.T.O.P.S Problem Solving Resource:

Marlborough use the S.T.O.P.S Problem Solving Resource (among others) to teach children the 8 Problem Solving Strategies.

S.T.O.P.S or *Sequenced Teaching Of Problem Solving* aims to teach problem solving through a progression of problems covering the 8 *Problem solving Strategies*.

For a detailed explanation of how to use the resource see: www.stopsproblemsolving.co.uk

Visit the 'User Guide' section.

Planning

Maths is taught every day for at least 45 minutes, except for days when children are on school trips or there are other extenuating circumstances. Starters take place every day, for 5-10 minutes practising mental recall, revising previous learning and applying it through Test Teasers.

Maths lessons centre on the core objectives and steps to success for the objective.

At the end of each term a whole week is dedicated to the teaching of Measure, Statistics and Geometry.

The three number based lessons on Tuesdays, Wednesdays and Thursdays are taught as part of a larger sequence of progression, across two or more weeks.

Year 6		MARLBOROUGH MATHS WEEKLY PLANNING		Week Commencing: 07/09/16	
Focus: Place Value					
Termly Number and Calculation objectives:		Termly MSG objectives:		Key Vocabulary for Maths Dictionary:	
Number <ul style="list-style-type: none"> I can read, write, order and compare numbers to ten million I can determine the value of each digit in numbers up to ten million I can round any number Addition and Subtraction <ul style="list-style-type: none"> I can add and subtract mentally with integers, decimals and fractions I can use estimation to check answers Multiplication and Division <ul style="list-style-type: none"> I can identify common factors, common multiples and prime numbers I can multiply and divide mentally with integers and decimals I can multiply multi-digit numbers I can divide numbers up to 4 digits by a two-digit number using an appropriate method Decimals, fractions and percentages <ul style="list-style-type: none"> I can use common factors to simplify fractions and use common multiples to express fractions in the same denomination I can compare and order fractions, including fractions greater than 1 I can add and subtract fractions with different denominators and mixed numbers I can find fractions I can add whole numbers and decimals I can subtract whole numbers and decimals I can identify the value of each digit to three decimal places, multiply and divide by 10, 100, 1000 I can multiply one digit numbers with up to two decimal places by whole numbers Algebra <ul style="list-style-type: none"> I can express missing number problems algebraically 		Measurement <ul style="list-style-type: none"> I can calculate the perimeter of rectilinear shapes I recognise that shapes with the same areas can have different perimeters and vice versa I can use, read, write and convert between standard units I can convert miles to km and vice versa Geometry <ul style="list-style-type: none"> I can describe simple 3D shapes I can recognise and build simple 3D shapes including making nets I can recognise and classify polygons Statistics <ul style="list-style-type: none"> I can draw a line graph and use this to answer a question 		Place Value Decimal point Left Right Thousandths Hundredths Tenths Ones Units Tens Hundreds Thousand Ten Thousands Hundred Thousands Millions Dimension Vertex / vertices Edge Face Curved Flat	

Assessment

At Marlborough, we believe that it is important to complete a combination of both formative and summative assessments. We use our own assessment system to complete continuous formative teacher assessments of the children in their class throughout the year. Summative assessments, consisting of test booklets from Year 2 upwards, take place at the end of each year and are used alongside S.T.E.A.M assessments to make final teacher assessment judgments. To assess children who may be working at greater depth we follow the PEER Model (Prove, Explore, Explain, Re-apply), which allows children to have the opportunity to demonstrate a deeper understanding of concepts.

Teachers use the S.T.E.A.M assessment documents to select the criteria to focus on for each week's planning.

  ...a Strategy for Teaching, Embedding and Assessing Mastery										
Number										
(6 Statements)										
I can read, write, order and compare numbers to ten million										
I can determine the value of each digit in numbers up to ten million										
I can round any number										
I can check my answers using number facts and rounding										
I can solve number problems										
I can solve number problems										
Autumn	0	0	0	0	0	0	0	0	0	0
Spring	0	0	0	0	0	0	0	0	0	0
Summer	0	0	0	0	0	0	0	0	0	0
Number Statements Completed	0	0	0	0	0	0	0	0	0	0
Number Percentage Completed	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Estimated Grade	<	<	<	<	<	<	<	<	<	<
Emerging - 5-30% Developing - 30-60% Secure - 60% +										

Parents

At Marlborough we believe that it is important to provide parents with the necessary information and tools so that they can best support their children in mathematics. As such, we plan and deliver detailed workshops for parents to enable them to learn how their children are taught different aspects of maths in school. In particular, written calculation methods are demonstrated so that children have a clear strategy that they can use consistently and confidently both in school and at home.

Support for Pupils

Our belief is that all children should be provided with equal opportunities and that every pupil has access to the Maths Curriculum. Following the aims of the Maths National curriculum, the aim is to keep children progressing at an equal pace with the majority of pupils attaining age related expectations. For those grasping concepts rapidly, their knowledge will be deepened to ensure they master the objectives for their specific year group rather than stretching onto the next year group's curriculum. Where necessary, pupils may be taught in small targeted groups to offer specific support according to need. Adaptations are made in the form of adult support, time scale, equipment and resources to accommodate for provision of pupils with SEND, children identified to be working below expected for their year

group or for pupils that are working at greater depth to have access to higher order mathematical skills.