

MEREWORTH PRIMARY SCHOOL

Mathematics Policy

Updated March 2015

Introduction

This policy is a statement of the aims, principles and objectives for the teaching of mathematics at Mereworth Primary School.

Aims

Mereworth Primary School's aim is for all pupils to develop a sound understanding of basic mathematical concepts through practical and investigational work, enabling them to meet the aims of the new curriculum by:

- ☒ becoming **fluent** in the fundamentals of mathematics, alongside developing conceptual understanding, developing the ability to recall and apply knowledge, rapidly and accurately
- ☒ **solving 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, persevering in seeking solutions.
- ☒ **reasoning mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- ☒ being able to demonstrate their skills and knowledge and talk about their work using appropriate mathematical language
- ☒ enjoying mathematics, being successful and have a positive attitude to the subject
- ☒ using mathematics as part of their everyday life in school and at home

Objectives

- ☒ to ensure that all pupils follow a broad and balanced mathematics program based on the requirements of the updated National Curriculum (2014)
- ☒ to ensure that all pupils are provided with interesting and challenging tasks that enable them to achieve standards commensurate with their abilities and potential
- ☒ to ensure that pupils can work individually, collaboratively in groups and within the whole class
- ☒ to allow pupils to develop as independent learners, able to make decisions about their own work.

Principles of Teaching and Learning

Our teaching and learning strategy is based on of the guidance from the updated National Curriculum, statutory from September 2014. All mathematical teaching is underpinned by the principle of developing procedural fluency and conceptual understanding alongside each other. It is also founded on the understanding that the ability to reason and problem solve is paramount.

Numerate pupils should:

- ☒ have a sense of the size of a number
- ☒ know by heart tables
- ☒ calculate mentally and with pencil and paper
- ☒ show procedural fluency when carrying out mental and written calculations
- ☒ develop visualisation skills
- ☒ make sense of problems
- ☒ have strategies for checking
- ☒ explain methods and reasoning
- ☒ suggest suitable units for measuring
- ☒ make sensible estimates
- ☒ make predictions from graphs, charts and tables.

Mathematics in the Foundation Stage:

Mathematics is developed throughout the Foundation Stage, through

- ☒ the routine of the day
- ☒ whole class counting, songs and rhymes
- ☒ adult led guided group work
- ☒ child initiated activities
- ☒ the learning environment, inside and out
- ☒ questioning and discussion
- ☒ opportunities for solving 'real life' problems

Mathematics in KS1

'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 should involve working with numerals, words and the four operations, including with practical resources [for example, concrete objects and measuring tools].' At this stage, pupils should develop their ability to

recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve 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 read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1.' Mathematics programmes of study: key stages 1

Children in KS1 follow the National Curriculum objectives, organised into termly, half termly and then weekly plans. Children broadly follow the same objectives, which are differentiated accordingly. Practical resources such as Numicon, base ten apparatus, number lines and other practical resources are used to support their conceptual development. They practise mental recall of number facts and use the number line then the blank number line to aid their mental calculation skills. They are encouraged to develop visual mental images for addition, subtraction, multiplication and division. Children are encouraged to attempt a wide range of problems, such as finding all possibilities problems, investigating statements, identifying and continuing a pattern and solving worded problems.

Mathematics in KS2

Lower Key Stage 2 (Years 3 and 4)

'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 should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers. At this stage, pupils should 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 should ensure that they can use measuring instruments with accuracy and make connections between measure and number. Mathematics programmes of study: key stages 1 and 2 National curriculum in England September 2013

Children in Years 3 and 4 follow the National Curriculum objectives, organised into termly and then weekly plans. Children broadly follow the same objectives, which are differentiated accordingly for the needs of each set. Practical resources such as Numicon, base ten apparatus, and other practical resources are still available to support their conceptual development. Visual models are also used to develop conceptual understanding for calculation methods. Visual models, such as the rectangular model, are promoted for concepts such as fractions. Children are encouraged to attempt a wide range of problems, such as finding all possibilities problems, investigating statements, identifying and continuing a pattern and solving worded problems.

Upper Key Stage 2 (Years 5 and 6)

'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 should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio. At this stage, pupils should 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 should consolidate and extend knowledge developed in number. Teaching should also ensure 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.’ Mathematics programmes of study: key stages 1 and 2 National curriculum in England September 2013

Children follow the National Curriculum objectives, organised into termly and then weekly plans. Children broadly follow the same objectives, which are differentiated accordingly for the needs of each set. Practical resources such as Numicon, base ten apparatus, and other practical resources are still available to support their conceptual development, if required. Visual models are also used to develop conceptual understanding for calculation methods. Visual models, such as the rectangular model, are promoted for concepts such as fractions. Children are encouraged to attempt a wide range of problems, such as finding all possibilities problems, investigating statements, identifying and continuing a pattern and solving worded problems.

Planning

Planning is derived from the statutory and non-statutory guidance from the national curriculum programmes of study and spread over each term (Autumn, Spring, Summer). Medium term planning sets out which objectives are covered in which weeks over each term. Short term weekly planning is completed on a variation of an agreed format, to suit the preference of individual teachers. All planning will usually contain daily counting/ mental and oral objectives and activities, a main learning objective, teaching input, activities and differentiation. It may also contain key vocab/questions and key points for the plenary. Planning should be annotated and adapted accordingly, reflecting the previous lessons outcomes.

Lesson structure

Mathematics lessons will generally be comprised of:

- ☐ Daily counting / oral work and mental calculation
- ☐ Main teaching input
- ☐ Differentiated group activities, included ‘Guided Group Work’ where appropriate
- ☐ Review – plenary session

Timings should be flexible, allowing for a range of approaches as required. For example, some lessons may have a slightly longer mental maths session to practice certain skills. Other lessons may go straight into the main objective and teaching point to allow time for an extended problem solving session with collaborative work, exploration and discussion. It might also be appropriate to have a predominantly instructional lesson at the start of a new concept, e.g. introducing a formal calculation method, where the children work together with the teacher on whiteboards. Lesson structure will vary through the week, with a range of instructional work, guided work and collaborative work and independent work, as suited to the needs to the class and the objectives being covered.

Teaching will be oral and interactive. It will involve different elements:

- ☐ demonstration – showing how to
- ☐ explanation – giving examples
- ☐ questioning – challenging understanding

☒ discussion and evaluation – talking about methods, errors

☒ direction – taking care, setting out neatly.

The aim of all lessons is to secure good progress in the class as a whole. A new unit of work normally begins with an introductory session with the whole class. This may be followed by group, paired or individual work on tasks linked to the topic, at levels appropriate to their abilities. All lessons end with a short review of the learning that has taken place in the lesson. It should engage all the pupils in the class.

Resources such as Numicon, digit cards, place value cards and dice, number lines, number activities and games are generally available in classrooms. Lessons will have clear learning objectives that are communicated to the pupils.

Teaching Calculations

Please see the separate calculations policy.

Marking

Please see the separate marking policy.

Assessment, Recording & Reporting

Teachers are expected to make regular assessments of pupils' progress and record them systematically.

This may involve:

☒ informal and formal testing of mental recall and mental calculation, given orally and through written work

☒ Summative assessments 3 times per year. The results of these are analysed and used to inform future planning

☒ Foundation Stage Profile

☒ reporting pupil progress to parents during parents' evenings through discussion and with reference to data reports and through 'End of Year' reports

Cross-curricular Skills and Links

Mathematics is frequently used in other curriculum subjects. Mathematical skills will be practised which will support ideas and activities in other subjects. Examples include measuring in technology, charts and graphs in science and geography, time and dates in history, patterns in art, music, and dance, and scoring and counting in physical education. Resource books are also available for developing cross curricular word problems in KS1 and KS2.

Computing

Use of the interactive whiteboards and the wide range of internet sites is encouraged for whole class teaching and pupil activities. Children will be taught how to use calculators and use them, when appropriate as a way of extending learning, towards the end of Key Stage 2.

Resourcing

An annual review of resources needs is overseen by the subject manager for mathematics and new stock is ordered as appropriate. There are central stores of materials for both key stages and some essential equipment is contained within each classroom.

Differentiation and Special Educational Needs

Teaching is organised to enable pupils of all abilities access to the learning. This maybe through ability grouping and setting or in mixed ability groupings within classes. Teachers are to have high, but varying expectations of pupils dependent on their ability, and these expectations need to be discussed and reviewed with the pupils regularly.

Pupils with SEN are usually supported within class by the learning support staff. Teachers will monitor the progress of individuals or groups of children and act upon any underachievement which presents itself. The most able mathematicians are provided with appropriate materials to ensure that they are challenged and stretched. A variety of materials are used to broaden their understanding of topics.

Home learning

Formal home learning is set from Year 1 for Maths and appropriately differentiated. Children are expected to learn their multiplication tables as well. Parents are given guidance from foundation Stage to Year 6 at Meet the Teacher evenings in Term 1, as to how they can help their child with Maths at home, although formal homework is not set. Class web pages often offer information on current Maths topics and with hyperlinks to interactive Maths sites too.

Equal Opportunities

There is a school equal opportunities policy which is applied to mathematics. Teaching materials are chosen to reflect the cultural and ethnic diversity of our society. We try to avoid stereotyping through gender or race. Pupils' performance is monitored to ensure that no group of pupils is disadvantaged. In lessons, the full participation of both girls and boys is encouraged and care is taken to ensure that the emphasis on whole class teaching does not disadvantage any gender group.

Health & safety

In line with the school's health and safety policy, children are instructed in the safe use of all equipment. In particular, extra care should be taken when using heavy weights with balances on the floor. Care needs to be taken when younger children are using small apparatus such as counting objects. Children working outside the classroom will work in pairs or groups and be supervised by an appropriate adult.

Review

This policy will be reviewed by the mathematics subject manager, following discussions with the Head teacher and other colleagues. Any amendments will be presented to the whole staff the Governing body will be made aware of any changes.