

Parsloes Primary School



Maths Mastery Policy

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INTENT:

"Mathematics is a creative and highly interconnected discipline that has been developed over centuries, 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." (National Curriculum, 2014)

At Parsloes Primary School, we believe that all children can and will achieve in mathematics. We believe it is our responsibility, as teachers and leaders, to provide an environment and experiences that enable children to:

- become fluent in the fundamentals of mathematics;
- develop a deep understanding of the fundamentals of mathematics;
- develop the ability to reason and solve problems.

A MASTERY APPROACH

In September 2019, Parsloes Primary School joined London North East Maths Hub's four-year "Teaching for Mastery" programme. In 2020-2021, we are in the second or "Developing" year of the programme. We are therefore at an early stage of our transition to a mastery approach to the teaching and learning of mathematics. We understand that this is a gradual process, with some elements of the approach taking several years to become fully embedded across the entire school. We are moving towards the approach described in this policy being in all classes across the school; at present, it is more developed in some classes than others.

What is Mastery?

Children are deemed to have 'mastered' a particular objective when they are able to build on it to develop understanding of new mathematics. For each objective, children must have enough conceptual and procedural fluency to enable them to solve non-routine problems in unfamiliar contexts without relying on memorised procedures.

Key Elements of Teaching for Mastery

Our teaching for mastery approach is underpinned by the NCETM's 5 big ideas.

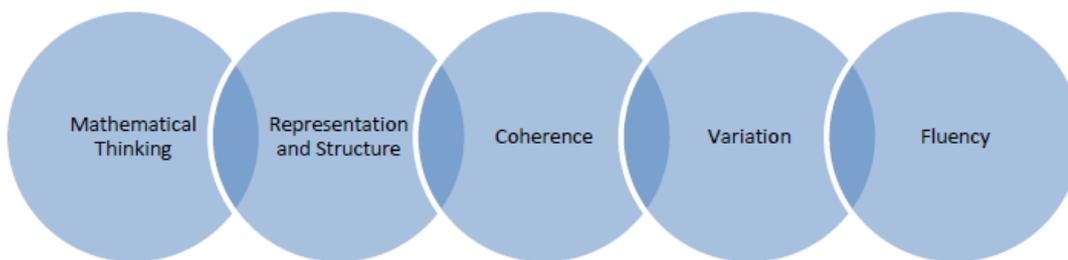


Fig.1: The NCETM's Five Big Ideas in Teaching for Mastery: <https://www.ncetm.org.uk/resources/50042>

Whole-Class Teaching

All children¹ are taught as a whole class, and each child is given access to the same lesson content. All children will attempt the same, core task. Appropriate support is available for any child who might need it, and there are opportunities to deepen learning even further through the provision of more challenging questions and activities. No assumptions are made before the lesson about which children might need more support, nor which ones will likely move on to the more difficult tasks.

Longer Units of Work

Children no longer revisit maths topics each term. Instead, units of work are extended over several weeks, giving children plenty of time to grasp and rehearse every concept. Each topic is broken down into key skills which are then carefully mapped out into a coherent, logical sequence. These longer units of work allow children time to master each skill before they move onto the next. The longest time is dedicated to key mathematical topics and concepts. Regular retrieval practice takes place; that is, opportunities to revisit and apply content from previous units of work are incorporated into fluency sessions and main maths lessons.

¹ Except a very small number of children with specific SEND.

Lesson Structure

Lessons will commonly be taught using a 'ping pong' style approach, so called because the teacher orchestrates a continual back-and-forth dialogue with the children, using questions, short tasks, explanations, demonstrations and discussions. This enables the teacher to vary the pace and direction of the lesson if necessary, and to continuously monitor the progress of the class.

Many and Varied Representations

A great deal of emphasis is placed on developing children's conceptual understanding. The majority of ideas in maths are entirely abstract, generally characterised by a string of symbols that, without an understanding of what they signify, are simply meaningless. In order for children to attach meaning to these abstract ideas, we need to expose them to the underlying mathematical structure. This is done through the use of concrete and pictorial resources, which help children to construct a mental image of the maths. To ensure that children gain a comprehensive understanding of each concept, teachers provide sufficient variation in the representations and examples that they give.

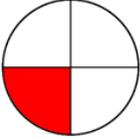
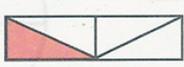
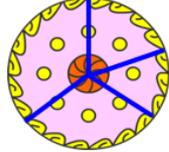
standard	non-standard	non-concept
		
$76 = 70 + 6$ 	$76 = 60 + 16$ 	$76 = 7 + 6$ 

Fig.2: Conceptual variation highlighting the essential features of one quarter and the partitioning of seventy-six.

Teachers also think carefully about the order in which they present questions so that important features of a concept or strategy are emphasised.



Fig.3: Procedural variation highlighting how an increase in one or both addends leads to a corresponding increase in the sum.

Fluency

Equal attention is also given to improving children's procedural fluency; that is their ability to recall core number facts (including addition, subtraction, multiplication and division facts) quickly and efficiently. Children are expected to learn some facts off by heart and they are taught mental strategies to quickly derive others. Much more time, particularly in Years 1 to 3, is now dedicated to developing these basic number skills. Children in every class are given daily opportunities in school to practise and develop their procedural fluency. Children in Years 2 to 6 use Times Tables Rockstars at home and at school to support them to be able to recall rapidly the times tables.

Language

Children are encouraged to communicate what they think. They are expected to use precise mathematical language and to speak in full sentences so that mathematical ideas are conveyed with clarity. Teachers and teaching assistants support children by modelling this way of speaking. Stem sentences will usually also be provided.

Early Intervention

Teachers identify children who are struggling with a concept within a lesson and immediate extra support is provided so that they are able to keep up with the rest of the class in the next lesson.

GUIDELINES: EYFS

Planning

Teachers in EYFS follow the yearly overview from Power Maths. The overview sets out the order in which topics should be taught and how much time should be dedicated to each one. On occasion, teachers may identify that a particular cohort requires additional time to achieve mastery of a certain topic or group of objectives. Likewise, it may occasionally be possible for a cohort to develop a deep understanding of a particular topic in less time than is allowed for on the yearly overview. Teachers therefore exercise their professional judgement when deciding when to move onto the next unit of learning.

Timetabling

Children in Nursery have a short, daily maths teaching session and two group teaching sessions per week, aimed at developing their understanding of simple mathematical concepts such as counting to 10, maintaining 1 to 1 correspondence and identifying and describing simple 2D shapes. Children explore concepts related to size, weight and capacity in their independent learning time. Children are taught these concepts using physical resources, pictorial resources, songs, games and role-play. The children complete an adult led maths task every two weeks.

In Reception, children have daily counting sessions, lasting around 5 minutes. They also have carpet sessions of up to fifteen minutes, where all children are taught by the class teacher. This whole-class input is then consolidated through small group, focus activities led by teachers and nursery nurses/TAs and lasting approximately ten to fifteen minutes.

In both Nursery and Reception, the independent activities at the maths table link to the focus for the week. In addition to these planned independent activities, children also have the opportunity to self-select resources to consolidate their maths learning during child-initiated activities. We recognise the importance of play-based learning and therefore encourage children to develop their understanding of different areas of maths during their inside and outside play.

Assessment

The assessment of mathematics is part of the overall assessment of the complete child and should be seen alongside all the other areas of development. Assessment in mathematics should reflect the general principles and procedures laid down in the Assessment Policy.

Regular observations and assessments help to ensure that children who need additional intervention to consolidate their mathematical understanding are identified and supported by appropriate interventions.

At the end of every term, teachers refer to *Development Matters* and identify at which stage pupils are currently working. Pupils who are struggling with specific concepts are picked up through continuous assessments and given additional support. Evidence towards these assessments is collected throughout the year. Towards the end of the academic year, teachers in Reception also make a judgement as to whether or not each child has met the level of development expected at the end of the EYFS for each Early Learning Goal.

GUIDELINES: YEARS 1 to 6

Planning

The National Curriculum for England: Mathematics programmes of study (2014) provides the basis for all mathematics planning. To ensure whole-school consistency and progression, the DfE-approved 'Power Maths' scheme is used to support planning in Years 1 to 6. All calculation methods taught follow the guidance given in the Power Maths calculation policy.

Long-Term Planning

Teachers in Years 1 to 4 follow the yearly overview for their year group. The overviews set out the order in which topics should be taught and how much time should be dedicated to each one. On occasion, teachers may identify that a particular cohort requires additional time to achieve mastery of a certain topic or group of objectives. Likewise, it may occasionally be possible for a cohort to develop a deep understanding of a particular topic in less time than is allowed for on the yearly overview. Teachers therefore exercise their professional judgement when deciding when to move onto the next unit of learning.

In Years 5 and 6, teachers use the yearly overview set out by White Rose Mathematics. This ensures that the skills children have previously learned are built upon and new knowledge is imparted in each unit. Topics may be moved within the overview if teachers' assessments show there is gap in children's learning that needs to be addressed before moving onto a new unit of work. As in Years 1-4, longer may be spent on a topic if a teacher feels their children need more time to gain a deepened understanding of the mathematical skills and concepts being taught.

Medium-Term (MT) Planning

First, teachers watch the Power Maths 'Before You Teach' Unit Video. Then, they use the transcript from the video, their knowledge of their classes and the guidance on the first page of the unit's Teacher Guide to help them to plan out the unit.

Teachers break down the unit's learning into small, connected steps (or key points), building from what the children already know. In most cases these steps will closely follow the sequence of lessons given in the Power Maths eTextbook. Teachers may also find it useful to refer to the NCETM PD materials and/or the White Rose schemes of learning.

Teachers think carefully about which representations best expose the mathematical structures being taught. They consider how they will provide extra support and challenge throughout the unit, supporting children to overcome anticipated misconceptions and enabling them to go deeper in their understanding of the ideas.

In Years 5 and 6, the children will be pre-assessed through informal tests to identify specific gaps in their learning. From both the tests and the White Rose Long Term Overview, teachers will break down the unit of work to ensure new knowledge is taught in small steps, links with previous mathematical concepts that the children have learned and fill any gaps the tests may have identified. Learning objectives are mapped out across the whole unit to clearly show the learning journey and the expectations for children's end goal.

To map out the topics, teachers use White Rose, NCETM and Power maths materials to ensure that the lessons are tailored to meet the needs of all children within the class. Fluency questions are portrayed in a variety of different ways and reasoning and problem-solving skills are built within the learning in each lesson.

Short-Term Planning

Teachers are not expected to produce short term plans for mathematics. However, the new mathematics being taught each lesson (including key points/steps and difficult points/anticipated misconceptions) is identified explicitly in the lesson slides (Powerpoint presentations). Teachers carry out formative assessment continually and, at times, in responding to this, they will alter the pace of progression through the planned material in order to better meet the needs of children.

In Years 5 and 6, independent work consists of varied fluency, reasoning and problem-solving so each lesson deepens children's mathematical understanding. These questions are adapted when needed based on formative assessment of previous learning. When necessary, children will use manipulatives to show their knowledge of concepts before learning abstract methods and they are encouraged to continue to use them if they are not confident on new skills.

Lesson design and structure

Problem-solving is not seen as a separate activity but rather is embedded in every lesson. Carefully chosen contexts are provided for the abstract mathematical concepts being taught to provide extra scaffolding and so that children can develop their reasoning skills. In addition to the Power Maths resources, teachers refer to the NCETM PD materials, White Rose resources and the Nrich website for additional examples of rich contexts.

Teachers in Years 1 to 6 create short, independent tasks for children to complete on most days to consolidate learning and to assist with formative assessment. Teachers ensure that tasks are opportunities for "intelligent practice" (i.e. that they develop and embed fluency and conceptual knowledge). Children who grasp concepts rapidly are challenged through the provision of rich and sophisticated tasks rather than being accelerated onto new content. Additional support may be given in the following ways: further use of representations, carefully directed questioning, additional time and activities to consolidate understanding and the use of flexible focus groups.

Assessment

The assessment of mathematics is part of the overall assessment of the complete child and should be seen alongside all the other areas of development. Assessment in mathematics should reflect the general principles and procedures laid down in the Assessment Policy.

Assessment in mathematics is continuous and on-going. There are assessment opportunities in every lesson. Teachers look for children who know why and how as well as those who demonstrate procedural fluency through the quick, accurate and efficient calculation of correct answers. Teachers look for children who are able to apply their understanding of mathematics flexibly in new and unfamiliar situations. These on-going assessments that teachers make as part of every lesson and through marking help teachers to adjust their teaching on a day-to-day basis.

Teachers use the following assessments:

Year 1 - pupil observations (autumn), NTS tests (spring & summer)
Year 2 - KS1 SATs papers
Years 3 - 5 - NTS tests
Year 6 - KS2 SATs papers

The recorded data from these assessments are used to track pupil progress and are discussed by the class teacher, SENDco, Phase Leader and SLT during termly Pupil Progress Reviews. These meetings assist class teachers and Year Group Leaders to make adaptations to planning (and where required, to plan specific interventions) to ensure the needs of all children are met.

Teachers make long-term assessments towards the end of the school year. They use this data to assess progress against school and national targets. With the help of these long-term assessments, teachers are able to set targets and plan for the next school year. The long-term assessments are made using end-of-year tests and teacher assessment. Children undertake the national tests at the end of Years 2 and 6.

Recording and Presentation

All children in Years 1 to 6 have a maths book containing squared paper. Children may record in their books during the "guided practice" part of the lesson or mini whiteboards may be used. Independent tasks will usually be completed in books to support teachers to make assessments. Wherever possible, teachers are encouraged to limit printing and photocopying by allowing children to copy down questions and tasks from the board rather than by providing a worksheet. However, it is recognised that in some, a pre-prepared worksheet will provide the best learning opportunity, e.g. where a series of representations or the progressive removal of scaffolding is required to ensure all children can access new learning. There is also a Practice Book that the pupils will work in.

Regardless of whether or not a worksheet is provided, children are always encouraged to record their own ideas and methods, using symbols, full sentences and drawings. Children are encouraged to work as neatly as possible but fostering independent mathematical thinking is prioritised over presentation, particularly in Years 1 to 3. There should be a clear progression in children's ability to express themselves mathematically across the year, supported in the early stages by appropriate levels of adult modelling and scaffolding.

Children use only pencil in their maths books. In Key Stage 2, children write one number per square (with the exception of indices and fractions) and use rulers to draw straight lines. In Key Stage 1, children are also encouraged to make progress towards these expectations.

All written work in maths books is preceded by a lesson objective and the short date. In Year 1, this information may be provided on a sticker or by use of a stamp. If a class is continuing with an earlier lesson, they do not rewrite the title but rather draw a line using a ruler under the previous work and write the short date.

Feedback and marking

Research (Black et al. 2003) shows that the most effective and beneficial forms of assessment are ones which support learning (i.e. are formative) and are built-in to lesson design. To support assessment in mathematics, teachers:

- plan well-structured classroom activities;
- include regular discussions of answers and strategies, providing opportunities for pupils to develop reasoning skills and to check and deepen their understanding;
- provide children with plenty of opportunities for dialogue and interaction (with the teacher and with other pupils), focusing in particular on key ideas and concepts (including misconceptions and difficulty points) and effective, efficient ways of working.

Teachers are supported to focus on planning and teaching effective lessons (and to maintain a manageable workload) by the following, efficient approach to feedback and marking. Teachers regularly review children's work, both during and after lessons. They identify where pupils have made a simple slip and where their errors reflect a lack of understanding (see marking policy). Teachers point out slips verbally or make a dot with a red pen to indicate where they occur. Children are then encouraged to self-correct.

If errors demonstrate a lack of understanding, the teacher provides additional support, for example, one-to-one verbal feedback, additional modelling in a pupil's book (in red pen) or a same-day intervention with a small group of pupils. Where a large number of pupils demonstrate lack of understanding of a particular point or area, this is addressed with a whole-class review (immediately or at the beginning of the next lesson) or via the insertion of extra lessons into the unit of work.

Where a pupil has required additional support or scaffolding to complete a task, the nature of this support is recorded in the child's book by the teacher or TA in red pen. This supports teachers to make accurate assessments and provides evidence for their judgements for internal and external moderation processes.

REPRESENTATIONS AND RESOURCES

Resources are available for all classes and are stored within classes or in a central location.

Each classroom has a "Maths Working Wall" on which key vocabulary and representations are displayed.

INCLUSION

Teachers are aware of children with identified special educational needs and disabilities and plan for their needs accordingly and on the basis of advice and guidance from the SENDco and external professionals.

PROFESSIONAL DEVELOPMENT

All staff will be provided with regular professional development to support them with the teaching of mathematics. All new staff will receive appropriate support and initial training from the Maths Lead.

HOME-SCHOOL LINKS

We recognise that parents and carers have a valuable role to play in supporting their child's mathematical learning. An overview of the curriculum for each year group is available on the school's website, as well as guidance on end-of-year expectations and the calculation methods used across the school.

Links to online maths games and activities are provided on the school's website.

Parents and carers are informed of their child's progress at Parents Evenings and in the annual end of year report. Parents and carers are encouraged to speak to their child's teacher at any point during the year should they have any concerns or questions regarding their child's progress in mathematics; appointments can be made through the school office. The school also provides a number of opportunities for parents and carers to learn about the mathematics curriculum through parent workshops and online videos.

MONITORING AND REVIEW

The monitoring and evaluation of the Maths policy is the responsibility of the Maths Subject Leader who is responsible to the Head teacher and the Governors for the development of Maths throughout the school.

Monitoring of the standards of the children's work and the quality of teaching in Maths is the responsibility of the Headteacher, Deputy Headteacher and the Maths Lead. The work of the Maths Lead also involves supporting colleagues in the teaching of Maths, being informed about current developments in the subject and providing a strategic lead and direction for the subject in the school.

The Maths Lead has an allocated regular management time in order to undertake the following:

- ensures teachers understand the requirements of the National Curriculum and supports them to plan lessons. Leads by example by setting high standards in their own teaching;
- leads continuing professional development (CPD); facilitates joint professional development, e.g. lesson study and book looks; provides coaching and feedback for teachers to improve pupil learning;
- leads the whole-school monitoring and evaluation of teaching and learning in mathematics by: observing teaching and learning in maths regularly; analysing assessment data in order to plan whole school improvement in mathematics; conducting work scrutiny to inform evaluation of progress; conducting pupil interviews;
- takes responsibility for managing own professional development by participating in external training, independent private study, engagement in educational research and scholarly reading;
- monitor and purchase resources;
- ensures that the school's senior leaders and governors are kept informed about the quality of teaching and learning in mathematics;
- works in close partnership with the SENDco to ensure the learning needs of all pupils in mathematics are met effectively;
- keep parents informed of all mathematics issues;
- keep the maths policy under regular review