

Houghton on the Hill

Church of England Primary School



School Policy For	<i>Mathematics</i>
Date Revised	<i>August 2022</i>
Responsible Staff Member	<i>Ali Woollerson</i>

This policy outlines the teaching, organisation and management of the mathematics taught and learnt at Houghton on the Hill C.E. Primary School.

1. STATUTORY REQUIREMENTS

The school's policy for Mathematics is based on the National Curriculum for Mathematics and the Mathematics sections of the Statutory Framework for the Early Years Foundation Stage profile. This policy has been drawn up as a result of staff discussion and has the full agreement of the Governing Body. The implementation of this policy is the responsibility of all the teaching staff.

The Governing Body receive regular reports on the progress of Mathematics provision so that committees can make well informed judgements about progress being made towards the priorities and targets in the school improvement plan.

2. INTENT

When children leave Houghton Primary School, we aim for them to ...

- *Have a 'can do' attitude, demonstrating confidence, perseverance, enjoyment and curiosity for mathematics.*
- *Have confidence and competence, i.e. mastery, with numbers and the number system including recall of facts, mental methods, jottings and standard written methods, reasoning and problem solving.*
- *Have 'number sense' by demonstrating that they can be flexible in the methods that they choose; understanding and explaining these methods; producing accurate answers efficiently and recognising if the answer is 'reasonable'.*
- *To be mathematical thinkers by noticing patterns, showing and talking about their thinking in different ways, making connections and seeing relationships, and noticing what is the same and what is different?*
- *Understand Geometry and Measures in a range of contexts.*
- *Be able to explain and make predictions from the numbers in graphs, diagrams, charts and tables.*

- *Use and apply their mathematical knowledge, skills and vocabulary in different contexts.*
- *Recognise the importance of mathematics in everyday life in the past, today and future.*

We fulfil the aims in the following ways:

- *Have an expectation that all pupils can achieve in mathematics. All pupils are encouraged by the belief that by working hard at mathematics they can succeed and that by making mistakes is to be seen not as a failure but as a valuable opportunity for new learning.*
- *Provide a classroom culture where pupils are confident in taking risks.*
- *Carefully plan lessons that develop fluency, reasoning and problem solving for all strands of the Mathematics Curriculum.*
- *Design lessons that have a high level of teacher-pupil and pupil-pupil interaction ('ping pong') where all pupils in class are thinking about, working on and discussing the same mathematical content.*
- *Provide differentiation, not through offering different content, but through paying attention to the levels of support and challenge needed to allow every pupil to fully grasp the concepts and ideas being studied. This is through precise questioning and by carefully choosing manipulatives and pictorial representations that help deepen procedural and conceptual knowledge together.*
- *Provide further challenge for those pupils who grasp ideas quickly through deeper analysis of lesson content and by applying the content in new and unfamiliar problem-solving situations – not by acceleration into new content.*
- *Quickly identify pupils who fail to grasp an important aspect of the lesson and provide rapid intervention to ensure that they are ready to move forward with the rest of the class.*
- *Provide pupils with the skills, vocabulary and confidence to become mathematical thinkers.*
- *Allow for a significant amount of time to develop a deep understanding of the key ideas and concepts that are needed to underpin future learning.*
- *Emphasise the structures and connections within the mathematics which help to ensure that pupils' learning is sustainable over time.*

- *Provide regular opportunities for pupils to rehearse key facts, such as number bonds, Geometry Measure facts, in order to avoid cognitive overload in the working memory so pupils can focus on new ideas and concepts.*
- *Continually self –reflect on our own teaching and look for ways to improve our own professional development such as sharing good practice within our school community, drawing on the expertise of others and researching ideas.*
- *Plan lessons that celebrate the use of mathematical ideas so that children have an interest and enjoyment of the subject that will remain within them beyond their time at Houghton.*

3. IMPLEMENTATION

The National Curriculum is organised into the following strands;

- Number and Place Value
- Addition and Subtraction
- Multiplication and Division
- Fractions
- Measurements
- Geometry
- Statistics (Year 2 onwards)
- Algebra (Year 6 only)
- Ratio and Proportion (Year 6 only)

The above strands are broken down into statutory objectives for each year group. These can be found in more detail in the National Curriculum for Mathematics (2014). By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programmes of study as set out in the National Curriculum.

Planning reflects a greater emphasis of mastery of the key skills of mathematics. Teachers ensure that children have adequate time to develop their fluency and understanding, combined with opportunities for children to reason and solve problems (routine and non-routine), before moving onto a new concept.

Differentiation is evidenced through the amount of support and intervention needed, not in the content taught. Challenge is through complex problem solving to deepen understanding, not a rush to new mathematical content.

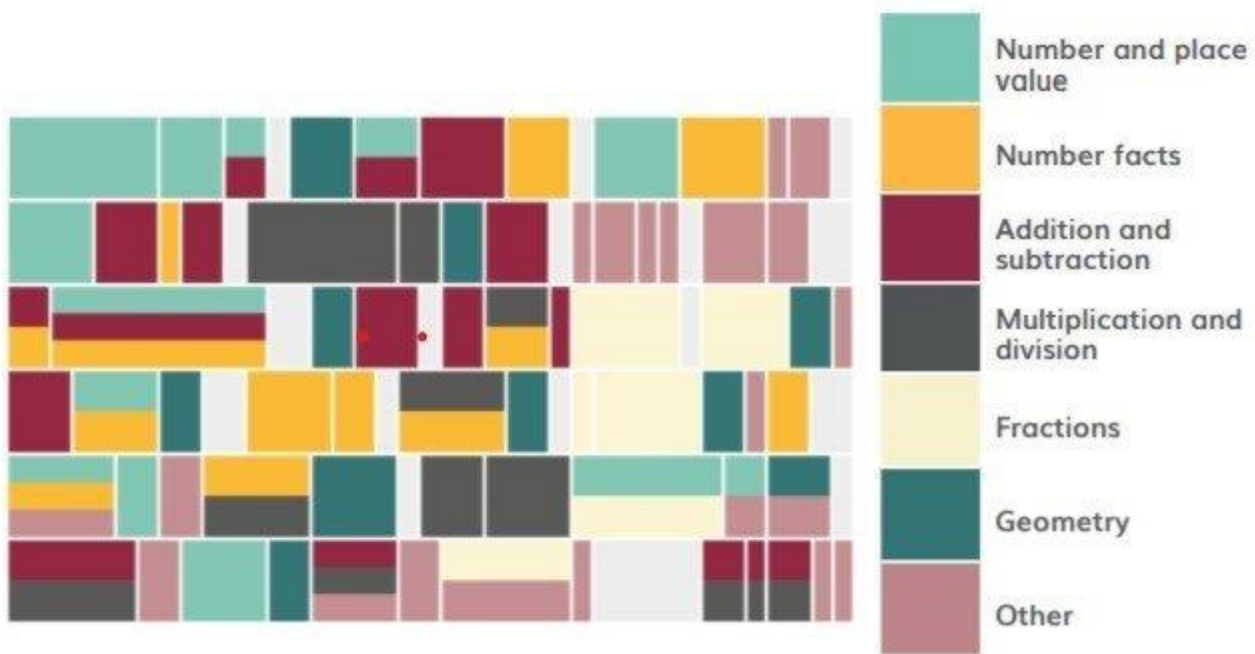
Long term Planning

Our EYFS teachers are part of the Mastering Number Program and use this to support their daily planning. They supplement the whole class directed teaching with carefully designed activities in their continuous provision. This NCETM program aims to strengthen the understanding of number, and fluency with number facts, among children in the first three years of school so in addition to the daily Maths lesson, Year 1 and Year 2 are also using the resources for a 15-minute number session

We use the NCETM Curriculum Prioritisation materials for our long-term planning in Key Stage 1 and Key Stage 2. This ensures that the National Curriculum Objectives are covered. By following this coherent sequence, we have ensured that there is progression; consistency with language, representations and calculation strategies; and that connections are made to previous learning. Within the units of work, e.g. Addition, links are made to other areas of Maths such as Measures (if appropriate). Mathematical objectives, including Statistics, are also taught within other subjects such as Science, History, Geography, Art and Design and Technology. The Mathematics covered within this subject should match the expectations of work being taught in a Mathematics lesson e.g. lines graphs Year 5, Bar charts in Year 3, Block diagrams in Year 2.

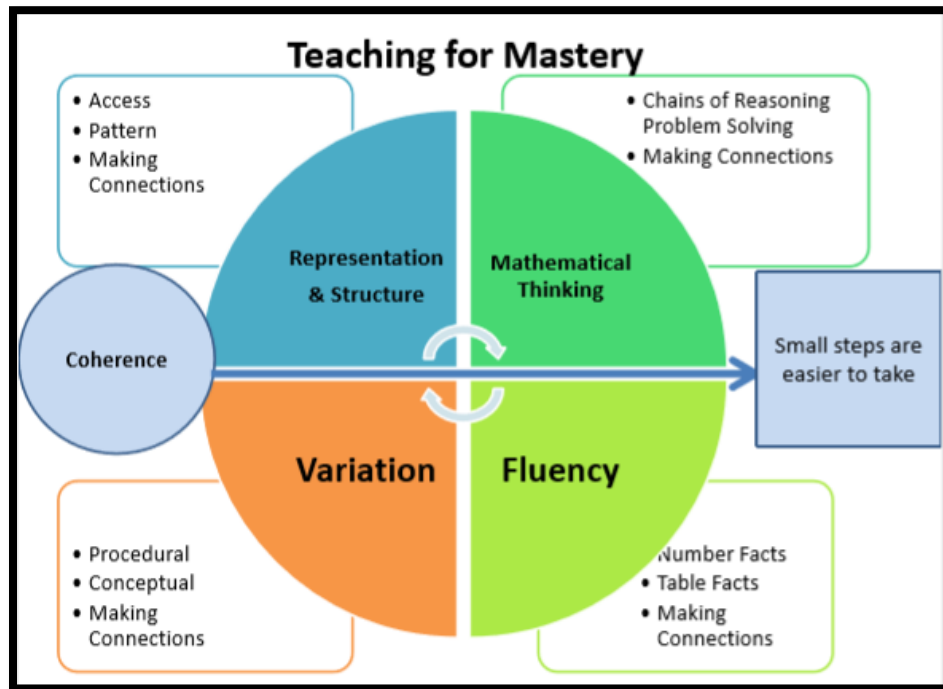
Medium term Planning

The Curriculum Prioritisation sequence is broken down into about a dozen units for each year group. This image shows you the weighting for each unit. The top row is Year 1 and the bottom row is Year 6. You can see that in the earlier years, we spend a lot of time on Number, Place Value, Addition and Subtraction.



www.ncetm.org.uk/classroom-resources/cp-curriculum-prioritisation-in-primary-maths/

When teachers are planning a unit of work, they consider several areas which relate to the 5 Big Ideas of mastery.



Short term Planning

For each of the mapped-out units, teachers use the related NCETM (National Centre for Excellence in Mathematics) Professional Development materials to support the medium-term planning in Key Stage 1 and Key Stage 2. These are all signposted in the Curriculum Prioritisation maps for each year group.

www.ncetm.org.uk/classroom-resources/cp-curriculum-prioritisation-in-primary-maths/

Teachers are not expected to provide a short-term plan- the slides are the plan. Time should be spent on carefully crafting the lesson. Teachers are encouraged to think carefully about small steps, representations, questions, language, stem sentence etc. using the Professional Development (PD) plans to support them.

Teachers consider the following areas when planning....

Key Learning Outcomes

For each unit of work, in the related PD materials there are a number of learning outcomes.

In short term planning teachers...

Use their professional judgement and knowledge of the class to determine how to long to spend on each learning outcome because for some lessons, these learning intentions may be combined whereas in others they may be broken down into smaller steps. The long-term overview outlines how long should be spent on each unit so teachers need to ensure that there is sufficient time to cover all units.

Fluency

Fluency facts are regularly taught e.g. times tables, number bonds, Geometry and Measure facts.

In short term planning teachers...

*Develop the fluency in mental methods, encouraging pupils to **calculate rather than count** e.g. using known facts to solve unknown facts. Example- when adding $8+6$ pupils are encouraged to add $8+2+4$. This can apply to larger numbers such as $68+6$, $708+6$ etc.*

Develop fluency in written formal methods. Informal methods are used for a short period of time and are used as a stepping stone for formal written methods.

*Provide opportunities for **intelligent practice**. 'In designing [these] exercises, the teacher is advised to avoid mechanical repetition and to create an appropriate path for practicing the thinking process with increasing creativity' (Gu, 1991)*

Encourage children to look for connections.

Provide opportunities for additional practice of fluency facts to support number sense. This takes the form of Mastering Number lessons in EYFS and Key Stage 1 but in Key Stage 2 there are opportunities to reinforce Geometry and Measure Facts, Time Tables and Number Sense.

Reasoning

Teachers promote Reasoning skills by asking questions such as 'What's the same and what's different?'; 'Which is the odd one out?'; 'True or false?'; 'Convince me'; 'Always Sometimes or Never? The NCETM progression document supports teachers with this.

In short term planning teachers

*Provide opportunities for deeper thinking (challenge) throughout the lesson.
Ask LSAs to write down the responses of children who find it difficult to record their responses.
Use reasoning prompts for written explanations e.g. I noticed..... I agree because....*

Problem solving

Within a Mastery lesson, teachers include Problem solving questions (which incorporate Reasoning and Fluency skills). This might be for an anchor task (Let's learn something new...) This involves routine and non-routine problems.

Teachers also plan discrete Problem-solving lessons, using NRich or other low threshold/high ceiling activities which all children have access too.

In short term planning teachers

Choose to use to introduce new learning through problem solving e.g. an anchor task.

Ensure that all pupils have opportunities to tackle them – they are not just located at the end of an exercise or set as extension tasks so that only the 'rapid graspers' work on these.

Assess who needs support and who needs further challenge during the lesson. These questions and scaffolding are planned prior to the lesson.

Understand that Problem solving is not just word problems and they will plan in opportunities to develop their skills in the following;

Working systematically

Conjecturing

Trial and Improvement

Logical Reasoning

Spotting patterns

Visualising

Working Backwards

Comparison

Teachers reinforce equivalence and greater than and less than with all concepts, including measures ($=$ $<$ and $>$). This includes varying the position of the $=$ symbol and empty box problems.

Stem sentences/ Precise vocabulary

Stem sentences help children to communicate their ideas with mathematical precision and clarity. These sentence structures often express key conceptual ideas or generalities and provide a framework to embed conceptual knowledge and build understanding. Teachers plan for these during a unit of work.

For example: ***If the whole is divided into three equal parts, one part is one third of the whole.***

Having modelled the sentence, the teacher asks individual pupils to repeat this, before asking the whole class to chorus chant the sentence. This provides children with a valuable sentence for talking about fractions, for example. Repeated use helps to embed key conceptual knowledge.

In every lesson, children are expected to use precise mathematical vocabulary. Sometimes, pupils will record the sentences in their books. Working walls support this too.

In short term planning teachers

Plan in opportunities for stem sentences (as outlined in the NCETM PD materials) and add them to their learning environment as part of their lesson.

Measures and Geometry

When appropriate, Measures and Geometry are taught alongside key skills such as Addition and Subtraction rather than as a discrete unit. This is mapped in the long-term planning.

Misconceptions

There will be opportunities to address misconceptions as they arise but teachers also pre- plan examples which the children will find tricky. For example, teachers think carefully about the numbers that they choose e.g. using teens numbers when ordering numbers as these are the ones pupils usually transpose (13/31 for example). Reasoning questions are used to address misconceptions too e.g.

Always, Sometimes, Never? / True or false? / Odd one out e.g. *Sam says that if you add 2 tens to 43 then the answer is 45. Do you agree? Prove it.*
Bob says to record three hundred and four you write 3004. Is he correct?

In short term planning teachers

Provide examples of misconceptions as part of the lesson e.g. as an anchor task or talk task, or will be asked to reason about a given question that addresses a misconception.

Cross- Curricular links

Statistics is included in every Science topic and, where appropriate, in other subjects e.g. reading tables in a Geography lesson or making a tally chart in a History lesson. Other Maths objectives can be covered in other subjects too but must match the year group expectation e.g. find the difference between given populations, (Year 5) calculate the perimeter of the pyramid (Year 3)

Representation and Structure

Teachers use models and manipulatives that expose the structure of the maths and they make connections between them e.g. money/place value; Tens frames/ Part -Part whole/ bar model. When using the bar model, teachers reinforce that this representation is a model not a method in that it helps children to understand relationships between numbers and to strengthen students' understanding of procedures. It is used alongside calculation strategies. The strategies that are used are outlined in the NCETM PD materials.

Other areas that teachers consider in their short-term plans

- The Maths is contextualised to help them understand the concepts.
- The learning outcomes are broken down into smaller steps.
- Teachers reinforce what the number represents in an equation e.g. $10-4=6$, $4 \times 5=20$, $50 \div 10=5$?
Which number is the whole, part, size of group, number of groups, factor, product, dividend, divisor, quotient etc.?
- Regular assessments or quizzes are planned to check understanding and aid working memory.
- Questions to support and deepen understanding are planned for prior to the lesson.

4. ORGANISATION

In the Foundation Stage, children receive adult led whole class and group mathematics teaching as well as daily independent child-initiated activities. They are given opportunities to work on mathematical skills both indoors and outdoors, including Forest School. Activities relate to strands of the Early Years Foundation Stage Curriculum and also make links to other areas of the Curriculum.

In KS1 and KS2 children have a daily mathematics lesson between 45 and 60 minutes. Opportunities for children to use and apply their mathematical knowledge, skills and vocabulary in different contexts, including outdoor mathematics, are also planned for in addition to their daily Maths lesson. Teachers can choose to plan a longer session e.g. whole morning mathematics activities, as long as there is appropriate coverage of other subjects across the timetable.

A typical lesson will follow this format, but teachers may sometimes use their professional judgement to plan the sequence of a daily lesson and unit of work that follows a different structure.

Let's warm up our brains
Let's learn something new
Let's talk
Let's develop our learning
Let's work independently
Let's recap

Throughout this sequence there will be opportunities for teacher- pupil and pupil-pupil discussion. Also, the teacher will plan in times for children to record their work at different stages during the lesson, not just at the 'independent stage'. For example, at the start they may answer some fluency questions in their book; or when asking to talk about their work they may be asked to write down what they have noticed before discussing this with the class. Therefore, the 'ping-pong' style of teaching may be both verbal and recorded.

Following the mastery approach, children work on the same tasks and engage in common discussions. Differentiation is achieved through choice of manipulatives and visual representations, and skillful questioning. Difficulties and misconceptions are identified through regular formative assessments and addressed with rapid intervention.

There is challenge throughout the lesson, not just at the end, and all children are exposed to it. During the lesson, the teacher will identify which children need further challenge and they will be given opportunities to solve problems of greater complexity (i.e. where the approach is not immediately obvious) demonstrating creativity and imagination. They may also be asked to independently explore and investigate context and structure, communicate results clearly and systematically explain and generalise the mathematics.

5. IMPACT

ASSESSMENT

Teachers plan lessons that aim for all children to master the key skills. Therefore, ongoing assessment is an important component of the mastery curriculum. Class teachers are responsible for assessing individual's attainment in mathematics in line with the school's Assessment Policy.

Assessments are either formative (day to day assessments that take place continually and inform planning) or summative (formal assessments that take place at the end of a strand, term or year).

Assessments include;

- Work samples e.g. books and morning work
- Observations when class teaching
- Questioning e.g. recall of facts 1:1, asking a child to explain how they solved a problem
- Photographs
- Tests or weekly quizzes e.g. teacher generated, published tests or end of Key Stage statutory tests
- Feedback from pupils e.g. responses in books, verbal feedback.

We use the DfE Maths Guidance to support assessment. This guidance provides Ready to Progress Criteria for each year group. These are the core concepts that pupils need to know in order to achieve in Maths. Teachers assess each Ready to Progress Criteria and record it on an excel sheet which is regularly reviewed and shared with the next teacher and SLT. This highlights the children who need intervention, either focused in class through quality first teaching, rapid intervention or pre-teaching or through 1:1 support.

www.gov.uk/government/publications/teaching-mathematics-in-primary-schools

In the Foundation Stage, teachers assess the children against the Early Learning Goals but formative assessment should not entail prolonged breaks from interaction with children, or require excessive paperwork. Teachers draw on their knowledge of the child and their own expert professional judgement, and are therefore not be required to prove this through collection of physical evidence.

In KS1 and KS2, a child's attainment is regularly updated on Target Tracker by SLT to monitor progress against age appropriate expectations. This is based on Teacher Assessment, weekly quizzes and termly tests. These results are discussed with the Head of School or Executive Headteacher at termly Pupil Progress Meetings so that progress of individuals can be closely monitored.

At the end of KS1 and KS2, children complete Statutory Assessment Tests and results are reported to parents.

6. PARENTAL ENGAGEMENT & HOMEWORK

We value the part parents play in the education of the children at Houghton. There is a dedicated Mathematics page on the school website and online weekly class news and homework provide information about the Mathematics Curriculum and the calculation methods that we teach.

Mathematics homework is sent home each week. In addition to this, children are encouraged to consolidate recall of facts such as number bonds and multiplication facts at home, as these play a central role in the Mathematics Curriculum. When appropriate, short videos of calculation strategies, for example, will be shared online.

Each term, test scores are shared with parents, with feedback given if there are any gaps in understanding. Parents have opportunities to discuss progress with the class teacher in the Autumn and Spring term, but they are very welcome to speak to the teacher at any suitable time during the year.

7. SEN PROVISION

It is assumed that most children progress through the curriculum content at the same pace. If a child has a specific difficulty relating to Mathematics that is listed on their IEP, they are given extra time or additional support with a teacher or LSA to address their specific needs and to support and develop their mathematical knowledge and skills accordingly.

8. GREATER DEPTH PROVISION

If a child has demonstrated that they have a deep understanding of an age appropriate concept and is excelling in an area of mathematics, they are given further opportunities to develop fluency, reasoning and problem solving and apply higher order thinking skills through carefully planned tasks.

9. INTERVENTION

In Foundation, KS1 and KS2, if a child is identified as having a difficulty or misconception with an age-related expectation or Ready to Progress Criteria, they are targeted through individual or small group work. These interventions provide short term targeted support using precise questioning and scaffolding to enable learners to reach their full potential and are regularly monitored.

10. EQUAL OPPORTUNITIES

We incorporate mathematics into a wide range of cross-curricular subjects and seek to take advantage of multicultural aspects of mathematics e.g. Islamic patterns in RE. All children have equal access to the curriculum regardless of their gender. This is monitored by analysing pupil performance throughout the school to ensure that there is no disparity between groups

11.ROLE OF SUBJECT LEADER

The Subject Leader is responsible for improving the standards of teaching and learning in Mathematics through:

- monitoring and evaluating mathematics: -
 - pupil progress
 - provision of Mathematics
 - the quality of the Learning Environment,
- taking the lead in policy development,
- auditing and supporting colleagues in their CPD,
- purchasing and organising resources,
- keeping up to date with recent Mathematics developments.

