Mathematics Policy

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Mathematics Policy

Contents

1 Intent

Mathematics is important in everyday life. It is integral to all aspects of life and with this in mind, Higham Primary School endeavours to ensure that children develop a positive and enthusiastic attitude towards mathematics that will remain with them through life. We are committed to ensuring that children recognise the importance of Mathematics in the wider world and that they are able to use their mathematical skills and knowledge confidently in a range of different contexts. We want all children to enjoy Mathematics and to experience success in the subject, with the ability to reason mathematically.

At Higham we strive for pupils to have a Growth Mindset "can do" attitude, by being resilient, determined in the face of a challenge, co-operative, creative and most importantly, having a positive attitude to making mistakes and seeking solutions. Assessment for Learning, an emphasis on investigation, problem solving and the development of mathematical thinking and a rigorous approach to the development of teacher subject knowledge are therefore essential components of Higham Primary School's approach to Mathematics.

Higham Primary School shares the aims of the national curriculum for mathematics (2014) by ensuring 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.

At Higham, these skills are embedded within lessons and developed consistently over time. Children are taught to become competent and independent mathematicians. By adopting the 'mastery approach' to teaching mathematics, we want pupils to build a deep understanding of concepts which will enable them to apply their learning in different situations, rather than simply learning procedures by rote. Through mathematical talk, children will develop the ability to articulate, discuss and explain their thinking.

2 Purpose of Study

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.

3 Programme of Study for Mathematics

3.1 Foundation Stage

The educational programmes in the Statutory Framework for the Early Years Foundation Stage, sets out the activities and experiences for children, in each of the areas of learning. For mathematics it states:

'Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.'

3.2 Overview of Key Stages 1 and 2

The Programmes of study for mathematics are set out year by year for Key Stages 1 and 2 in the new National Curriculum (2014). The programmes of study are organised in a distinct sequence and structured into separate domains. Pupils should make connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

3.3 Key Stage 1

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 (e.g. 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.

3.4 Lower Key Stage 2

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.

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

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

3.5 Upper Key Stage 2

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.

Pupils should read, spell and pronounce mathematical vocabulary correctly.

4 Implementation

Higham's mastery approach to the curriculum is designed to develop children's knowledge and understanding of mathematical concepts from the Early Years through to the end of Year 6. We follow the National Curriculum and use White Rose Schemes of Work as a guide to support teachers with their planning and assessment. The calculation policy is also used within school to ensure a consistent approach to teaching the four operations over time. Pupils study mathematics daily, covering a broad and balanced mathematical curriculum including elements of number, calculation, geometry, measures and statistics. Due to the interconnected nature of mathematics, we aim to teach mathematics in a cross curricular manner as well as discretely to teach the practical application of mathematical skills. We focus not only on the mathematical methods but also focus on mathematical vocabulary and use the Mastery approach to broaden and deepen mathematical understanding.

At Higham, we embed a deep understanding of maths by employing a concrete, pictorial, abstract approach – using objects and pictures before numbers and symbols so that pupils understand what they are doing rather than just learning to repeat routines without grasping what is happening. Moving between these approaches enables pupils to connect abstract symbols with familiar contexts, which supports pupils in making sense of maths.

- Concrete representation - a child is first introduced to an idea or a skill through the use or real life or mathematical objects. It is important for children to use a wide range of concrete resources as this 'hands on' approach is the foundation for conceptual understanding. Examples of resources include real life objects like sweets, straws, pencils etc; Dienes / base 10; Numicon; bead strings; counters; cubes; place value counters; Cuisenaire rods; Rekenreks.
- Pictorial representations – when a child has sufficiently understood the hand-on experiences performed, they can now relate them to representations such as diagrams or pictures. These are used to represent numbers and symbols. Examples of pictorial representations include: number lines, 100 square, place value grid, bar method, drawing of concrete representations. These representations are used to help them reason and solve problems.
- Abstract representation – with the foundations firmly laid, students should be able to move to an abstract approach using numbers and key concepts with confidence.

We use the Bar Model Method to support solving word problems by drawing either part-whole or comparison models to represent the quantities given in a word problem. The process of solving a word problem using bar models allows pupils to communicate their understanding of the problem using a visual representation. This gives pupils a clearer idea of how the known and unknown quantities are related, enabling them to decide on the operations to use, hence making the word problem more accessible.

In Key Stage 2, at least four times a week, children complete a 'Flashback' activity at the start of a lesson. This is an opportunity for retrieval practice in order to build long term memory or for further consolidation and practice of a skill. Typically, it will be fluency based and include questions based on recent learning, as well as those from previous units of work. It should take approximately ten minutes to complete and children will self-mark with the teacher in purple pen.

In Key Stage 2, an arithmetic test, will be completed once a fortnight, with the review and target teaching of common misconceptions in the alternate week.

Please See 'The Calculation Policy', for further guidance on the progression of calculation methods from the Foundation Stage to Year 6.

The NCETM Mastering Number project is used to secure firm foundations in the development of good number sense for all children from Reception through to Year 1 and Year 2. The aim over time is that children will leave Key Stage 1 with fluency in calculation and a confidence and flexibility with number. Attention will be given to key knowledge and understanding needed in reception, and progression through Key Stage 1 to support success in the future.

5 Teachers Planning

Long term planning – The National Curriculum for Mathematics 2014, Early Learning Goals (Number and Numerical Patterns) and Development Matters July 2021 provide the long-term planning for mathematics being taught in school.

Medium term planning – Year 1 to 6 use the White Rose Maths Hub schemes of learning as their medium-term planning documents. These schemes provide teachers with an overview of the small steps needed in order to achieve the National Curriculum objectives. Each "small step" is then broken down further into; notes and guidance, mathematical talk, varied fluency and reasoning and problem solving. The plans support a mastery approach to teaching and learning and have number at their heart. They ensure teachers stay in the required key stage and support the ideal of depth before breadth. They support pupils working together as a whole group and provide plenty of time to build reasoning and problem-solving elements into the curriculum. Children of all abilities are given the opportunity to develop their skills, knowledge and understanding. There is a clear progression of skills, knowledge and understanding so that there is an increasing challenge for the children as they move up through the school. It is important to note that teachers have the autonomy to adapt the medium-term plans to suit the needs of their class.

Short term planning – Each lesson has a clear learning objective derived from the medium-term planning in line with the Primary Curriculum for mathematics 2014. Short term planning should be progressive, ensuring fluency and providing regular opportunities for reasoning and problem solving. Each teacher is responsible for evaluating the maths lessons and deciding on the next steps.

In the EYFS, we follow the NCETM Mastering Number scheme of work as our maths planning. Each week has set objectives which allows all children to develop a deeper understanding of each number through designated maths lessons, adult led group work and child-initiated activities both inside and outside the classroom.

6 Organisation

At Higham, we follow the mastery approach to maths therefore 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 will always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly will be challenged through being offered deeper, more sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material will consolidate their understanding, including through additional practice, before moving on. We will provide the children with the necessary resources to allow all children to access the curriculum and encourage them to use this where appropriate.

7 Assessment

Assessment is an integral part of teaching and learning and is a continuous process. Teachers use formative assessment strategies to daily assess children's learning and understanding. This will be through;

- Effective questioning
- Clear learning objectives and success criteria
- Facilitating and listening to discussion
- Regular marking of work, including the analysis of errors and picking up on misconceptions. (Please see Feedback and Marking policy for further guidance)

These ongoing assessments inform future planning and teaching. Lessons are adapted readily and interventions are put in place where necessary.

The Higham Primary Progression of Knowledge and Skills for Mathematics document is used to support teachers in their judgements and ensure next steps are clearly identified.

By the end of each year, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study. Teachers use tracking grids to assess whether pupils are working towards the expected standard, are working at the expected standard or are working at greater depth. These tracking grids are completed regularly throughout the year.

In Key Stage 2 children sit Testbase assessments or official DFE tests at least three times a year. In Year 2 pupils sit the non-statutory Key Stage 1 tests in Term 6. These tests are used to support teacher judgements when assessing pupil progress. These are discussed at regular Pupil Progress Meetings and appropriate support and intervention is put in place. Pupils' progress is reported to parents three times a year. Additional White Rose assessments are carried out at the end of each unit of work.

At the end of Year R pupils will be assessed against the Foundation Stage Profile and Early Learning Goals in Mathematics.

At the end of Key Stage 2, pupils will sit Statutory Assessment Tests.

In Year 4 we will administer an online Multiplication Tables Check (MTC), a requirement from the DFE. The purpose of the MTC is to determine whether pupils can recall their times tables fluently, which is essential for future success in mathematics. It will help schools to identify pupils who have not yet mastered their times tables, so that additional support can be provided. To support the children with their multiplication practice we use 'Times Table Rockstars' as an online and fun learning platform which also offers resources to be used in the classroom.

8 Special education needs and disabilities (SEND)

Daily mathematics lessons are inclusive to pupils with special education needs and disabilities. Where required, children's PPP's incorporate suitable objectives from the National Curriculum for Mathematics or

development matters and teachers keep these in mind when planning work. Maths focused intervention in school helps children with gaps in their learning and mathematical understanding. These are delivered by support staff and overseen by the SENCO and/or the class teacher.

Within the daily mathematics lesson teachers have a responsibility to not only provide differentiated activities to support children with SEND but also activities that provide sufficient challenge for children who are high achievers. It is the teachers' responsibility to ensure all children are challenged at a level appropriate to their ability.

9 Equal Opportunities

Positive attitudes towards mathematics are encouraged, so that all children, regardless of gender, ethnicity, culture, religion, language, disability, age and social circumstance develop an enjoyment and confidence with mathematics.

10 Monitoring and evaluation

The mathematics leader alongside senior leaders, regularly monitors and evaluates the quality and standards of mathematics throughout the school and this enables the leader to support teachers in their own classrooms.

11 Use of ICT

Calculators should not be used as a substitute for good written and mental arithmetic. They will therefore only be 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. At Higham Primary School teachers use their judgement about when ICT tools should be used.

12 Resources

Each class has a stock of core resources that are age appropriate. Additional mathematical equipment is stored centrally.

13 Home Learning

All pupils in Reception and Key Stage 1 also have access to NumBots, a web-based programme that supports children's understanding, recall and fluency in mental addition and subtraction, so that they can move from counting to calculating. Pupils are expected to use this programme for ten minutes a week. In Year 2 this learning is reinforced with weekly number bonds or times tables tests.

In Key Stage 2, all pupils have access to Times Tables Rock Stars, a web-based programme that supports the children's recall, speed and fluency of multiplication and division facts. Children are encouraged to use the 'Garage Mode', which is a carefully sequenced programme of times tables practice as well as 'Studio Mode' to develop their speed and accuracy. Pupils are set weekly tasks by their teacher to complete. Key Stage 2 challenges, known as 'band battles' are also set regularly to encourage participation and raise the profile of maths within the school.

14 Working Walls

Each class must have a maths working wall. Working walls provide an opportunity for teacher's and pupils to model, scaffold and provide prompts as part of the ongoing learning in Maths lessons. This will display the current and relevant vocabulary, and concrete, pictorial and abstract methods as appropriate and other information to support children in their understanding of key concepts. Working walls should be referred to and added to throughout the lesson and unit of work. Work is not necessarily mounted as it is expected to develop rapidly and change frequently.

15 Spoken Language

The National Curriculum for Mathematics reflects the importance of spoken language in pupil's 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. They must be assisted in making their thinking clear to themselves as well as others and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

16 Links with other policies

- Assessment
- Calculation
- Curriculum
- Early Years Foundation Stage

- Feedback and Marking
- Special Educational Needs and Disabilities
- Teaching and learning