HIGHGATE
PRIMARY SCHOOL

Mathematics Policy

December 2020

Introduction

The purpose of Mathematics education is to develop pupils' ability to make sense of the world around them through the application of mathematical knowledge and reasoning. It aims to instill in pupils a sense of excitement about the subject and a spirit of curiosity which encourages them to explore patterns and relationships in both number and space. It provides an essential foundation for later development of skills across all aspects of science, technology and engineering and, more generally, relevant to most areas of employment.

Aims

The aims of our Mathematics curriculum are:

- to promote enjoyment and enthusiasm for learning through practical activity, exploration and discussion
- to develop a solid understanding of the key concepts underpinning the number system
- to promote fluency and flexibility in choosing and applying calculation methods
- to develop the ability to solve problems through resilience, decision-making and reasoning in a range of contexts
- to explore features of shape and space and develop measuring skills in a range of contexts
- to create, explore and explain patterns and relationships across in number and space
- to develop a practical understanding of the ways in which information is gathered and presented
- to understand the importance of mathematics in everyday life

Approach to teaching and learning

Mastery

In line with the National Curriculum for Mathematics, we want our pupils to develop mastery of the subject. This means that all pupils, other than those with significant special needs which prevent them doing so, follow the School's scheme of work for their age group, in mixed-ability classes. Each class masters concepts and skills in turn before moving onto the next stage. During this process, higher-attaining pupils are stretched through tasks which deepen their understanding and mastery of the concepts involved, often involving open-ended outcomes, while lower-attaining learners are supported through provision of concrete and visual resources and, where appropriate, adult support. A range of strategies, including directed questions and guided group work, are used to engage and involve all pupils. Within each class, pupils will usually be in mixed-attainment groups although they may be grouped by attainment for some activities, depending on the requirements of the specific activity. The intention is that all children succeed in acquiring the mathematical skills and knowledge which they need in order to prepare them for secondary school and beyond, whilst developing a positive attitude towards the subject.

Engagement

Each lesson combines whole-class teaching with time for the pupils to work in groups or individually. A range of activities is provided to cater for the range of attainment within the class, all of which are designed to allow children to achieve the learning objective for the lesson. Frequent use is made of games, puzzles

and problems which encourage participation and which have open-ended outcomes to stimulate pupils' exploration.

Reasoning
Opportunities to develop reasoning skills are provided in every lesson. Pupils are encouraged, wherever possible, to discover solutions to mathematical problems for themselves, by applying what they already know to new situations. In doing so, they develop their ability to think logically, to approach problems systematically and to be resilient in the face of difficulty. They are prompted to break problems down into smaller steps, to employ trial-and-improvement methods and to reflect on their work. Pupil talk is encouraged as this is an essential component in helping children develop and clarify their mathematical thinking, and pupils are expected to use whole sentences when conversing mathematically, as they do in other subjects. As children progress, they are increasingly expected to explain, as well as describe, what they have done. These skills are applied across a wide range of contexts covering number, shape and space and real-world problems.

Understanding
A number of key concepts underlie mathematics and it is essential that children develop a sound understanding of these at an early stage. Examples include the base-10 place value system, the relationship between multiplication and addition, and the connection between fractions and division. Conceptual understanding is initially built through ample use of concrete objects, starting with toys for developing early counting. Pupils then move on to visual representations, such as number lines or sketches, before they encounter and use the concepts in abstract form, although concrete resources are still made available for reinforcement or revision. It is important that these stages are mastered in a logical sequence and are not rushed; short-cuts taken here result in insecure understanding which leads to problems further on.

Fluency
Children learn by heart the basic addition, subtraction, multiplication and division facts. These give them confidence to approach harder calculations, as well as serving as building blocks to help solve them. Knowing these key facts by heart reduces the load on working memory so that more of the child's mental resources are available to tackle the more complex aspects of mathematical problems.

A range of written and mental calculation methods are learnt, detailed in the appended calculation policy. The sequence in which these are encountered is structured so that children understand how and why each one works, allowing them to apply the methods flexibly and efficiently; pupils are encouraged to develop decision-making skills, thinking flexibly about how to apply what they know in the most effective way in the context of specific problems.

Mental mathematics is practiced daily throughout Key Stages 1 and 2. This regular practice allows pupils to build speed, reliability and confidence and provides essential support to the parallel development of written calculation skills. Children are also encouraged to build fluency through regular practice at home, including through the use of web applications. This emphasis on mental fluency ensures that children are prepared for the demands of National Curriculum assessments in Years 2, 4 and 6.

Mathematics curriculum planning

Mathematics is a core subject in the National Curriculum, which sets out statutory requirements within programmes of study for each year group.

We carry out curriculum planning in mathematics in three phases: long-term, medium-term and short-term. We have developed our own scheme of work which acts as the long-term element of our planning. It contains a detailed outline of the learning objectives for each year group and ensures coverage of the statutory requirements of the National Curriculum.

Our medium-term mathematics plans, which are adapted from the scheme of work and from individual topic overviews, define the learning objectives to be addressed over each half-term. They ensure an appropriate balance of work and, taken as a whole, suitable coverage over the year. These plans are drawn up by class teachers and periodically reviewed by the subject leader.

Class teachers complete the short-term plans, usually weekly, for the teaching of mathematics. These record the specific learning objectives and success criteria for each lesson and give details of the mental and oral starters, the main teaching input, including key questions, independent and group activities, and plenary sessions. Specific reference is made to the role of adults within the lesson, to the provision of resources to support learners, to any differentiation required to enable all pupils to meet the learning objective and to opportunities for pupils to explore the objective in greater depth. These plans are stored electronically and are monitored on a regular basis by the subject leader or another senior leader.

The Early Years Foundation Stage

Mathematics in our Nursery and Reception classes relates to the Early Learning Goals, which are set out in the statutory framework for the Early Years Foundation Stage and cover the areas of Number and Shape, Space and Measures. All children have the opportunity to develop their understanding of number, measurement, pattern, shape and space through play and structured activities that allow them to enjoy, explore, practice and talk confidently about mathematics. Our priority is on equipping early learners with a strong sense of number and of the basic mathematical concepts (such as the ideas of 'one more' and 'one less') so that they are completely ready for the demands of the Key Stage 1 curriculum and beyond.

Teaching Assistants

Weekly plans are shared with additional adults who will be working in the mathematics classroom no later than the beginning of each week. Their role in each lesson will be clearly stated on the plan. This allows Teaching Assistants the opportunity to discuss with the class teacher any issues arising from the plans prior to the relevant lesson. Where necessary, additional adults will be provided with specific guidance as to their role in each stage of the lesson, including the extent of support which they should provide during independent and group work.

Contribution of mathematics to other curriculum areas

English

Mathematics contributes significantly to the teaching of English by actively promoting the skills of reading, writing, speaking and listening. Pupils learn the importance of precise use of correct vocabulary. They read and interpret problems in order to identify the mathematics involved, and present their work to others, challenging each other and justifying their reasoning. As they develop, they are increasingly expected to provide clear written explanations of their methods and conclusions.

Computing

Computing and Mathematics intersect in a variety of ways. The practice of logical reasoning and systematic working in Mathematics enhances the development of programming skills in Computing. By employing control software, pupils develop their use of standard and non-standard measures for distance and angle whilst learning programming skills. They use simulations to predict and identify patterns and relationships. Children are introduced to a range of software and websites which provide a wealth of mathematical games, puzzles and problems; many of these can also be accessed at home.

Personal, social and health education (PSHE) and Citizenship

Mathematics contributes to the teaching of PSHE and Citizenship as children become increasingly familiar with real-life situations, particularly through their work on problems involving money.

Science

In Mathematics, children develop the measuring skills, including the ability to read scales, which support them in carrying out scientific investigations. They learn ways of recording, representing and interpreting data, such as tally charts, tables, and bar and line graphs, which similarly support their investigative work in Science.

Highgate Primary Curriculum (HPC) topics

The thinking skills that children develop in Mathematics lessons form a key part of the HPC and are applicable to every subject. Whilst the daily Mathematics lesson is a discrete session, many opportunities exist for linking it to each year group's current HPC topic, including in the selection of contexts for mathematical problems. We plan for these cross-curricular opportunities in each year group, both through

the long term curriculum map and through medium and short term planning. The subject leader supports class teachers in identifying these opportunities.

Equal Opportunities
Every child has access to a broad and balanced mathematics curriculum through our planning and delivery of the National Curriculum requirements. We create effective learning environments that are relevant and motivating for all children. We value the cultural and linguistic diversity of all pupils and reflect this in our lessons, ensuring that children's different life experiences find expression within the curriculum for each class and that children who are new to English are supported to understand key mathematical vocabulary. Class teachers provide suitable learning opportunities for all children through adapting activities, providing additional support or challenge according to the individual needs, abilities and experiences of children within the class, and actively challenge gender stereotypes with regard to mathematics.

To the extent that resources permit, catch-up programmes or booster groups are used to support children identified as not achieving nationally-expected levels of attainment. These are in addition to standard class provision and may be delivered by Teaching Assistants with guidance from class teachers.

Teaching mathematics to children with special educational needs and disabilities (SEND)
Some pupils have special educational needs which impact their mathematical learning. Working with the Inclusion Manager, class teachers identify those areas where additional or different provision is needed in order to allow each pupil to participate and progress. These areas include classroom organisation, resources, pedagogy, differentiation of activities and adult support. See the SEND policy for further information.

Assessment and recording
We carry out both formative and summative assessment of pupils' learning. In the short term, we make diagnostic evaluations of how well each child has met the learning objectives for each lesson. These are used to adjust daily lesson plans to match pupils' needs.

The class teacher maintains an assessment folder for mathematics, either on paper or electronically using the FFT Aspire Pupil Tracking system. For each child, this includes statements of attainment linked to the learning objectives for the child's year group outlined in the programme of study of the National Curriculum (other than for pupils with significant needs who are unable to access the curriculum for their chronological year group, in which case learning objectives for a previous year group may be used.) On an ongoing basis, class teachers assess and record the pupil's attainment against each of these statements. Evidence for this may come from work in books, contributions to classroom activities or from tests. Tests are used diagnostically to provide an additional source of evidence of a pupil's attainment, not as a judgement on the pupil's overall level of attainment.

At least termly, class teachers review the tracking records for each child and use them to inform an assessment of the child's overall degree of mastery of the learning objectives which have been covered up to that point. This judgment is made on a 'best fit' basis, as it is unlikely that the same degree of mastery will have been demonstrated for every statement; greatest weight is given to statements of attainment which relate to the number system and to calculation. Judgments thus made are recorded and passed termly to the Senior Leadership Team as part of the school's Pupil Progress review process.

Pupil tracking provides an ongoing and detailed picture of a pupil's progress against the expectations laid out in the National Curriculum. By highlighting areas of attainment, they make it easy to identify target areas in which progress is less swift. Short and medium term planning is adjusted to ensure that these target areas are addressed. Individual pupil targets are set and shared with children and with parents at termly consultations.

End-of-year assessment judgments are made using the process outlined above and form the basis of the written report to parents. Tracking information is passed on to the class teacher who will be with the child

the following year so that they have a detailed picture of that child's mathematical strengths and weaknesses prior to the start of the new school year. A new tracker is then begun for each child and is used to assess their progress in mastering the learning objectives relevant to the new year group.

In Years 2 and 6, pupils are also assessed by the National Curriculum Tests (SATs.) These are compulsory for most children in maintained schools and provide a levelled score which can be used to obtain a 'pass' or 'fail' result for each pupil, in addition to the judgement which has been assessed by the class teacher. For Year 6, this result forms part of the school's statutory accountability and is reported to parents alongside the class teacher's assessment; for year 2, the result is used to inform this teacher assessment and will not normally be reported to parents. Additionally, children in Year 4 are statutorily required to take an online Multiplication Tables Check, intended to assess recall of times tables facts. Results from this test also form part of the school's accountability reporting and are shared with parents.

In the Early Years Foundation Stage, the teaching team carries out ongoing observations and records of achievement for individual children over the year. Formative assessments are made throughout the learning process to determine how the children are progressing against the Early Learning Goals. Teachers use a tracking sheet to record each child's progress at the end of the first half term (Baseline) and at the end of each term. At the end of the Reception year, a summative assessment is made which assesses a child's mastery of every subject area after instruction, and completes their Foundation Stage Profile. This data informs the end-of-year report to parents. Children will be assessed as either 'emerging', 'expected' or 'exceeding' in relation to the Early Learning Goals. Each child will also have a Profile Book containing evidence of their progress and attainment in the form of photographs, a written narrative and selected pieces of work celebrating their investigations, discoveries, observations and achievements. See the Assessment Policy for further information.

Marking

Teachers mark a child's work against the learning objective for the task set. The purpose of marking is to acknowledge pupils' effort, to assess their learning and to provide feedback to them on what they need to do to improve. Accordingly, while every piece of work will be read and acknowledged, not every calculation will be marked in detail; however, teachers will use the information gleaned from marking to adjust the following day's teaching where needed, either for the whole class or through giving additional support to individual pupils or groups. Next steps for pupils are managed by target sheets kept in the mathematics books - see the Marking appendix to the Assessment Policy for further details.

Homework

Mathematics homework is given to pupils weekly from Year 2 to Year 6. We aim to provide purposeful, practical activities which encourage parent/child interaction and enable parents to help reinforce concepts taught in class. Parents are also encouraged to help their child practice quick recall of mathematical facts, such as number bonds and times tables. Online resources, such as TT Rockstars and MyMaths, are subscribed to by the school to support families with this, and other, home learning and class teachers can provide advice regarding other suitable online games and puzzles to access at home. See the Homework Policy for further information.

Resources

Provision of appropriate resources is vital to children's development of conceptual understanding. A range of equipment is kept within each phase, such as number lines, number squares, cubes, Numicon shapes, mirrors, money and dice. Further resources, including Dienes equipment, Cuisenaire rods and calculators are held within those phases where they are most used with additional stock kept in the resource room.

Calculators may be used across all age ranges. They allow children to extend their exploration of number patterns into areas which include excessively complex or long-winded calculations. They are not used as a substitute for calculation skills.

Classroom resources should be clearly labelled and accessible to the children. As children's mathematical thinking develops, we encourage them to make independent and informed decisions when choosing and using appropriate resources. This is an integral part of developing children's problem solving skills.

Each phase in Key Stages 1 and 2 has access to a range of problem-solving activities published by BEAM. These are used regularly to further develop children's problem-solving and thinking skills.

Monitoring and review

Monitoring of the standards of children's learning and the quality of teaching is the responsibility of the mathematics subject leader (MSL). The work of the MSL also involves supporting colleagues in the teaching of mathematics, being informed about current developments in the subject, and providing a strategic lead and direction for the subject in the school. The MSL subject leader gives the Headteacher and governing body an annual summary in which strengths and weaknesses are evaluated and priority areas for improvement identified. Reports to the head teacher and the governing body are informed by the subject development plan, which the MSL writes annually.

Staff Responsible for Implementation of the Mathematics Policy

Peter Burge - Mathematics Subject Leader
William Dean - Headteacher

Related policies

Assessment Policy
Curriculum Policy
EYFS Policy
Homework Policy
SEND Policy
Teaching and Learning Policy