Happy children aiming high

New Hartley First School

Mathematics Policy

Introduction

At New Hartley First School we believe that mathematics equips pupils with a powerful set of tools, the acquisition of which allows them to become fully participating citizens in society who are able to think mathematically, reason, solve problems and assess risk in a range of contexts. Mathematics is the exploration of relationships and patterns, in both number and shape, in the world around them. Children will learn to understand, distill and clarify information; consider what they know that will help them to solve problems, realizing what they need to know next; create systems and strategies, organising information in a way that helps find patterns and ultimately solutions and to communicate and present their findings effectively.

Purposes

In our planning, teaching and assessment of mathematics, it is our aim to:

1) Develop lively, enquiring minds encouraging pupils to become self- motivated and confident through growth mind-set.
2) Foster a curiosity of mathematics, rooted in a positive sense of sense which ensures that children are resilient in their studies, relishing the opportunity to learn from their mistakes.
3) Establish a learning environment in which children feel that they have the potential to be just as 'good' at maths as their classmates.
4) Develop problem solvers, who can reason, think logically, work systematically and apply their knowledge of mathematics.
5) Nurture a growth mind-set alongside the teaching of mathematics, allowing children to tackle problem solving challenges as well ensuring that they have the confidence to infer their own conjectures based on their prior knowledge and understanding.
6) To secure high standards through effective teaching and learning throughout the school.
7) To establish clear, realistic targets for raising standards and to provide a manageable plan for achieving them.
8) To enable children to calculate accurately and efficiently both mentally and with pencil and paper using a range of strategies, ensuring that children are able to select the most appropriate method with confidence.

9) To develop an awareness of mathematics in the environment and in everyday situations and to provide children with carefully planned cross-curricula opportunities to meaningfully use and apply mathematics
10) Enable the subject leader to review, monitor and evaluate the planning, teaching and assessment of mathematics throughout the school.
11) Provide children with the ability to communicate effectively and confidently using mathematical language.

Aims of the National Curriculum

The National Curriculum for mathematics aims to ensure 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 have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems
- **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.

Programmes of Study

Foundation Stage

The programme of study for the Foundation stage is set out in the EYFS Framework.
Mathematics involves providing children with opportunities to develop and improve their skills in counting, understanding and using numbers, calculating simple addition and subtraction problems; and to describe shape, spaces and measures.

Key Stage 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 strands. 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.

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.

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 multiplication 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.

Teaching and Learning

Teachers' planning and organisation

Teachers follow the White Rose Maths Hub schemes of work, which ensures continuity and progression in the teaching of mathematics. The teaching of curriculum objectives is broken down into small steps, enhancing children's learning through depth rather than breadth.

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Within a unit of work, the time spent on teaching a specific learning objective or set of learning objectives depends on the needs of the children.

Lessons follow the 5 principles for mastery teaching:

1) Coherence (The small progressive step journey which the learning takes).
2) Representation and Structure (Children will have access to a range of concrete equipment (manipulatives) before moving on to a visual and abstract representation
3) Fluency (all children will be given time to practice fluency).
4) Mathematical Thinking (Al children will have the opportunity to solve problems and reason within a lesson).
5) Variation (How questions and problems are shown and varied so that they progressive deepen children's understanding).

All teachers plan daily mathematics lessons following this structure. Planning is done on a weekly basis. Teachers plan for opportunities to engage in 'mathematical talk' with the children, enhancing their accurate use of mathematical vocabulary as well as planning opportunities to encourage children to answer questions in full sentences (STEM sentences) to support their understanding and future application. Teachers plan the support which they will make available within the lesson to ensure that all children are able to meet the learning objective set for the lesson. Teachers may use a maths 'master class' intervention prior to a maths lesson, to pre-teach elements of a lesson based on pre-empted misconceptions. Equally, opportunities for challenge are planned for ahead of every lesson; allowing those who are quick to grasp a concept the opportunity to apply their understanding to a range of closed or open ended problems. We ensure that across each term children are given a range of experiences in mathematics lessons e.g. practical activities and mathematical games, group problem solving activities, individual, group and whole class discussion activities, open and closed tasks. We ensure that children can use a range of methods to calculate and have the ability to check whether their chosen methods are appropriate, reliable and efficient.

A Typical Lesson

The key elements of maths lessons at NHFS include: asking questions and conjecturing; making, sharing and exploring mistakes; spotting patterns, making connections. . .investigating; collaborative problem solving; talking and sharing. . .noise!

A typical lesson in Years 1 to 4 will have the following components:

- Daily skills session, either before or away from the mathematics lesson which focuses on a small selection of basic fluency skills (see basic skills policy).

- Main teaching session which lasts approximately 40 minutes and uses the five mastery principles. The main teaching session will include both teaching input and pupil activities and a balance between whole class, guided grouped and independent work, (groups, pairs and individual work) effectively offering appropriate challenge. Sometimes the focus for this session is new learning, at other times pupils may be practising, to master the application of a concept they have learned earlier. The focus of this session may vary for different children depending on their learning need.
- Maths learning builds from a concrete understanding of concepts where children are manipulating objects. When children are able to see concepts this way, they then need to understand the same concepts represented pictorially. Children are then ready for abstract representation before being able to apply their knowledge to different situations. The use of this CPA approach is used to inform planning and elements of this CPA approach will be evident in all lessons.

Differentiation

Teaching is underpinned by a belief in the importance of mathematics and that the vast majority of children can succeed in learning mathematics in line with national expectations for the end of each key stage. Children are encouraged to apply a growth mind-set to their exploration of maths and to their belief in their ability to do mathematics. Encouraging children to 'have a go' is seen as paramount, with mistakes being celebrated as opportunities for your brain to grow! The whole class is taught mathematics together, with no differentiation by acceleration to new content. The learning needs of individual pupils are addressed through careful scaffolding, skilful questioning and appropriate rapid intervention, in order to provide the necessary support and challenge.

Differentiation of tasks is done in various ways:

- Open ended questioning and activities which allow children to link their learning and reason
- Recording e.g. some children may give their responses verbally and this may be scribed by a member of staff. Alternatively, learning may be recorded with photographs as opposed to formal recording
- Resourcing e.g. use of concrete equipment such as Numicon, base ten, cubes, counters, 100 squares, number lines, mirrors to support some children
- Groupings are of mixed attainment and are not fixed

Independent work often involves some focused, targeted group work from the teacher, however groupings are 'fluid and flexible' based on the children's performance in a previous

lesson or the beginning of that particular lesson. Where Teaching Assistants are available, they are fully briefed before the lesson and use the same teaching methods modelled by the teacher to support individuals or groups.

Assessment

Assessment information will be used to inform planning so that lessons are pitched at the children's individual levels, using differentiation skilfully and including an element of 'challenge' which is the children's next steps in their learning. This information is used to inform the 'Small Steps Assessment' grid, which is completed daily by teachers. Children who have been identified as having not successfully mastered the concept, will be targeted for same day intervention. Teachers will also use formative assessment in the form of the White Rose assessment papers, which will be used termly to inform data, planning, intervention and pupil progress meetings. Termly pupil progress meetings will be held by the Head Teacher with class teachers to track the progress of individual children and groups of learners.

Resources

Concrete resources (manipulatives) are integral to the CPA approach used to inform teaching and learning, and therefore it is vital that such equipment is readily available within each classroom. Each classroom (year 1-4) has a 'Maths Station' offering a range of resources and manipulative which complement our calculations policy. Children are encouraged to use this as a 'self-serve' area, and enjoy selecting their own resources to support their learning.

Guidelines

1) Children should be provided with a variety of practical experiences related to number and place value, addition and subtraction, multiplication and division, Fractions (including decimals), measurement, geometry: properties of shapes and statistics.

2) Children should be provided with a daily variety of experiences to develop mental and recorded skills in numeracy with and without counting aids, standard and non-standard measures, 2D and 3D shapes and to collect, handle and interpret data.

3) Children should experience activities, which promote an understanding of the concepts of each Key Performance Indicator (number and place value, addition and subtraction, multiplication and division, Fractions (including decimals), measurement, geometry: properties of shapes and statistics.).

4) Investigation, estimation and discovery should be developed through ensuring sound understanding of number operations.

5) Mental maths activities, games and practical activities will help support the teaching of basic skills and the understanding of mathematical principles and vocabulary.

6) Children should be given the opportunity to collaborate and discuss mathematical activities and to use a variety of practical applications throughout the whole of their work. A wide variety of apparatus, activities and challenges will be used to extend confidence and understanding in using and applying maths.

7) Same day intervention will be offered in the form of 'Maths Master classes' which will allow teachers to: provide rapid intervention prior to the next maths lesson; to pre-teach elements of an upcoming lesson; to provide children with additional opportunities for challenge.

8) Planning will be based upon the current National Curriculum (2014). Programmes of Study and the White Rose Hub schemes of work inform medium term plans and subsequently weekly planning. Class teachers are responsible for the relevant provision of their own classes. Although lessons are planned in advance, they are adjusted in light of daily assessments. Throughout the whole curriculum, opportunities to extend and promote Mathematics should be sought. Nevertheless the prime focus should be on ensuring mathematical progress delivered discretely or otherwise.

9) The maths subject leader will monitor resources, effectiveness of planning, staff in need of in-service support/coaching, the effectiveness of agreed assessment procedures and use of the schools calculation policy and work with partnership First and Middle Schools as part of the assessment group.

Linked Documents

Calculation Policy

Fluency in Maths Policy

New Hartley First School Teaching and Learning Profile for Maths

White Rose Maths Hub schemes of work (Year 1-4)