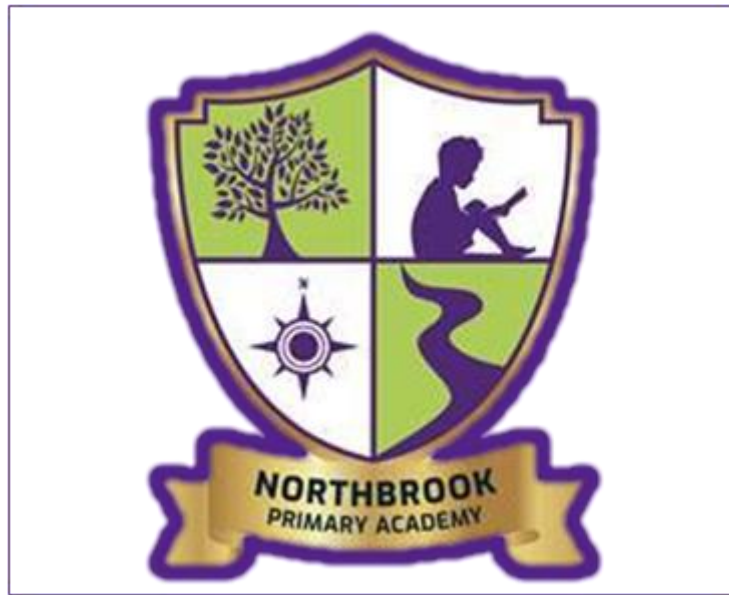


Northbrook Primary Academy



Mathematics Guidelines

Date of guidelines: September 2023

Review Date: September 2024

Northbrook Primary Academy

Mathematics Policy 2023

At Northbrook Primary Academy School, we want to ensure our children have access to a high-quality maths curriculum that is both challenging and enjoyable. We provide our children with a variety of mathematical opportunities, which will enable them to make the connections needed to enjoy greater depth in learning. We want to make sure children are confident mathematicians who are not afraid to take risks and fully develop independent learners with inquisitive minds who have secure mathematical foundations and an interest in self-improvement. We believe mathematics is an important part of children's development throughout school, right from an early age.

Aims

Our school curriculum for mathematics is designed to ensure that all pupils by the end of year 6:

- 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.

These aims are in line with the Key stage one and two National Curriculum aims.

The national curriculum states 'Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas.'

However, pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems.

Approach to Maths teaching

At Northbrook Primary Academy our vision is:

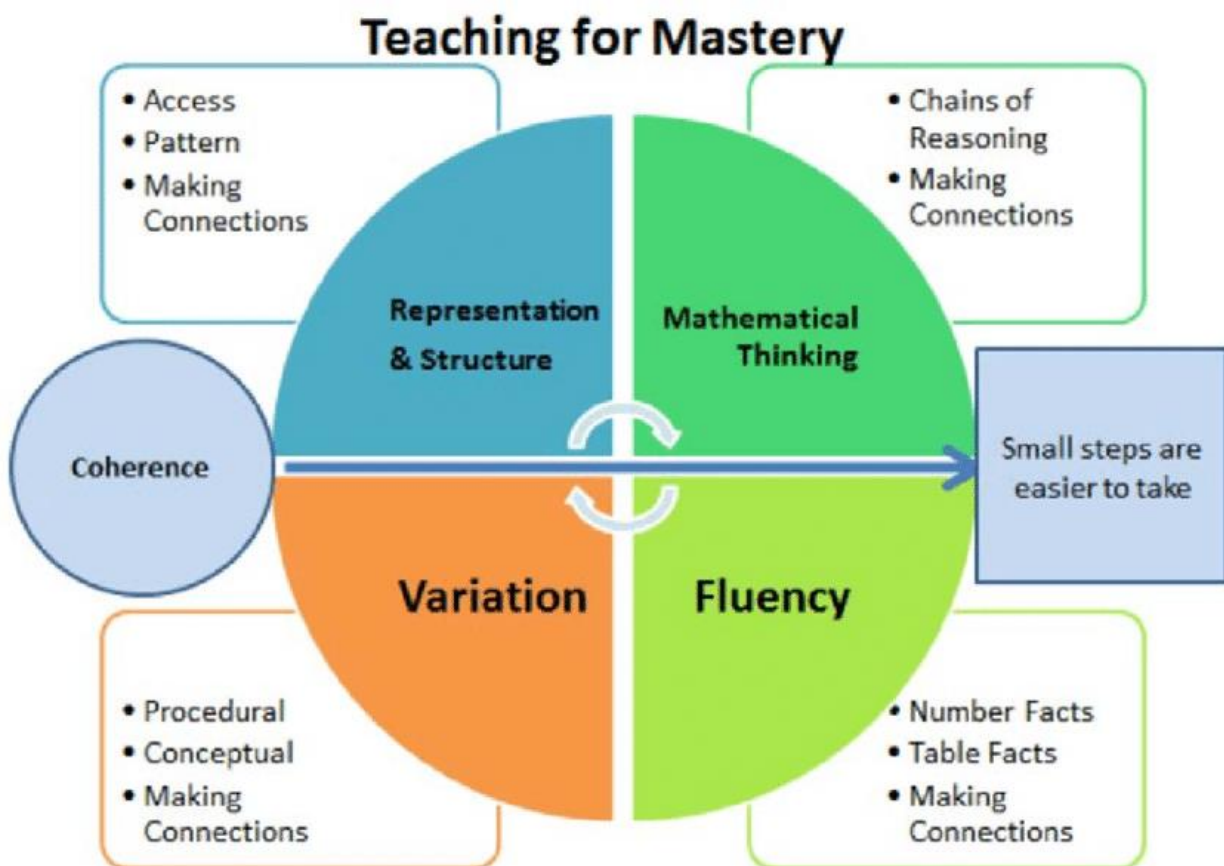
- To promote a positive attitude towards mathematics in all pupils and allow them to grow an understanding of where the subject fits in the wider world.
- To ensure all pupils have the mathematical knowledge and understanding to be ready for their next stage of education.
- To enable all pupils to find rich and varied links between mathematics and a wide breadth of other areas of the curriculum, but in particular Science.

- To ensure all pupils progress in mathematics and are equipped to meet national attainment levels through their depth of study.
- Provide teaching and learning which ensures children are challenged appropriately and provided with a depth of understanding across the breadth of the curriculum.
- To use a wide range of concrete, pictorial and abstract representations to develop all pupils' relational understanding of mathematics and strengthen number sense.
- To ensure all pupils are confident using mathematical vocabulary when reasoning about mathematics and can articulate their understanding to a high level.
- To promote a resilient and positive approach in all pupils, particularly when Problem Solving, that meets our school values.

Implementation

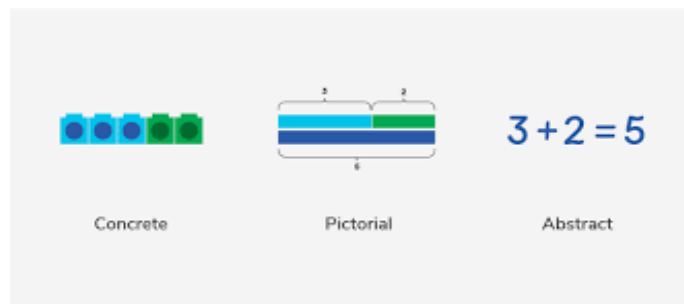
Teaching and Learning

The teaching and learning of Mathematics at Northbrook Primary academy follow a mastery approach. This approach aims to deliver maths in a child friendly way using a well-planned, sequenced structure alongside the core principles of the White Rose Maths and NCETM mastery approach to cover national objectives.



Every lesson at Northbrook is designed to 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.



Concrete – “The doing stage”

Using a variety of physical equipment and experiences to represent our maths and using these to solve problems.

Pictorial – “The showing stage”

Using drawings, figures and images to help us understand the maths in front of us and using it to support our learning.

Abstract – “The conceptual stage”

Using abstract concepts represent our maths at a symbolic level, using only numbers, notation, and mathematical symbols, for example +, −, x, / to indicate addition, subtraction, multiplication, or division.

Having a strong focus on building arithmetic, known facts and number skills in children through direct teaching and guided practice of fluency

What is Fluency?

Fluency comes from deep knowledge and practice.

This is the first stage of pupils’ understanding. When assessing pupils, if a child is fluent in a concept.

Fluency includes: conceptual understanding, accuracy, rapid recall, retention and practice

Accuracy – Pupils carefully completing calculations with no or few careless errors.

Pace – Pupils are able to quickly recall the appropriate strategy to solve the calculation and progress through a number of questions at an age appropriate pace.

Retention – Pupils will be able to retain their knowledge and understanding on a separate occasion to when the concept was first introduced.

The key to fluency is deep knowledge and practice and making connections at the right time for a child.

Using explorative and investigative teaching methods to ensure children develop a strong mathematical curiosity and are equipped with valuable strategies to solve problems using inductive and deductive reasoning.

What is Reasoning?

Verbal reasoning demonstrates that pupils understand the mathematics. Talk is an integral part of mastery as it encourages students to reason, justify and explain their thinking. This can be tricky for children who are not used to focusing on verbal reasoning in their mathematics lessons. Therefore, our lessons focus on encouraging children to voice their thought processes, take part in class debates and create opportunities for them to challenge their peers using logical reasoning.

What is Problem Solving?

Mathematical problem solving is at the heart of the Mastery Approach. Pupils are encouraged to identify, understand and apply relevant mathematical principles and make connections between different ideas. This builds the skills needed to tackle new problems, rather than simply repeating routines without a secure understanding.

Teaching and modelling the use of mathematical vocabulary and showing it's importance in children's daily lives.

Mathematical Talk

We believe a mastery classroom should never be a completely quiet classroom. The way pupils speak and write about mathematics transforms their learning into an active process. This links to our belief at Northbrook that teaching communication and oracy is fundamental for our children.

Mastery approaches use a carefully sequenced, structured approach to introduce and reinforce mathematical vocabulary using STEM sentences.

To encourage talk in mathematics, our concepts are introduced by including sentence structures (stem sentences). Pupils should be able to say not just what the answer is, but how they know it's right. This is key to building mathematical language and reasoning skills. This gives pupils the confidence to communicate their ideas clearly, before writing them down.

Example Stem Sentences: The denominator is 5 because the whole has been divided into 5 equal parts. The numerator is 3 because 3 equal parts have been shaded/circled.

Our teachers maintain a high expectation upon pupils to repeat and use the correct mathematical vocabulary to explain their understanding verbally and in their reflection

comments. By also displaying the vocabulary during the lesson, pupils will be able to use this independently.

Using working walls effectively to support children’s retention of learning through constantly re-visiting what they have learnt.

Planning

At Northbrook Academy we use the White Rose Maths scheme progression of learning. Therefore, our long- and medium-term plans are based around the small steps set out in this scheme. We also follow the NCETM mastering number planning for all children in EYFS and KS1.

Long term plans

There is a termly overview for each year group from Year 1 to Year 6. Each term is split into twelve weeks. These overviews are designed to support a mastery approach to teaching and learning and support the aims and objectives of the 2014 National Curriculum. The overviews have number at their heart.

EYFS (including mastering number)

Years 1 – 6 (example from year 5)

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Number Place value FREE TRIAL VIEW		Number Addition and subtraction VIEW		Number Multiplication and division A VIEW		Number Fractions A VIEW					
Spring term	Number Multiplication and division B VIEW		Number Fractions B VIEW		Number Decimals and percentages VIEW		Measurement Perimeter and area VIEW		Statistics VIEW			
Summer term	Geometry Shape VIEW		Geometry Position and direction VIEW		Number Decimals VIEW		Number Negative numbers VIEW	Measurement Converting units VIEW		Measurement Volume VIEW		

Medium Term plans

Medium term planning is designed around the small steps of the White Rose scheme progression. These provide a breadth of study for children that allows them to meet all the objectives outlined in the National Curriculum. The objectives outlined in the medium-term planning directly inform the short-term planning.

Small step objectives are followed for each unit (shown below)

Small steps

- Step 1 Roman numerals to 1,000
- Step 2 Numbers to 10,000
- Step 3 Numbers to 100,000
- Step 4 Numbers to 1,000,000
- Step 5 Read and write numbers to 1,000,000
- Step 6 Powers of 10
- Step 7 10/100/1,000/10,000/100,000 more or less
- Step 8 Partition numbers to 1,000,000

Short term Plans

Daily lesson plans identify the purpose of the lesson based on the small step identified on the medium-term overview and the key learning outlined for each unit. We also focus on planning direct teaching opportunities for Mathematical oracy into every lesson.

Year 5 | Autumn term | Block 1 – Place value | Step 1

Roman numerals to 1,000

Notes and guidance

In Year 4, children learned about Roman numerals to 100. In this small step, they explore Roman numerals to 1,000, and the symbols D (500) and M (1,000) are introduced. Children explore further the similarities and differences between the Roman number system and our number system, learning that the Roman system does not have a zero and does not use placeholders. Children use their knowledge of M and D to recognise years using Roman numerals. Asking children to write the date in Roman numerals is one way to reinforce the concept daily.

Things to look out for

- Children may mix up which letter stands for which number.
- Children may add the individual values together instead of interpreting the values based on their position, for example interpreting CD as 600 instead of 400.
- It is often more difficult to convert numbers that require large strings of Roman numerals.
- Children may think that numbers such as 999 can be written as IIM instead of CMXC.

Key questions

- What patterns can you see in the Roman number system?
- What rules do we use when converting numbers to Roman numerals?
- What letters are used in the Roman number system? What does each letter represent?
- How do you know what order to write the letters when using Roman numerals?
- What is the same and what is different about representing the number 'five hundred and three' in the Roman number system and in our number system?

Possible sentence stems

- The letter _____ represents the number _____.
- I know _____ is greater than _____ because _____.

National Curriculum links

- Read Roman numerals to 1,000 (50) and recognise years written in Roman numerals.

Key learning

- Each diagram should show a number in Roman numerals, digits and words. Complete the diagrams.
- Match the Roman numerals to the numbers.

Here is a date written in Roman numerals. XXI / IX / MMXV. What day of the month is shown? What month is shown? What year is shown?

Here are the end credits of two films. The Roman numerals show the year the films were made. © WRM Films MCMXIV. © White Rose Studios MMXV. In what year was the older film made? In what year was the more recent film made? How long was there between the making of the two films? Give your answer in Roman numerals.

Throughout our lessons we - teach/practice/apply/assess and the content of the lesson will reflect this. Small step objectives are derived from the medium-term planning in line with the Primary Curriculum for mathematics 2014 and ensure opportunities for fluency and reasoning and problem solving are given to all children. However, the purpose and objective of the lesson are always be based on the teacher’s ongoing assessment and may be adjusted whenever necessary to ensure that the curriculum is adapted to the class.

A range of questions should be taken from the teacher’s guidance documents for each half term. Within the planning documents, there are notes and guidance, Mathematical Talk (including Stem Sentences) and examples of how to show Varied Fluency, Reasoning and Problem Solving, however resources from the NCETM planning sequence may also be used to reinforce areas where required.

Maths in the Early Years

Teachers of the EYFS ensure the children learn through a mixture of adult led activities and child initiated activities both inside and outside of the classroom. EYFS planning is based on Development Matters and the Early Learning Goals (Number, Shape Space & Measure) using an integrated program of NCETM Mastering number and White Rose Maths (Shape space

and measure). Planning is based on the medium-term plans and small steps of progression provided and delivered as appropriate to individual children with thought to where the children are now and what steps they need to take next.

Assessment and Tracking

Prior Knowledge: Previous year unit checks are used to assess children's knowledge in specific topic areas. Flashback four starters are also used daily to assess children's knowledge across the yearly progression so far.

On going formative: teachers assess children's work daily using informed marking, low stakes quizzes and questioning to ensure learning and teaching is adjusted for the needs of the children. Lancashire KLIPs form the basis of regular assessment. This formative assessment provides evidence for a termly review of the child's attainment and progress. This means that the children's progress is continually and accurately being reviewed against National Curriculum expectations across all of the attainment targets.

End point checks: Unit checks are used to assess children's understanding of the unit content, particularly their ability to apply their knowledge into rich and complex problems.

Termly: The White Rose termly assessments will be used to support teachers' judgements each term to track children's progress and report to parents. NCETM Assessments will also give teachers additional evidence of progress using the ready to progress check points aligned to the White Rose scheme.

Statutory summative testing:

Inclusion and Equality of opportunities

Our aim is to present a differentiated curriculum that extends and fulfils the needs and potentials of every learner. Our school aims to be an inclusive school. Within the teaching of Maths, we aim to ensure that all pupils regardless of gender, ethnic origin, cultural background or ability have full access to the Maths curriculum. Teachers respond to diverse learning needs so that pupils are appropriately supported and challenged to experience success in learning and achieve as high standard as possible. Through our Maths teaching, we provide learning opportunities that enable all children to reach their full potential. As part of our vision to enable each child to reach their full potential, children who, through teachers' ongoing assessment, are considered at risk of not achieving their target will take part in maths interventions. These will take place in addition to the daily maths lesson. When appropriate, all children are exposed to their year group expectations. However, when progress falls significantly outside the expected range, the child may have special educational needs. In this instance, the child will be taught from the year group objectives appropriate to the needs of that particular child.

Adaptation is provided through:

- The modification of tasks and activities that take into account individuals' strengths and weaknesses and enable them to participate at an appropriate level. All children are appropriately challenged throughout each topic.

- The provision of support by a teacher or TA
- The expectations of outcomes of tasks and valuing individual achievements and contributions.

Monitoring and review

Monitoring is carried out regularly by the Maths subject leader in the following ways:

- Pupil voice: informal discussion pupils
- Staff confidence survey: informal discussions with staff and CPD opportunities
- Scrutiny of planning or books / lesson observation and informal drop-ins
- Observation of displays/ scrutiny of challenges.
- See Saw monitoring for active learning opportunities.
- Pupil Progress discussions and analysis of data Feedback is provided to senior managers following monitoring. It is used to inform CPD needs.

Any resource requirements are also identified and purchased according to needs and budget as stated in school development plan. This policy is a practical working document for the teaching and learning of Maths throughout the school. It is therefore subject to regular review in the light of experience, monitoring and changes.

Policy written by M. Morris (2023)