Mathematics at Slade Primary School

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 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.

With that in mind, we want all children that attend Slade Primary School to be engaged and excited by maths. Maths is an important part of everyday life, so we aim to create opportunities for our children to acquire disciplinary knowledge by being able to reason, to solve problems, to think logically and to work systematically and accurately. The lessons that are taught are accessible and challenging for all.

At Slade we follow the Numicon scheme of work. The Numicon scheme introduces concepts using the 'Concrete, Pictorial and Abstract' (CPA) approach which enables children to experience hands on learning and have clear models and images to help deepen their understanding. The CPA approach has a huge amount of support (i.e. Bruner, Piaget) in terms of being fundamental for how children learn mathematical concepts.

Staff have access to the Teaching Resource Handbooks, Online Resources and Pupil Books to help aid them in the planning of their lessons. We are lucky to have a fantastic range of resources in each classroom, which ensure children across all year groups use manipulatives to aid their learning. The Numicon scheme also introduces concepts with real life problems, ensuring that the children feel like what they are learning is relevant to them. In addition to this, the Numicon scheme uses a spiralling approach: there is a clear progression that builds on skills and ensures prior learning supports future learning (both in a year group and across a key stage) through a clear curriculum map that each year group follows.

For example, in Year 4, children first look at number bonds to 10, 100 and 1000 (building on previous learning from Year 3) in Calculating 1. Children then look at mental methods for addition with problems that bridge 10 and 100 in Calculating 2. Children then learn how to round to 10, 100 and 1000 in Numbers and the Number System 3. This then supports other mental strategies (i.e. rounding and adjusting, adding near doubles) that are learnt in Calculating 3. In this progression children have learnt clear methods for mental addition, with gradual complexity and a variety of strategies. After these mental methods have been established, children learn the formal written method for addition (building on the expanded method learnt in Year 3) in Calculating 8. Formal column addition will then also be used in different concepts throughout the rest of the year to ensure that it is revisited and the learning embedded. See the extract of the progression below to see the spiral progression, with addition being revisited at regular intervals, enabling children to build on their previous learning whilst revisiting key concepts already learnt. This also ensures that topics are not taught as a large block once in a year, but instead visited at regular intervals throughout the year.

Calculating 1	Using adding and subtracting facts and understanding inverse relationships
Numbers and the Number System 1	Understanding place value in 4-digit numbers
Pattern and Algebra 1	Exploring sequences and number patterns
Numbers and the Number System 2	Ordering and comparing numbers to 1000 and beyond
Calculating 2	Strategies for bridging when adding and subtracting
NPC Milestone 1	

Numbers and the Number System 3	Estimating and rounding
Geometry 1	Classifying triangles and quadrilaterals
Calculating 3	Developing fluency with mental adding strategies
Calculating 4	Developing fluency with mental subtracting strategies
Calculating 5	Developing fluency with multiplying facts to 12 × 12
Calculating 6	Developing fluency with dividing facts to 12 × 12
NPC Milestone 2	

Pattern and Algebra 2	Exploring inverse relationships
Calculating 7	Mental strategies for multiplying and dividing by 10 and 100
Geometry 2	Understanding reflective symmetry
Numbers and the Number System 4	Introducing negative numbers
Numbers and the Number System 5	Fractions and recognizing part-whole relationships
Calculating 8	Developing fluency with the column method of adding
Calculating 9	Developing fluency with the column method of subtraction
NPC Milestone 3	

Trickier concepts are also introduced later on in the academic year, ensuring that children have firm foundations to allow them to make the connections in their learning.

Key facts (i.e. number bonds, times tables etc.) are revisited regularly in warm ups to maths lessons to ensure the children have a clear substantive knowledge base. In addition to this, concepts from previous learning are used in these activities to help and ensure the concepts are fully understood and embedded.

On the following pages are the progressions that each year group follow.

Curriculum Progression (Year 1 – Year 6)

Below shows the progression that each year group follows, in order, throughout the year.

*NPC – Number, Pattern and Calculating

**GMS – Geometry, Measure and Statistics

Year 1

Securing Foundations 1	Learning about Numicon Shapes, number rods, pattern and counting
Securing Foundations 2	Naming Numicon Shapes, building patterns and counting objects
Securing Foundations 3	Building Numicon Shape patterns, more repeating patterns and number lines
Securing Foundations 4	Comparing and ordering, more patterns, beginning calculating
Securing Foundations 5	Describing relationships, more adding and patterns in movement
NPC* Milestone 1	

Securing Foundations 6	Naming number rods, investigating teen numbers and finding totals
Securing Foundations 7	More about teen numbers, number patterns, adding
Securing Foundations 8	Beginning subtracting, more number patterns
Securing Foundations 9	Sorting, more practical subtracting
NPC Milestone 2	

Securing Foundations 10	Comparing lengths and weights, more subtracting
Securing Foundations 11	Counting and adding
Securing Foundations 12	Similar attributes, numbers to 20 and the '+' symbol
NPC Milestone 3	

Pattern and Algebra 1	Preparing for equivalence and using the '=' symbol
Calculating 1	Introducing the subtracting symbol
Number and Number Systems 1	Ordering numbers to 20
Calculating 2	Adding and subtracting 1 and 2
Geometry 1	Recognising and imagining common 3D shapes
Measurement 1	Comparing, ordering and measuring lengths
Measurement 2	Introducing 1p, 2p, 5p and 10p coins
Calculating 3	Money
NPC Milestone 4	

Numbers and the Number System 2	Find how many by grouping
Measurement 3	Units of time
GMS** Milestone 1	

Geometry 2	Making pictures, shapes and patterns
Calculating 4	Exploring adding and subtracting facts to 10
Measurement 4	Comparing, ordering and measuring heaviness
Calculating 5	Halves and quarters of wholes
NPC Milestone 5	

Measurement 5	Comparing and ordering capacity
Pattern and Algebra 2	Reasoning with Numicon Shapes and number ideas
Patter and Algebra 3	Odd and even
Calculating 6	Understanding subtracting as 'difference' and as 'how many more?'
Geometry 3	Recognising and imagining common 3D shapes
GMS Milestone 2	

Number and Number Systems 3	Exploring recall of adding and subtracting facts within 10
Calculating 7	Developing recall of adding and subtracting facts within 10
NPC Milestone 6	

Number and Number Systems 4	Structure of 2-digit numbers and more ordering
Pattern and Algebra 4	Logic
NPC Milestone 7	

Geometry 4	Comparing and naming solid 3D shapes
Calculating 8	Adding more than 2 numbers
Calculating 9	Partitioning into tens and ones
Measurement 6	Telling the time
Pattern and Algebra 5	Finding possibilities
NPC Milestone 8	

Geometry 5	Position, direction and movement
GMS Milestone 3	

Year 2

Numbers and the Number System 1	Counting to 100 and beyond
Pattern and Algebra	Exploring different patterns
NPC Milestone 1	

Calculating 1	Adding and writing adding sentences
Calculating 2	Subtracting and writing subtracting sentences
Numbers and the Number System 2	2-digit numbers
NPC Milestone 2	

Calculating 3	Ordering adding and subtracting facts
Pattern and Algebra 2	Exploring the inverse relationship between adding and subtracting within 10
Numbers and the Number System 3	More 2-digit numbers
Numbers and the Number System 4	Comparing and ordering numbers to 100
Pattern and Algebra 3	Exploring equivalence – introducing empty box notation
NPC Milestone 3	

Measurement 1	Introducing centimetres
Calculating 4	Adding and subtracting whole tens
Geometry 1	Making and classifying polygons
Geometry 2	Identifying the faces, edges and vertices of solid 3D shapes
Calculating 5	Adding and subtracting 1 and 10
Geometry 3	Investigating symmetry
GMS Milestone 1	

Pattern and Algebra 4	Odd and even
Calculating 6	Partitioning into tens and units to answer adding and subtracting problems
Pattern and Algebra 5	Patterns and sequences of 2s, 3s, 5s and 10s
NPC Milestone 4	

Calculating 7	Adding and subtracting 1-digit numbers to and from 2-digit numbers
Measurement 2	Introducing the 20p, 50p and £1 coins
Measurement 3	Introducing the £2 coin and the £5, £10 and £20 notes
GMS Milestone 2	

Calculating 8	Introducing multiplying as repeated adding
Calculating 9	Learning times tables and about multiplying through arrays
Numbers and the Number System 5	Rounding
Calculating 10	Mental strategies for near doubles and adding and subtracting 9
NPC Milestone 5	

Calculating 11	Bridging through multiples of 10
Geometry 4	Recognizing and naming prisms and cylinders
Calculating 12	Adding three or more 10digti numbers
Calculating 13	Adding and subtracting 2-digit numbers to 100
Measurement 4	Introducing metres
GMS Milestone 3	

Calculating 14	Adding and subtracting to 20
NPC Milestone 5	

Calculating 15	Introducing 'How many … in …?'
Pattern and Algebra 6	Logic
Calculating 16	Halves, quarters and thirds of wholes
Pattern and Algebra 7	Finding all possibilities
Numbers and the Number System	Introducing fractions as numbers
NPC Milestone 7	

Measurement 5	Introducing kilograms and grams
Measurement 6	Introducing litres and millilitres, and units of temperature
Measurement 7	Telling the time and adding and subtracting units of time
Geometry 5	Investigating and describing rotation
GMS Milestone 4	

Year 3

Calculating 1	Developing fluency with adding and subtracting facts to 10
Numbers and the Number System 1	Finding how many by grouping in 10s and 100s
Calculating 2	Developing fluency with adding and subtracting facts to 20
Numbers and the Number System	Exploring hundreds, tens and units with base-ten apparatus
NPC Milestone 1	

Pattern and Algebra 1	Exploring the inverse relationship between adding and subtracting
Numbers and the Number System 3	Keeping count and writing numbers down
Calculating 3	Mental methods for adding single-digit numbers
Calculating 4	Mental methods for subtracting single digit numbers
Geometry 1	Investigating the parts and properties of polygons and polyhedral
Pattern and Algebra 2	Exploring steps of constant size through sequences and multiples
Calculating 5	Revising multiplying as repeated adding
NPC Milestone 2	

Calculating 6	Exploring multiplying through arrays
Calculating 7	Introducing dividing as 'How many … in …?'
Geometry 2	Identifying and comparing angles by size
Numbers and the Number System 4	Partitioning 2 – and 3-digit numbers with and without money
Geometry 3	Sorting and classifying 2D and 3D shapes
GMS Milestone 1	

Numbers and the Number System 5	Ordering and subtracting numbers to 1000
Calculating 8	Adding and subtracting multiples of 10 and 100
NPC Milestone 3	

Calculating 9	Patterns of similar adding and subtracting calculations
Pattern and Algebra 3	Reading and creating scales with different intervals
Number and the Number System 6	Finding half way, rounding to the nearest 10 or 100
Calculating 10	Learning multiplying facts and looking for patterns
Calculating 11	Introducing the sharing structure of dividing
NPC Milestone 4	

Pattern and Algebra 4	Extending sequences and finding differences
Calculating 12	Partitioning strategies for adding and subtracting
Measurement 1	Telling the time to the minute on the 12-hour clock
Measurement 2	Exploring units of time
GMS Milestone 2	

Calculating 13	Using apparatus and imagery to introduce the written column method of adding
Calculating 14	Using apparatus and imagery to support subtracting and introducing the written column method
Calculating 15	Exploring ratio and scaling problems and introducing the short written methods of multiplying and dividing
NPC Milestone 5	

Measurement 3	Measuring accurately and calculating with metres, centimetres and millimetres
Measurement 4	Calculating with pounds and pence and handling money
GMS Milestone 3	

Calculating 16	Making connections between dividing into equal parts and calculating with fractions
Measurement 5	Measuring and calculating with grams and kilograms
Measurement 6	Measuring and calculating with litres and millilitres
Numbers and the Number System 7	Understanding fractions of a whole and fractions as numbers
Numbers and the Number System 8	Using fraction notation to describe parts of a discrete set
Pattern and Algebra 5	Finding all possibilities and investigating a general statement
NPC Milestone 6	

Geometry 4	Using grids and grid references
GMS Milestone 4	

Year 4

Calculating 1	Using adding and subtracting facts and understanding inverse relationships
Numbers and the Number System 1	Understanding place value in 4-digit numbers
Pattern and Algebra 1	Exploring sequences and number patterns
Numbers and the Number System 2	Ordering and comparing numbers to 1000 and beyond
Calculating 2	Strategies for bridging when adding and subtracting
NPC Milestone 1	

Numbers and the Number System 3	Estimating and rounding
Geometry 1	Classifying triangles and quadrilaterals
Calculating 3	Developing fluency with mental adding strategies
Calculating 4	Developing fluency with mental subtracting strategies
Calculating 5	Developing fluency with multiplying facts to 12 × 12
Calculating 6	Developing fluency with dividing facts to 12 × 12
NPC Milestone 2	

Pattern and Algebra 2	Exploring inverse relationships
Calculating 7	Mental strategies for multiplying and dividing by 10 and 100
Geometry 2	Understanding reflective symmetry
Numbers and the Number System 4	Introducing negative numbers
Numbers and the Number System 5	Fractions and recognizing part-whole relationships
Calculating 8	Developing fluency with the column method of adding
Calculating 9	Developing fluency with the column method of subtraction
NPC Milestone 3	

Geometry 3	Investigating angles in shapes
GMS Milestone 1	

Numbers and the Number System 6	Introducing decimal fractions
Pattern and Algebra 3	Exploring 'equals' in balancing number sentences
Calculating 10	Exploring the distributive property and developing written methods of multiplying
NPC Milestone 4	

Calculating 11	Using multiplying facts to solve dividing problems
Pattern and Algebra 4	Exploring multiples and factors
Calculating 12	Developing fluency with the short written method of multiplying
Calculating 13	Developing fluency with the short written method of dividing
Calculating 14	Solving problems involving more than one step
NPC Milestone 5	

Measurement 1	Finding times and durations and using 24-hour clock
GMS Milestone 2	

Pattern and Algebra 5	Looking for growing patterns in problem solving
Numbers and the Number System 7	Exploring equivalence in fractions and introducing proportion
Numbers and the Number System 8	Introducing decimal fractions with two places
Measurement 2	Calculating with money amounts
Measurement 3	Understanding and using units of length and distance
GMS Milestone 3	

Measurement 4	Understanding and using units of mass
Measurement 5	Understanding and using units of capacity and volume
Pattern and Algebra 6	Solving problems and puzzles systematically
Measurement 6	Understanding perimeter and area
GMS Milestone 4	

Pattern and Algebra 7	Exploring general rules, reasoning and logic
NPC Milestone 6	

Year 5

Numbers and Number System 1	Working with numbers up to a million
Numbers and Number System 2	Exploring equivalence with fractions
Numbers and Number System 3	Understanding decimals
Geometry 1	Measuring angles
Calculating 1	Developing fluency with adding and subtracting calculations and understanding inverse relationships
Calculating 2	Strategies for bridging when adding and subtracting mentally
	NPC Milestone 1

Numbers and Number System 4	Estimating and rounding
Calculating 3	Further strategies for adding and subtracting
Pattern and Algebra 1	Exploring sequences and number patterns
Geometry 2	Transformations
Number and Number System 5	Working with negative numbers
Calculating	Developing fluency with multiplying and dividing
	NPC Milestone 2

Numbers and Number System 6	Comparing and ordering fractions
Pattern and Algebra	Using inverse relationships to solve problems
Calculating 5	Written methods of adding
Calculating 6	Written methods of subtracting
Calculating 7	Multiplying and dividing by 10, 100 and 1000
	NPC Milestone 2

Measurement 1	Metric and imperial units
	NPC Milestone 3

Pattern and Algebra 3	Properties of number
Calculating 8	Using mental methods for multiplying and dividing
Calculating 9	Division with remainders
Geometry 1	Exploring angles
Calculating 10	Proportion and ratio
Calculating 11	Percentages
	NPC Milestone 4

Measurement 2	Interpreting charts and graphs
Numbers and the Number System 7	Solving problems with fractions, decimals and percentages
Pattern and Algebra 4	Looking for patterns and generalizing
Measurement 3	Calculating area and perimeter
	NPC Milestone 4

Calculating 12	Written methods of multiplying
Measurement 4	Estimating volume and capacity
Calculating 13	Written methods of dividing
Calculating 14	Calculating fractions of amounts
NPC Milestone 5	

Measurement 5	Working with area and perimeter
GMS Milestone 3	

Measurement 6	Scale drawing
Calculating 15	Calculating with fractions
Calculating 16	Solving problems involving several steps
Measurement 7	Solving problems involving time, money and measures
GMS Milestone 4	

Pattern and Algebra 5	Using equivalence to solve problems
Pattern and Algebra 6	Logic and reasoning
NPC Milestone 4	

Year 6

Preparing for Formal testing 1	Self-assessment and choosing imagery
Preparing for Formal Testing 2	Problem solving strategies
Numbers and the Number System 1	Working with numbers beyond a million and decimals
Calculating 1	Adding and subtracting negative numbers in context, and large numbers
Calculating 2	Multiplying and dividing
	NPC Milestone 1

Measurement 1	Statistics, charts and graphs
Pattern and Algebra 1	Multiples, factors and primes
Numbers and the Number System 2	Fractions
Calculating 3	Estimating, rounding and equivalence
Calculating 4	Column methods for adding and subtracting
Calculating 5	Percentages
	NPC Milestone 2

Geometry 1	2D shapes and angles
	GMS Milestone 1

Calculating 6	Exploring calculations: multi-step non-routine problems and order of operations
Calculating 7	Ratio and proportion
Measurement 2	Areas of 2D shapes
Calculating 8	Converting fractions and decimals
Pattern and Algebra 9	Exploring number sequences and relationships
	NPC Milestone 3

Measurement 3	3D shapes – net and surface area
	GMS Milestone 2

Calculating 9	Written column methods of multiplying
Calculating 10	Introducing long written methods of dividing
Measurement 4	Volume and scaling
Calculating 11	Adding and subtracting with fractions
Calculating 12	Multiplying and dividing fractions
Pattern and Algebra 3	Using algebra to solve problems
	NPC Milestone 4

Geometry 2	Circles
Calculating 13	Solving non-routine problems using all four operations
Geometry 3	Transformations in the four quadrants
	GMS Milestone 3

Pattern and Algebra 4	Using symbols and letters for variables and unknowns
	NPC Milestone 5

Preparing for Formal Testing 3	Fluency in calculating with whole numbers and decimals
Preparing for Formal Testing 4	Fluency in calculating fractions and decimals
Preparing for Formal Testing 5	Preparing to do maths in test conditions

NPC and GMS Investigating activity groups

The investigating activities are independent and can be followed in any order. You may choose to use some or all of the topics with your class, according to their interests and the time available.

NPC Investigating 1	Making squares
NPC Investigating 2	What did I do?
NPC Investigating 3	How many ways?
NPC Investigating 4	Decimal patterns
NPC Investigating 5	Which is the best value?
NPC Investigating 6	An enterprise project
GMS Investigating 1	Shape shifting
GMS Investigating 2	Macro maths
GMS Investigating 3	Interesting information

EYFS

Children in the EYFS setting also use Numicon to help embed their understanding in maths from the very beginning. In EYFS, teachers plan from the Numicon Firm Foundations Scheme which aims to build a secure future in mathematics for every child.

The Statutory framework for EYFS provides guidance on what needs to be provided to the children through the Maths Curriculum Educational Programme. Through providing a broad and balanced curriculum, it is the aim that children develop a strong grounding in number so that they have the firm foundations needed to excel mathematically. The Numicon scheme aims for children to be able to count confidently from 1 to 10 and develop a deep understanding of the numbers 1 to 10, whilst also understanding the relationships and patterns between these numbers.

Children are given a variety of different opportunities to apply this understanding of number (i.e. using manipulatives, counting different objects etc.). Children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. Teachers also provide a rich opportunity for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. Finally, the framework sets out the importance of children being provided with an environment that nurtures positive attitudes and interest in mathematics, and one that supports learners in looking for patterns and relationships and spotting connections.

By the end of the year, children at the expected level will have achieved the Early Learning Goals by:

- Having a deep understanding of the numbers to 10, including the composition of each number
- Subitise (recognise quantities without counting) up to 5
- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including doubling facts
- Verbally count beyond 20, recognising the pattern of the counting system
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally