Mathematics – Curriculum Overview

Intent

At New Pasture Lane we offer the children a progressive mathematics curriculum based on the National Curriculum to develop mathematical knowledge and skills for our children. They will be positive and enthusiastic towards mathematics, with an awareness of the diversity of the subject.

- They will be competent and confident in taking risks to apply mathematical knowledge, concepts and skills.
- They will be able to solve problems, reason mathematically and think logically and systematically.
- They will be able to work independently and in cooperation with others.
- They will be able to use and apply mathematics across the curriculum, and to understand the application of mathematics in real life contexts and scenarios.
- They will have a developed confidence in mental fluency with whole number

All children have equal access to the mathematics curriculum, regardless of race or gender. Resources and learning environments are planned and designed to enable all children access to the learning required. Differentiated activities are provided to support less able learners and challenge rapid graspers so they are able to work at greater depth in mathematics. The mathematics curriculum is ambitious for pupils with SEND to ensure they can access the subject at an appropriate level and make progress towards clearly defined end points (see appendix ii)

Mathematical knowledge can be linked to engaging topics but will be gained by the teaching of year group progressive skills which build on previous learning, ensuring pupils' learning becomes embedded. In addition to this, pupils will engage in enrichment activities to support their learning of mathematics for a real purpose through science, computing, PSHE and further cross-curricular lessons.

Implementation

New Pasture Lane Primary School uses planning documents based on Master the Curriculum (EYFS and Key stage 1) and Hamilton Trust (Key stage 2). These planning documents ensure key concepts are taught progressively as pupils move through the school and that units are sequenced throughout the year to build knowledge and skills. These schemes of work have been chosen for teacher planning in maths but we expect our teachers to adapt the schemes to the needs of their pupils. Teachers use their understanding of how children learn mathematics and apply this in their planning.

The Master the Curriculum and Hamilton Trust planning objectives have been thoroughly cross referenced against the maths programme of study to ensure all objectives are covered fully. The blocks suggested allow children to revisit previously learned knowledge, concepts and procedures so that maths knowledge can become deeply embedded in the children's memories.

Progressive knowledge such as number bonds, times tables and the four operations are used to underpin pupils' understanding of place value and number within year groups. Lesson objectives are structured and sequenced so that final outcomes are secure and meaningful. Children do not learn objectives in isolation but continue to embed these through carefully planned application of their learning throughout the year. This embedding will develop the children's automaticity.

At New Pasture Lane we believe that children should be given opportunities to practise their maths knowledge outside of the maths lesson therefore children have access to Numbots (EYSFS, KS1), Mathletics and TTrockstars (Key stage 2) both in and out of school to build on their fluency and methods taught within the class. We complement our maths learning by using online lessons provided by TUTE to challenge the more able mathematicians (KS1 and KS2) and it is also used in Year 6 as a revision tool.
Medium-Term Planning is documented, based on Master The Curriculum (EYFS and KS1) and Hamilton Trust (KS2) materials, for each year group. It is the responsibility of the class teacher to adapt planning to suit the children's needs. Reasoning and problem solving is a focus for the school and wherever possible children are encouraged to apply their knowledge and skills in different situations. Short-Term Planning identifies specific learning objectives for each unit and is uploaded to the school curriculum drive by the class teacher along with the relevant slides and resources. All children have access to the Maths curriculum, as work is tailored appropriately for children with SEND. Children will learn through similar activities, with outcomes modified to suit all needs in accordance with their STEPS curriculum. The STEPS curriculum ensures that learning is progressive, revisited and overlearnt due to the needs of the specific child. A record of the STEPS curriculum is kept with each child and referred to by the adult supporting them.

We understand the importance of retrieval practice in ensuring that taught content becomes part of the child's long term memory. We therefore spend the first ten minutes of every morning completing retrieval practice questions linked to the children's current learning in maths (KS1, KS2). We also use regular arithmetic testing and every class completes a formal arithmetic paper at the end of each half term. Teachers then use this assessment to influence their future planning and teaching. This is introduced in the summer term for Year 1 children.

We recognise the important role that display has in the teaching and learning of mathematics. Every class has a mathematics working wall to support and reflect current work. Display is also used to support mathematical thinking and processes through visual aids such as number lines, number grids, vocabulary cards that provide visual support for the children's mental processes. Children's mathematical work is frequently celebrated through display across the school.

The start of our daily maths lesson is to engage the children and build their confidence through a range of low stakes maths games, songs and metal warm-ups. This is then followed by a high quality and inclusive teaching input, including modelling and questioning and then followed by independent work. The end of the lesson then brings together the class to address misconceptions, celebrate progress and push thinking further through challenge activities and questions.

Daily maths sessions include explicit reference to vital mathematical vocabulary and the use of stem sentences to support and encourage all children to communicate their ideas with mathematical precision and clarity. These sentence structures often express key conceptual ideas or generalities and provide a framework to embed conceptual knowledge and build understanding.

Work in maths books should utilise one digit per square and work should be dated and headed up with the learning objective for the session. Marking in maths follows the marking policy using live marking with opportunities for self-correcting and identifying misconceptions.

Impact

Work in books and regular ongoing assessment is used as a measure of progress towards the identified end points. Pupils are given regular opportunities to recap and embed learning as well as applying their knowledge to solve a range of tasks and problems. Where gaps in learning are identified, the reasons for this are analysed and this information is used to plan further teaching or intervention activities where needed.

Maths Impact This is shown in:

1. Key Performance Indicator (KPIs) records (see appendix i)
2. Evidence of work in books, including evidence of applying key knowledge to solve more complex problems
3. Regular low stakes assessments
4. Progress records and data overviews
5. Benchmarking against national tests (PUMA)
6. Pupil voice
7. Subject Action and School Development Plans and SSE cycle.

Key Performance Indicators (Appendix 1)

Early Years Foundation Stage

Mathematics Early Learning Goal: **Number**

Children at the expected level of development will: -

- Have a deep understanding of number 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 double facts.

ELG: **Numerical Patterns**

Children at the expected level of development will: -

- 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.

National Curriculum Year 1 to Year 6

Progression through key concepts in relation to the end points

Key Stage 1

Year Group	**Key Performance Indicators - Place Value** **KS1 End points** - 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 [for example, concrete objects and measuring tools]. - Know the number bonds to 20 fluently and be precise in using and understanding place value. - Read and spell mathematical vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.
1	Count to hundred, forwards and backwards, beginning with 0 or 1, or from any given number.
	Count, read and write numbers to 100 in numerals and words.
	Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least.
	Given a number, identify one more or one less.
	Count in multiples of twos, fives and tens.
2	Count in steps of 2, 3 and 5 from 0 and in tens from any number, forward and backward.
	Recognise the place value of each digit in a two digit number (tens, ones)
	Identify, represent and estimate numbers to 100 using different representations including the number line.
	Compare and order numbers from 0 up to 100; use <, > and = signs.
	Read and write numbers to at least 100 in numerals and words.
	Partition any two-digit number into different combinations of tens and ones, explaining their thinking verbally, in pictures or using apparatus.

Year Group	**Key Performance Indicators - Addition and Subtraction** **KS1 end points** - 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 [for example, concrete objects and measuring tools]. - Know the number bonds to 20 fluently and be precise in using and understanding place value.
1	Represent and use number bonds and related subtraction facts (within 20)
	Add and subtract one digit numbers (to 20), including zero.
	Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.
2	Can partition two digit numbers into different combinations of tens and ones
	Recall all number bonds to and within 10 and use these to reason with and calculate bonds to and within 20, recognising other associated additive relationships.
	Add and subtract any 2 two-digit numbers using an efficient strategy, explaining their method verbally, in pictures or using apparatus (e.g. 48 + 35; 72 – 17)

Year Group	**Key Performance Indicators - Multiplication and Division**
1	Count in multiples of twos, fives and tens.
2	Recall multiplication and division facts for 2, 5 and 10 and use them to solve simple problems, demonstrating an understanding of commutativity as necessary.

Year Group	**Key Performance Indicators - Fractions**

1	Recognise, find and name a half as one of two equal parts of an object, shape or quantity.
	Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.

2	Recognise, find, name and write fractions 1/3 , 1/4 , 2/4 and of a length, shape, set of objects or quantity.
	Write simple fractions for example, ½ of 6 = 3
	Add and subtract fractions with the same denominator within one whole.

Year Group	**Key Performance Indicators - Shape** **Key Stage 1 end point** - Develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary.
1	Recognise and name common 2D and 3D shapes, including rectangles, squares, circles and triangles, cuboids, pyramids and spheres.
2	Name and describe properties of 2-D and 3-D shapes, including number of sides, vertices, edges, faces and lines of symmetry.

Year Group	**Key Performance Indicators - Measure** **Key Stage 1 end point** - Be able to use a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.
1	Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.
	Recognise and know the value of different denominations of coins and notes.
2	Use different coins to make the same amount.
	Read the time on a clock to the nearest 15 minutes.

Lower Key Stage 2

Year Group	**Key Performance Indicators - Place Value** **Lower Key Stage 2 End points** - Become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. - Read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.
3	Find 10 or 100 more or less than a given number; recognise the place value of each digit in a three digit number (hundreds, tens, ones).
	Compare and order numbers up to 1000
	Read and write numbers up to 1000 in numerals and in words.
	Recognise the place value of each digit in a three digit number (hundreds, tens and ones)
4	Count in multiples of 6, 7, 9, 25 and 1000.
	Find 1000 more or less than a given number.
	Count backwards through zero to include negative numbers.
	Recognise the place value of each digit in a four digit number (thousands, hundreds, tens and ones)
	Order and compare numbers beyond 1000.
	Round any number to the nearest 10, 100 or 1000.

Year Group	**Key Performance Indicators – Addition and Subtraction** **Lower Key Stage 2 End points** - Develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

3	Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.
4	Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

Year Group	**Key Performance Indicators – Multiplication and Division** **Lower Key Stage 2 End points** - 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.
3	Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.
4	Recall and use multiplication and division facts for multiplication tables up to 12 x 12.
	Multiply two digit and three digit numbers by a one digit number using formal written layout.
	Divide two and three digit numbers by a one digit number using an informal method.
	Recognise and use factor pairs and commutativity in mental calculations.

Year Group	**Key Performance Indicators – Fractions and Decimals** **Lower Key Stage 2 End points** - Develop their ability to solve a range of problems, including with simple fractions and decimal place value.
3	Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.
	Add and subtract fractions with the same denominator within one whole.
4	Recognise and show, using diagrams, families of common equivalent fractions.
	Add and subtract fractions with the same denominator.

	Recognise and write decimal equivalents of any number of tenths or hundredths.
	Recognise and write decimal equivalents to ¼, ½, ¾
	Round decimals with one decimal place to the nearest whole number.
	Find the effect of dividing a one or two digit number by 10 or 100, identifying the value of the digits in the answer as ones, tenths and hundredths

Year Group	**<u>Key Performance Indicators – Shape</u> <u>Lower Key Stage 2 End points</u> - Be able to draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them.**
3	Recognise angles as a property of shape or a description of a turn.
	Identify right angles, recognise that two right angles make a half-term, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle.
	Identify horizontal and vertical lines and pairs of perpendicular and parallel lines.
4	Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes.
	Identify lines of symmetry in 2D shapes presented in different orientations.
	Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.
	Identify acute and obtuse angles and compare and order angles up to two right angles by size.
	Describe positions on a 2D grid as coordinates in the first quadrant.
	Describe movements between positions as translations of a given unit to the left/ right and up/ down.

Year Group	**Key Performance Indicators – Measure** **Lower Key Stage 2 End points** - Use measuring instruments with accuracy and make connections between measure and number.
3	Measure, compare, add and subtract: lengths (m/cm/mm).
	Tell and write the time from an analogue clock, including using Roman numerals and 12-hour and 24-hour clocks.
4	Read, write & convert time between analogue and digital 12 and 24 hour clocks.
	Convert between different units of measure eg kilometre to metre.
	Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres
	Convert between different units of measure [for example, kilometre to metre]
	Find the area of rectilinear shapes by counting squares.
	Solve simple measure and money problems involving fractions and decimals to two decimal places.

Year Group	**Key Performance Indicators – Statistics**
3	Interpret and present data using bar charts, pictograms and tables.
4	Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.

Upper Key Stage 2

Year Group	**Key Performance Indicators - Place Value** **Upper Key Stage 2 End points** - Extend their understanding of the number system and place value to include larger integers. - Be introduced to the language of algebra as a means for solving a variety of problems - Read, spell and pronounce mathematical vocabulary correctly.
5	Read, write, order and compare numbers to at least 1000000 and determine the value of each digit.
	Count forwards or backwards in steps of powers of 10 for any given number up to 1000000.
	Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers including through zero.
	Round any number up to 1000000 to the nearest 10, 100, 1000, 10000 and 100000
	Establish whether a number up to 100 is prime and recall prime numbers up to 19
6	Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit.
	Round any whole number to a required degree of accuracy.
	Use negative numbers in context, and calculate intervals across zero.
	Use simple formulae

Year Group	**Addition and Subtraction** - 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. - Be fluent in written methods for all four operations, including long multiplication and division.
5	Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)

6	Perform mental calculations using efficient strategies to simplify calculations where appropriate, including with mixed operations and large numbers.

	Solve problems with multi-steps involving addition, subtraction, multiplication and division.

Year Group	**Key Performance Indicators - Multiplication and Division** **Upper Key Stage 2 End points** - 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. - Be fluent in written methods for all four operations, including long multiplication and division.
5	Multiply and divide whole numbers by 10, 100 and 1000.
	Multiply numbers up to 4 digits by a one or two digit number using a formal written method, including long multiplication for 2 digit numbers.
	Divide numbers up to 4 digits by a one digit number using the formal written method of short division and interpret remainders appropriately for the context.
6	Multiply multi-digit number up to 4 digits by a 2 digit number using the formal written method of long multiplication.
	Divide numbers up to 4 digits by a 2 digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions or by rounding as appropriate for the context.
	Divide numbers up to 4 digits by a 2 digit number using the formal written method of short division, interpreting remainders according to context.
	Perform mental calculations using efficient strategies to simplify calculations where appropriate, including with mixed operations and large numbers.
	Identify common factors, common multiples and prime numbers.

	Solve problems with multi-steps involving addition, subtraction, multiplication and division.

Year Group	**Key Performance Indicators - Fractions, Decimals and Percentages** **Upper Key Stage 2 End points** - 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. - Be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.
5	Compare and order fractions whose denominators are multiples of the same number.
	Identify, name and write equivalent fractions of a given fraction, represented visually including tenths and hundredths.
	Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements >1 as a mixed number
	Add and subtract fractions with the same denominator and denominators that are multiples of the same number.
	Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.
	Read and write decimal numbers as fractions for example 0.71 = 71/100]
	Read, write, order and compare numbers with up to three decimal places.
	Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.
	Round decimals with two decimal places to the nearest whole number and to one decimal place.
	Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
	Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal.
	Calculate using decimals, fractions and percentages

	Compare and order fractions, including fractions > 1
	Add and subtract fractions with different denominations and mixed numbers, using the concept of equivalent fractions.
	Multiply simple pairs of proper fractions, writing the answer in its simplest form for example 1/4x 1/2 = 1/8
6	Divide proper fractions by whole numbers e.g. 1/3÷ 2 = 1/6
	Recall and use equivalences between simple fractions, decimals and percentages, expressing as equivalent quantities
	Identify the value of each digit in numbers given to three decimal places and multiply numbers by 10, 100 and 1000 giving answers up to 3dp.
	Multiply one digit numbers with up to 2dp by whole numbers.
	Use written division methods in cases where the answer has up to two decimal places.
	Solve problems involving the calculation of percentages [for example, of measures and such as 15% of 360] and the use of percentages for comparison.
	Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts
	Solve problems involving similar shapes where the scale factor is known or can be found.

Year Group	**<u>Key Performance Indicators - Shape</u>** **<u>Upper Key Stage 2 End points</u>** - Develop their understanding of geometry and measures to consolidate and extend knowledge developed in number. - Classify shapes with increasingly complex geometric properties and learn the vocabulary they need to describe them.
5	Identify 3D shapes, including cubes and other cuboids, from 2D representations.
	Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.
	Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles.

	Draw given angles, and measure them in degrees (o)
6	Draw 2D shapes using given dimensions and angles.
	Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals and regular polygons.
	Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.
	Describe positions on the full coordinate grid (all four quadrants).
	Illustrate and name parts of circles, including radius, diameter and circumference and know that diameter is twice the radius.

Year Group	**Key Performance Indicators - Measure**
5	Measure and calculate the perimeter of composite rectilinear shapes in cm and m.
	Convert between different units of metric measure (for example, km and m; cm and m; cm and mm; g and kg; l and ml)
6	Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate.
	Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to 3dp.

Year Group	**Key Performance Indicators - Statistics**
5	Complete, read and interpret information in tables including timetables.
6	Interpret and construct pie charts and line graphs and use these to solve problems.

	Calculate the mean as an average.

Appendix ii

End points:

By the end of EYFS children will:

- 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.
- Children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built.
- Children will develop their spatial reasoning skills across all areas of mathematics including shape, space and measures.

By the end of Key Stage 1 children will:

- 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 [for example, concrete objects and measuring tools].
- Develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. • Be able to use a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.
- Know the number bonds to 20 fluently and be precise in using and understanding place value.
- Read and spell mathematical vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

By the end of Lower Key Stage 2 children will:

• Become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value.

• Develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

• Develop their ability to solve a range of problems, including with simple fractions and decimal place value. • Be able to draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them.

• 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.

• Read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.

By the end of Upper Key Stage 2 children will:

• 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. • 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.

• Be introduced to the language of algebra as a means for solving a variety of problems.

• Develop their understanding of geometry and measures to consolidate and extend knowledge developed in number. • Classify shapes with increasingly complex geometric properties and learn the vocabulary they need to describe them. • Be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.

• Read, spell and pronounce mathematical vocabulary correctly.