



Mathematics

Curriculum Overview

"The only way to learn mathematics is to do mathematics"

Paul Halmos

CURRICULUM OVERVIEW

Mathematics

AT HURWORTH, WE BELIEVE THAT MATHEMATICS IS A VITAL SKILL IN ADULTHOOD AND WE WANT ALL CHILDREN TO LEAVE OUR SCHOOL WITH THE MATHEMATICAL EXPERTISE THEY NEED.



INTENT - WE AIM TO...



Ensure all children can become fluent in all areas of mathematics and are able to reason about their learning in a way that deepens their understanding and allows all of them to be successful problem solvers.



Expose children to a range of representations and procedures in a systematic way that allows them to build from secure foundations.



Develop a structured, whole-school approach to problem solving once children have mastered the underlying content of an area of maths.



Develop children's mathematical fluency, using a systematic, whole-school approach to fact fluency.



Ensure mathematics is a transferable skill and that children are using their knowledge and understanding of mathematics in other areas of the curriculum.



Support children in keeping up with the taught curriculum through formative and summative assessment and targeted intervention.

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IMPLEMENTATION - HOW DO WE ACHIEVE OUR AIMS?

To turn our intent for how maths will be taught into a reality, we have constructed our own curriculum design that allows children to consolidate learning in the next unit by sequencing units that are linked. This also encourages our children to see the links in mathematics that deepens and secures their understanding. From this long-term curriculum design, our vision turns into effective learning through the following lesson design in KS1 and KS2:



A maths fluency lesson will start with retrieval practice that we call 'Flashback 4.' These questions are carefully selected by the class teacher to include something from the last lesson, something from last week, something from the last unit and something from last year (the current unit focus).



For a fluency lesson, following Flashback 4, the teacher will model selected fluency questions using 'I do, we do, you do'. The children will then complete their independent work. The independent work will be based around the teaching input with other types of varied fluency questions. Higher attainers and quick graspers are routinely encouraged through our stretch tasks, such as 'create a similar question', 'explain which was the most challenging question'.



At the end of the fluency lesson, there will be a class discussion around a reasoning prompt so that all children have had the opportunity to access this question. We do not view reasoning as a question at the end but rather it is the way the lesson is built on discussion, describing, explaining and justifying all the way through the lesson.



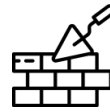
A problem solving lesson will start with a class discussion based on a reasoning question. This gives the class the opportunity to consolidate their knowledge from previous fluency lessons before moving onto problem solving questions.



For a problem solving lesson, the teacher will then model a selected problem using 'I do'. The same problem, using different numbers, will then be used for 'we do' and 'you do'.



For the independent part of a problem solving lesson, the children will complete problems similar to the problems that has been used during the teaching input. There will be 2-3 independent questions.



A CONSISTENT AND SYSTEMATIC APPROACH

At Hurworth Primary School, we understand the importance of mathematics as an essential skill for everyday life. With this in mind, we endeavour to provide a progressive, thoughtfully sequenced maths curriculum, which allows all children to build deep understanding, confidence and competence within mathematics as well as the ability to apply their knowledge as they move up through the school. We aim for all children to be able to talk confidently and reason about maths and follow their natural curiosity to make connections, explore patterns and ask questions. Resilience is key and we believe all children should learn without the worry of getting things wrong. We believe all children should experience success and enjoyment in the subject, relish the challenge that mathematics offers and most importantly, develop a positive 'can do' attitude towards mathematics.

In EYFS, mathematics is taught in accordance with the Early Learning Goals. There is lots of mathematical discussions, including applying skills, reasoning and problem solving. Throughout KS1 and KS2, there is a structured lesson design – retrieval (Flashback 4), vocabulary check and discussion, modelling of the key skill (following the I do, we do, you do approach), independent fluency task, varied fluency tasks, reasoning discussion. All units in KS1 and KS2 are completed with a mini-assessment; this is used to filter our children into two groups: pause and stretch. Those needing further support work in a pause lesson while those who showed mastery to a greater depth work in a stretch lesson. This stretch lesson acts as our higher attainer intervention and is where our children are exposed to rich and sophisticated problems.

Mathematics is embedded across the Early Years provision. The White Rose mastery approach has been adapted to suit Reception - using their sequence and practical ideas alongside our own knowledge of the children's interests and understanding. This allows all children to develop a deep understanding of a mathematical concept before moving on. We feel it is important to 'over teach' key concepts to ensure progress is made.

Throughout the Reception year, our daily mathematics lessons will include teaching: subitising, recognising and representing numbers, patterns (including number patterns), exploring shape and an introduction to measure. Within these areas, the children are exposed to fluency and varied fluency (different representations), leading to application, problem solving and reasoning through class and group discussion. Prior learning is consolidated daily to ensure important facts, knowledge and concepts are remembered and to provide a firm foundation for each unit and lesson. We want our children to know that there is often more than one way to solve a problem and that having a try, playing with numbers and gaining a sense of an 'appropriate answer' are key qualities of a mathematician.

Children at the expected level of development by the end of Early Years will:

Number Early Learning Goal	Numerical Patterns Early Learning Goal
<ul style="list-style-type: none"> Have a deep understanding of number to 10, including the composition of 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. 	<ul style="list-style-type: none"> 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, odds, doubles facts and how quantities can be distributed equally.

Maths Curriculum Sequence Year R

Getting To Know You	
Match - Sort - Compare	
Talk About Measure	
Talk About Pattern	
It's Me 1 -2 -3	
Circles & Triangles	
1, 2, 3, 4, 5	
Shapes With 4 Sides	
Consolidation	Assessment
Alive In 5	
Mass & Capacity	
Growing 6, 7, 8	
Length, Height & Time	
Building 9 & 10	
Explore 3D Shapes	
Consolidation	Assessment
To 20 & Beyond	
How Many Now?	
Manipulate, Compose & Decompose	
Sharing & Grouping	
Visualise, Build & Map	
Connections	
Consolidation	Assessment

Number, Place Value, Calculations, Fractions
Geometry
Measurement
Statistics
Assessment

CURRICULUM OVERVIEW

Mathematics

Place Value (10)
Addition & Subtraction (10)
Summative Assessment
Spatial Reasoning & Pattern
Place Value (20)
Measures
Addition & Subtraction (20)
Place Value (50)
Summative Assessment
Multiplication & Money
Place Value (100)
Time
Summative Assessment
Consolidation

Maths Curriculum Sequence Year 1

Number, Place Value, Calculations, Fractions
Geometry
Measurement
Statistics
Assessment

CURRICULUM OVERVIEW

Mathematics

Maths Curriculum Sequence Year 2

Place Value
Addition & Subtraction
Summative Assessment
Statistics
Introduction to Multiplication
Introduction to Division
Spatial Reasoning
Money
Summative Assessment
Fractions
Time
Multiplication & Division
Measure
Summative Assessment
Consolidation

Number, Place Value, Calculations, Fractions
Geometry
Measurement
Statistics
Assessment

CURRICULUM OVERVIEW

Mathematics

Place Value
Addition & Subtraction
Statistics
Length
Summative Assessment
Right Angles
2, 4, 8 Multiplication Tables
Unit Fractions
Summative Assessment
Non-Unit Fraction
Parallel & Perpendicular Sides in Polygons
Time
Mass & Capacity
Summative Assessment
Consolidation

Maths Curriculum Sequence Year 3

Number, Place Value, Calculations, Fractions
Geometry
Measurement
Statistics
Assessment

CURRICULUM OVERVIEW

Mathematics

Place Value
Position & Direction
Addition & Subtraction
Statistics
Perimeter
Assessment
x3, 6, 9 Multiplication Tables
x7 Multiplication Tables
Multiplicative Relationships
Summative Assessment
Fractions
Symmetry in 2D shapes
Time
Division With Remainders
Summative Assessment
Consolidation

Maths Curriculum Sequence Year 4

Number, Place Value, Calculations, Fractions
Geometry
Measurement
Statistics
Assessment

CURRICULUM OVERVIEW

Mathematics

Place Value
Negative Numbers
Position & Direction
Addition & Subtraction
Short Multiplication & Short Division
Assessment
Area & Scaling
Calculating With Decimal Fractions
Factors, Multiples, Primes, Squares, Cubes & Area
Summative Assessment
Fractions
Converting Units
Angles
Summative Assessment
Consolidation

Maths Curriculum Sequence Year 5

Number, Place Value, Calculations, Fractions
Geometry
Measurement
Statistics
Assessment

CURRICULUM OVERVIEW

Mathematics

Place Value
Position & Direction
Addition & Subtraction and Order of Operations
Statistics and Circles
Multiplication
Includes Unit Conversion
Assessment
Division
Includes Unit Conversion
Fractions & FDP
Ratio
Algebra
Shape, Area, Perimeter & Volume
Assessment
Shape, Area, Perimeter & Volume (continued)
Revision, Consolidation & Individual Pathways
SATs
Maths Projects: economic and financial literacy PS Skills Lessons 5 & 6

Maths Curriculum Sequence Year 6

Number, Place Value, Calculations, Fractions
Geometry
Measurement
Statistics
Assessment



Lingfield Education Trust

Calculation Policy



Mathematics is a subject in which key skills can be taught using different representations and different methods – this can cause confusion and cognitive overload for some students.

At Hurworth Primary, we use the Lingfield Education Trust Calculation Policy; this document provides teachers with an easy-reference guide to the methods we use. The aim is to allow all staff to synchronise their practice and ensure that children encounter the same methods throughout their mathematical journey, regardless of the teacher. This consistency will improve mathematical outcomes for all children.

The policy includes concrete, pictorial and abstract phases of learning.

Year 1		
Concrete	Pictorial	Abstract
<p>Pupils to use a range of practical resources with calculations bridging through ten to <u>not</u> use exchange. The concept of ten ones equalling one ten though is to be emphasized. They should progress to using labelled, physical number lines.</p> <p>$4 + 3 = 7$</p>	<p>Pupils to use a printed, labelled number line to count in steps of one for addition.</p> <p>$4 + 3 = 7$</p>	<p>Pupils to record their addition calculations as mathematical statements (number sentences) using the addition and subtraction symbols.</p> <p>$4 + 3 = 7$</p>

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VOCABULARY PROGRESSION

Vocabulary is at the heart of our mathematics curriculum. We believe that the understanding and use of mathematical vocabulary is the key to success. The vocabulary that children are expected to understand and use is progressive throughout year groups. This is detailed in the Lingfield Education Trust Maths Vocabulary Guide.



Maths

Vocabulary Guide

Year 1

Number & Calculation

Number	Place Value	Estimating
number	ones	guess
numeral	tens	how many ...?
zero	digit	estimate
one, two, three ... twenty	the same number as, as many as	nearly
teens numbers, eleven, twelve ... twenty	more, larger, bigger, greater	roughly
twenty-one, twenty-two ...	fewer, smaller, less	close to
one hundred	fewest, smallest, least	about the same as
none	most, biggest, largest, greatest	just over, just under
how many ...?	one more, ten more	too many, too few
count, count (up) to, count on (from, to), count back (from, to)	one less, ten less	enough, not enough
forwards	equal to	
backwards	one more, ten more	
count in ones, twos, fives, tens	one less, ten less	
equal to	compare	
equivalent to	order	
is the same as	size	
more, less	first, second, third... twentieth	
most, least	last, last but one	
many	before, after	
add, even	next	
multiple of	between	
few	half-way between	
pattern		
pair		

Addition & Subtraction

addition
add, more, and
make, sum, total
altogether
double
near double
half, halve
one more, two more ... ten more
how many more to make ...?
how many more is ... than ...?
how much more is ...?
subtract
take away
how many are left/left over?
how many have gone?
one less, two less, ten less ...
how many fewer is ... than ...?
how much less is ...?
difference between

Multiplication & Division

multiplication
multiply
multiplied by
multiple
division
dividing
grouping
sharing
doubling
halving
array
number patterns

Fractions

fraction
equal part
equal grouping
equal sharing
parts of a whole
half
one of two equal parts
quarter
one of four equal parts

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FACT FLUENCY

It is essential that children have secure, quick recall of number facts – number bonds and multiplication and division facts. In Key Stage 1, teachers use the White Rose Fluency Bee Scheme to support this. In Lower Key Stage 2, children are taught times tables in accordance with our school overview. Children are encouraged to use Numbots, Times Tables Rock Stars (TTRS), and 1-minute maths to supplement their learning. Parents are offered times tables workshops in Year 3 and Year 4 – these are designed to ensure parents know the importance of children knowing their multiplication and division facts and giving them ideas on how to support at home.



A school approach to teaching, practice and recall

Tables Expectations				
Year 1	Year 2	Year 3	Year 4	Year 5&6
x2 counting steps x10 counting steps x5 counting steps	x2 x10 x5	x2 x10 x5 x4 x8 x3 x6	Recap: x2, x10, x5, x4, x8, x3, x6 x9 x7 x11 x12	weekly mixed retrieval and recall of all table facts

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WE WANT ALL CHILDREN TO HAVE A SECURE UNDERSTANDING OF MATHEMATICAL CONCEPTS AND BE ABLE TO APPLY THESE WHEN REASONING AND PROBLEM SOLVING.



AMBITION FOR ALL

We want all children to achieve and succeed within mathematics, and so we carefully consider children's mathematical needs and barriers when planning our lessons. We address any SEND needs and nurture talents and strengths. We follow the Lingfield Education Trust 'Curriculum for ALL' guidance to ensure that all children can show the best version of themselves through our curriculum, as well as using the scaffolds and stretch tasks on the following pages.

In order to support children with SEND in meeting the ambitious curricular goals, we apply a range of specific support, adaptation and modification methods, specific to the child and their needs. These could include:

Ambition for ALL Special Educational Needs	Cognition & Learning Needs	<ul style="list-style-type: none"> • Use of maths manipulatives – both physical and electronic – to progress learning from concrete to pictorial to abstract – most maths is quite abstract and this presents a challenge for SEND pupils. • Use a consistent range of manipulatives at first so pupils have a go to resource that they know well before using a wider range. • Reduce the cognitive load required for tasks (minimising the amount of steps, simplifying the recording, not overloading with non-essential information) • Reduce the amount the amount of reading required and ensure decoding levels match the task. Ensure reading aspects of maths have improved accessibility, including larger font, bolds, the use of different colours and avoiding italics (Simpler versions of text so that reading materials match the child's reading ability) • Pre-teaching of pertinent vocabulary will support learning, as well as having clear displays and/or points of reference for the children to remember and use vocabulary correctly. • Use of additional adult when possible • Splitting teaching and tasks up into smaller steps: teach a step of learning and do tasks linked to it and then do the next steps – avoiding all teaching and all tasks at once. • Pay extra attention to the grading of difficulty of the work – only add one extra element of challenge at a time, for example carefully moving from no exchanging, to some, to lots, to exchanging from zeros in column subtraction. • Slowed down pace of learning and use of consolidation, for example lots of work on basic skills and varied fluency before reasoning and problem solving • When even the basic fluency mentioned above is too challenging then, where necessary, differentiated outcomes and tasks. • When SEND pupils do access reasoning and problem solving use sentence stems/starters to scaffold answers. • Use modified scientific resources (e.g. thermometer, measuring containers, scales) • Mixed ability groupings/paired work/peer support • Task targets/clear success criteria • Visual stimuli/hooks- turn abstract in to concrete • Constructive working atmosphere – research suggests quieter atmospheres aide maths learning
	Communication & Interaction Needs	<ul style="list-style-type: none"> • Pre-teaching of pertinent vocabulary will support learning, as well as having clear displays and/or points of reference for the children to remember and use vocabulary correctly. • Pre-teaching vocabulary, vocabulary maps/word banks • Use of visuals to support understanding of key concepts • Use of own communication methods / aids – such as PECS, Makaton, writing, drawing • Use of sentence stems to frame answers • Allow verbal responses where necessary
	Sensory / Physical Needs	<ul style="list-style-type: none"> • Use of maths manipulatives – both physical and electronic – to progress learning from concrete to pictorial to abstract – most maths is quite abstract and this presents a challenge for SEND pupils. • Use a consistent range of manipulatives at first so pupils have a go to resource that they know well before using a wider range. • Awareness of sensory needs, modification of learning environment (light, sound, seating) • Modifying visual sources, e.g. pictures, text • Written sources may be converted to auditory form • Provide activities that require movement for pupils who learn best through doing and for pupils who find it difficult to sit still for long periods – e.g. role-play, using the interactive whiteboard with pupil involvement.
	SEMH	<ul style="list-style-type: none"> • Pre-teach of concepts so pupils feel confident about the lesson to help avoid maths anxiety. • Agree with pupils before lesson about answering group questions to avoid pupils feeling being put on the spot. • Pre-emptive pre-teach sessions for when the teaching of the curriculum and personal beliefs may conflict.

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AMBITION FOR ALL

Some children show skill, knowledge or aptitude above that which is typically expected for their subject, for their age. It is important that these children are afforded the opportunity to shine.

Ambition for ALL | The Most Able

Indicators that children may be working above their age related expectations

- **Greater Depth Maths expectations are clearly stated at individual objective level through the Trust exemplification materials and mini assessments tasks.**
- Pupils can demonstrate all elements of Y6 expected outcomes in a range of contexts and types of problems solving (measurement, time, word problems, logic puzzles, finding all possibilities, true/false, finding and describing patterns and sequences)
- Pupils can solve more complex tasks with multiple steps.
- Pupils can solve problems that involve multiple mathematical concepts, for example having to convert between units before being able to solve a problem and then back afterwards.
- Pupils can solve open-ended problems, where there are multiple possibilities.
- Pupils can generalise from findings and create rules/patterns to solve further questions of a similar type, for example pupils may notice that the corners of triangles total 180° , those of quadrilaterals total to 360° and so those with five sides would total a further 180° to make 540° .
- Pupils can solve a problem / answer a question using a range of strategies – not just one.
- Pupils can guide other pupils to age-related expectations by teaching and modelling a concept.
- **It is important to note that while pupils working at a greater depth of understanding should be able to apply their existing knowledge to solve new ones, there is also a place for teaching such pupils the strategies needed to solve more complex problems.**



SCAFFOLDING WORK

Teachers use their assessment for learning to ensure that children receive appropriate scaffolds or adaptations to help them to become independent mathematicians. This is not limited to children with Special Educational Needs. Adaptations to the maths provision could include (but are not limited to):

- Concrete resources (for example, Numicon, Base 10, place value charts)
- Modelled examples in books
- Adapted independent task
- Use of working walls
- Support from an adult



IMPACT - HOW WILL WE KNOW WE ACHIEVED OUR AIMS?



Children are fluent in all areas of mathematics and are able to reason about their learning in a way that deepens their understanding.



Children can use and understand a range of representations and procedures in a systematic way.



Children have mastered the key content of mathematics and are able to use their skills to problem solve effectively.



Children can recall number facts quickly e.g. number bonds and multiplication and division facts.



Children are able to confidently use their mathematical knowledge and skills in other areas of the curriculum.



The majority of children are confident mathematicians and a high number pass the Multiplication Check and achieve at least the Expected Standard in mathematics.