#### Maths learning experience at Merry Hill

### **Our Vision (Intent)**

We believe that all children can succeed.

At Merry Hill, we want our children to be securely equipped with the fundamental maths knowledge so that they can continue on their learning journey, building on their firm foundations. Our aim is to develop a whole school culture of deep understanding, confidence and competence in maths, creating critical thinkers who enjoy problem solving and have a love of maths.

Our maths curriculum is carefully sequenced into a number of small learning steps so that children achieve and build on success within and across lessons. Our learning sequences provide sufficient opportunities to revisit previously learned knowledge and skills and this helps to embed learning in the children's long term memories. We aim to free up as much space as possible in the children's brains by systematically working on mathematical fluency. We want our children to be confident calculators who are flexible with number.

We place a high emphasis on mathematical talk within all maths lessons and actively promote and teach children to reason about the maths they are doing. This shows a deeper understanding of the concepts learnt.

As pupils progress throughout their time at Merry Hill, as a Mathematician, we aim that they will be able to:

- 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.

#### How we plan and teach Maths (Implementation)

In Nursery, Maths is taught in an active multi-sensory way. Children are introduced to one number at a time and practise forming that number in the air and counting out that number in a variety of ways, e.g. 5 claps, 5 stomps, 5 jumps etc. Maths opportunities are developed in CIL and children revisit their learning throughout the year.

Maths in Reception is taught daily, following and adapting the NCETM Mastering Number Programme 4 days a week with one additional session covering shape, space and measure. The children are systematically introduced to a number of the week which is represented in a variety of ways in the classroom for the children to access in their CIL. Children explore and learn the composition of each number. Within the maths session children work in groups to complete their independent learning/practise.

In Key Stage One children continue to build on the Mastering Number sessions. These are approximately 10-15mins 4 times a week. Strong links and connections are made between these sessions and the main maths lessons so that children understand the purpose of application of their fluency sessions. We use and adapt the Herts for Learning Essentials planning to ensure coverage and progression through the key stage.

Children are taught together, whole class, in mixed ability seating. Misconceptions are planned for and made explicit (on plans and) within lessons. Use of manipulatives for all children is prioritised in most lessons and teachers carefully choose which manipulatives to use in terms of which will best reveal and reinforce the structure of the maths to the children. Maths walls are used interactively in sessions to display the learning journey to children and they are referred to when building on prior learning and to encourage independence from the children. Stem sentences are modelled by staff and used by the children to help cement learning. They are repeated a number of times in lessons and in some cases key sentences are used to summarise learning. The correct use of mathematical vocabulary is a priority for all. Children are challenged through activities that require deeper thinking and reasoning. Assessment for learning is used to help teachers adapt lessons and inform future planning to ensure learning is suitably pitched to support and extend.

#### Intended Impact on...

## Pupil Voice...

Children enjoy their maths learning and talk enthusiastically about it. They understand how their learning may help them in the future. Using their book as a prompt they can explain what they have been learning to do and the strategies they have used or could use to solve a problem. Children use the correct mathematical vocabulary and the key sentences independently when reasoning. They are confident to discuss their learning with us to include what they have got better at, what has been particularly challenging, what they are proud of and what they are working on.

# Evidence in Knowledge and Understanding

Children are building their mathematical fluency and can quickly recall a growing number of number facts, which they use and apply in increasingly complex contexts. They can explain their learning and reasoning confidently using accurate mathematical vocabulary and sentences.

## Application...

Children are able to use and apply their growing knowledge and understanding in a range of contexts and to a range of more complex problems. They make links to previous learning and understand how it is helping them today. Where relevant, they make links between their learning in maths and across the curriculum.

### Outcomes

At Merry Hill we strive for all pupils to achieve their maximum potential. At the end of each year we expect the children to achieve ARE for their year group. Some children will progress further and achieve greater depth. Children who have gaps in their knowledge receive appropriate support and intervention to enable them to keep up with the curriculum. Barriers are addressed with the aim to accelerate progress. Children will be well prepared for their next phase of learning.

Area of Study	EYFS	Year 1	Year 2
Counting	Count on and back in ones up to 20 and beyond. Subitise (recognise quantities without counting) to 5. Count out up to 10 objects from a group. Match the numeral with a group of objects to show how many there are (up to 10).	Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number. Practise counting as reciting numbers and counting as enumerating objects. Count in twos, fives and tens from different multiples.	Using materials and a range of representations, count to at least 100 and begin to count to larger numbers. Count in steps of two, three, and five from 0, and in tens from any number, forward or backward.

	Key Sentences: Subitise means say how many you see without counting. The last number we count is how many we have in total.	Key Sentences: When we count <u>on/backwards</u> , the value of the next number is <u>greater (more)/less</u> .	Key Sentences: When we count on or backwards from zero in multiples of 2, the next number will always be even.
	When counting we point to each object one at a time and say its number name.		When we count on or backwards from zero in multiples of 3, the next number will alternate between odd and even.
	When counting on in 1s the sequence of numbers always stays the same. We still count in the same way whatever we		When we count on or backwards from zero in multiples of 5, the digit in the ones column will always be 5 or zero.
	are counting. If you rearrange the objects in the group the total stays the same.		When we count <u>on/backwards</u> in multiples of 10 from any number, the digit in the ones column will stay the same as the number you start on and the digit in the tens column will <u>increase/decrease</u> by 1.
	Key Vocabulary: count on, count back, ones, sequence, subitise, pattern, odd, even, every other, how many? total, zero	Key Vocabulary: value, greater (more), less, multiple	Key Vocabulary: multiples, alternate, digit, ones column, tens column, increase, decrease, sequence, continue, predict, rule
Number and Place Value	Order numerals from 0 – 10 (cardinality). Estimate the number of things, showing an understanding of relative size. Understand that numbers are made up	Read and write numbers to 100 in numerals. Read and write numbers from 1 to 20 in numerals and words. Identify one more and one less.	Read, write and compare numbers to at least 100. Recognise the place value of each digit in a two-digit number (tens, ones).
	(composed) of smaller numbers, exploring partitioning in different ways with a variety of objects.	Begin to recognise place value in numbers beyond 20.	Begin to understand zero as a place holder. Use place value and number facts to solve problems.

	Begin to conceptually subitise larger numbers by subitising smaller groups within the number.	Compare numbers up to 100 using the language of equal to, more than, less than (fewer), most, least.	Identify, represent and estimate numbers using different representations, including the number line
		Identify and represent numbers to 100 using objects and pictorial representations.	Use and = signs
		Recognise and create repeating patterns with objects and with shapes.	
	Key Sentences:	Key Sentences:	Key Sentences:
	More than, means a greater value/number or a greater amount.	Equal to (=) means that both sides of the number sentence have the same value.	Each digit in a number has a different value, based on which place value column it is in.
	Less than, means a lower value/number or a fewer amount.	When we compare and order numbers, we compare the digits in the greatest place value column first, then we move to the place	As you move from right to <u>left/left</u> to right in a number, the value of the place value columns
	Most, means the greatest value/number.	value columns to the right of this.	increases/decreases ten times.
	Least, means the lowest value/number.		A digit $\underline{x}$ in the $\underline{y}$ place value column tells you that there are $\underline{x}$ lots of $\underline{y}$ in that number.
			The value of a digit in the <u>x</u> column is <u>x</u> lots of that digit.
			When 0 is in a place value column it acts as the place holder.
	Key Vocabulary: Order, more than (greater), less than (fewer), most, least, estimate, whole, part, parts	Key Vocabulary: Numerals, one more, one less, place value, tens, ones, compare, equal to, place value column	<u>Key Vocabulary:</u> <u>T</u> ens, ones, hundreds, place holder, identify, represent, estimate, digit, value

	Understand the composition of all numbers	Read, write and interpret mathematical	Recall and use addition and subtraction facts
Addition and	to 10.	statements involving (+) (-) and (=) signs.	to 20 fluently.
Subtraction	Automatically recall (without reference to	Memorise and reason with number bonds to	Derive and use related facts up to 100.
	rhymes, counting or other aids) number bonds up to 5 (including subtraction facts)	10 and 20.	Using concrete objects, pictorial
	and some number bonds to 10, including double facts.	Represent and use number bonds and related subtraction facts within 20.	representations, and mentally, add and subtract numbers
		Add and subtract one-digit and two-digit	- a two-digit number & 1s
		numbers to 20, including zero.	- a two-digit number 10s
		Use concrete objects and pictorial representations, to solve one-step problems	- two two-digit numbers
		that involve addition and subtraction.	- adding three one-digit numbers
		Explore and solve missing number problems.	Using concrete objects and pictorial representations, solve problems with addition and subtraction.
			Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot.
			Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems.
			Prepare for formal written method by recording addition and subtraction in columns.

Key Sentences:	Key Sentences:	Key Sentences:
When you add 1 or more the number will be greater.	A number that is even is in the twos counting pattern.	An even number add an even number always equals an even number.
When you subtract 1 or more the number will be less.	A number that is odd is not in the twos counting pattern.	An even number add an odd number always equals an odd number.
	The ones digit tells us whether the number is odd or even.	An odd number add an odd number always equals an even number.
	When we are counting we are always looking for the pattern in the numbers.	(Generalisation: If you add any amount of even numbers the number will always be
	When you add/plus 1 or more to a number the sum will be greater.	even.) When you add a single digit to a multiple of 10, only the ones digit changes.
	When you subtract/takeaway 1 or more from a number the number will be fewer/less. When you add 0 to a number the sum	When you add a multiple of 10 to any number, only the tens digit changes.
	remains the same. When you subtract 0 the number remains the	When you add 3 or more single digit numbers we look for number facts that we know.
	same. When solving a problem I will use what I know.	Addition is commutative, this means you can add the addends in any order and the sum stays the same.
	KHOW.	Subtraction is not commutative, this means you cannot subtract the numbers in any order to get the same number.
		Addition is the inverse of subtraction.
		Subtraction is the inverse of addition.
		Addition and subtraction are the inverse of each other.

			Addition is the inverse of subtraction so we can use addition to find out or check a subtraction number sentence.
	Key Vocabulary: Composition, add, more, and, make, sum,	<u>Key Vocabulary:</u> Plus, subtract, minus, digit, reason,	Key Vocabulary: Addition, subtraction, derive, commutative,
	total, altogether, how many more?, take away, leave, how many left?, how many have gone?	represent, equals, number sentence, sign, operation, one-digit number, two digit- number	inverse, column addition, addends
Multiplication and Division		Using concrete objects, pictorial representations and arrays with the support of the teacher, solve one-step problems involving multiplication and division, by calculating the answer.	<ul> <li>Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.</li> <li>Calculate mathematical statements for multiplication and division within the multiplication tables.</li> <li>Use the multiplication (x), division (÷) and equals (=) signs.</li> <li>Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.</li> <li>Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in context.</li> </ul>

Key Sentences:	Key Sentences:	Key Sentences:
		Multiplying by two is doubling.
		Dividing by two is halving.
		When you multiply a whole number by 10 you make the number 10 times greater.
		When you multiply by 5, you can also multiply by 10 and half it.
		Multiplication is commutative which means you can multiply the factors in any order and you get the same product.
		Division is not commutative which means you cannot divide the numbers in any order to get the same quotient.
		Multiples of 10 have a zero in the ones column.
		Multiples of 5 have a zero or five in the ones column.
		You can split a multiple of a number into groups of a number with none left over.
		A number can be a multiple of more than one number.
		Multiplication is the inverse of division. This means we can use multiplication to help solve and check a division calculation.

	Key Vocabulary:	Key Vocabulary:	Key Vocabulary:
		Array, times, lots of, multiplication, division, calculate, share equally, group in pairs, divide, divided by, divided into.	Groups of, repeated addition, row, column, multiply, multiplied by, multiple of, once, twice, three times, four times, five times ten times times as (big, long, wide and so on), group in pairs, equal groups of, divide, divided by, divided into.
Fractions		Recognise, find and name a half as one of two equal parts of an object, shape or quantity.	Recognise, find, name and write fractions 1 / 3 , 1 / 4 , 2 / 4 and 3 / 4 of a length, shape, set of objects or quantity.
		Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.	Write simple fractions for example, $1/2$ of $6 = 3$ and recognise the equivalence of $2/4$ and $1/2$ .
	Key Sentences:	Key Sentences:	Key Sentences:
	A whole can be split into parts.	A fraction is a part of a whole.	The denominator is how many equal parts the whole has been split into.
		A half is one part of a whole that has been split into two equal parts.	The numerator is how many of the equal parts you have.
		A quarter is one part of a whole that has been split into four equal parts.	A half is equal to two quarters.
			If I know half of is is I also know is E.g. If I know half of 6 equals 3, then I also know that two quarters of 6 equals 3.
			A third is one part of a whole that has been split into three equal parts.

	Key Vocabulary:	Key Vocabulary:	Key Vocabulary:
	Whole, part, parts.	One whole, fraction, split, equal parts, half, one half, two equal parts, quarter, one quarter, four equal parts.	Denominator, numerator, equivalence, two quarters, three quarters, four quarters.
Geometry – Properties of shape	Investigate composing and decomposing shapes, learning which shapes combine to make other shapes. Create and repeat patterns, beyond AB patterns, and begin to identify the unit of repeat. Spot patterns in the environment. Use own ideas to make models of increasing complexity.	Handle, recognise and name common 2D and 3D shapes, including: - 2D shapes rectangles squares circles triangles - 3D shapes cuboids cubes pyramids spheres Recognise these shapes in different orientations and sizes.	Handle and name a wider variety of common 2D and 3D shapes including: -quadrilaterals -polygons -cuboids -prisms -cones Identify the properties of each shape -number of sides -number of faces Identify and describe the properties of 2-D shapes, including -number of sides -symmetry in a vertical line. Identify and describe the properties of 3-D shapes number of -edges -vertices -faces
			14000

		Identify 2-D shapes on the surface of 3-D shapes. Compare and sort common 2-D and 3- D shapes and everyday objects. Read and write names for shapes that are appropriate for their word reading and spelling. Draw lines and shapes using a straight edge.
Key Sentences:	<ul> <li><u>Key Sentences:</u></li> <li>We can identify, name and sort shapes by their properties.</li> <li>2D shapes are flat shapes.</li> <li>This is a triangle because it has 3 straight sides and 3 corners.</li> <li>This is a square because it has 4 straight sides, all the same length and 4 corners.</li> <li>This is a circle because it has 1 round side and no corners.</li> <li>This is an oblong because it has 4 straight sides and 4 corners, 2 sides are longer and 2 sides are shorter.</li> <li>This is a pentagon because it has 5 straight sides and 5 corners.</li> </ul>	<ul> <li><u>Key Sentences:</u></li> <li>This is an octagon because it has 8 straight sides and 8 corners.</li> <li>3D shapes are solid shapes.</li> <li>We can identify the 2D shapes in the net of a 3D shape.</li> <li>This is a cube because it has 6 square faces, 8 vertices and 12 edges.</li> <li>This is a cuboid because it has 6 faces and all of the faces are rectangles (either squares or oblongs). It also has 8 vertices and 12 edges.</li> <li>This is a cone because it has 1 curved face, no vertices and no edges.</li> <li>This is a cone because it has 2 faces – 1 circle face and 1 curved face, 1 vertex and 1 edge.</li> <li>This is a cylinder because it has 3 faces – 2 circle faces and 1 curved face, 2 edges and 0 vertices.</li> </ul>

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		<ul> <li>This is a cube because it has 6 square faces.</li> <li>This is a cuboid because it has 6 faces and all of the faces are rectangles (either squares or oblongs).</li> <li>This is a sphere because it has 1 curved face.</li> <li>This is a cone because it has 2 faces – 1 circle face and 1 curved face.</li> <li>This is a cylinder because it has 3 faces – 2 circle faces and 1 curved face.</li> </ul>	This is a square-based pyramid because it has 1 square face and 4 triangle faces. It has 5 vertices and 8 edges. This is a triangular-based pyramid because it has 4 triangle faces, 4 vertices and 4 edges.
	Key Vocabulary:	Key Vocabulary:	Key Vocabulary:
	Shape, flat, repeat, pattern, repeating pattern	2D, flat shape, 3D, solid shape, rectangle, square, oblong, circle, triangle, cuboid, cube, pyramid, spheres, size, orientation, identify, name, sort, properties, side, corner, straight, curved, face, because	Octagon, net, vertices, edges, cylinder, square-based pyramid, triangular-based pyramid
Geometry –	Use spatial language, including following and giving directions, using relative terms and describing what they see from different	Describe position, direction and movement, including whole, half, quarter and three- quarter turns.	Order and arrange combinations of mathematical objects in patterns and sequences.
Position and Direction	viewpoints. Investigate turning and flipping objects in order to make shapes fit and create models; predicting and visualising how they will look (spatial reasoning).		Use mathematical vocabulary to describe position, direction and movement, in a straight line. Distinguish between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anticlockwise).

	Key Vocabulary:	Key Vocabulary:	Key Vocabulary:
	Directions, forwards, backwards, turn towards, turn, flip.	On, in, under, next to, beside, beneath, on top, in between, left, right, whole turn, half turn, quarter turn, three-quarter turn	Rotate, right angle, clockwise, anticlockwise
Measurement	Be familiar with measuring tools in everyday experiences and play. Compares length, weight and capacity and tackles problems, including predictions. Order and sequence everyday events using everyday language related to time. Begin to measure time using timers and calendars.	Compare, describe and solve practical problems for: lengths and heights long/short longer/shorter tall/short double/half mass/weight: heavy/light heavier than/lighter than capacity and volume: full/empty more than less than half half full quarter full time quicker slower earlier later Measure and begin to record the following:	Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm) mass (kg/g) temperature (°C) capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels. Compare and order lengths, mass, volume/capacity and record the results using >, < and = . Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value. Explore and find different combinations of coins that equal the same amounts of money. Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change. Compare and sequence intervals of time.
		*lengths and heights	

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	*mass/weight *capacity and volume *time (hours, minutes, seconds) Recognise and know the value of different denominations of coins and notes Sequence events in chronological order using language:	Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times. Recall having learned, the number of minutes in an hour and the number of hours in a day.
	<ul> <li>before and after</li> <li>first <ul> <li>next</li> <li>today</li> <li>yesterday</li> <li>tomorrow</li> <li>morning</li> <li>afternoon</li> <li>evening</li> </ul> </li> <li>Recognise and use language relating to dates, including days of the week, weeks, months and years</li> <li>Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.</li> </ul>	
Key Sentences:	Key Sentences:	<u>Key Sentences:</u> We can measure length and height in metres (m) and centimetres (cm). We can measure mass in grams (g) and kilograms (kg).

		We can measure temperature in degrees Celsius. We can measure capacity in litres (I) and millilitres (mI). There are 60 minutes in an hour. There are 24 hours in a day. There are 100 pennies in one pound.
Key Vocabulary: Measure, measuring tools, size, compare, guess, estimate, enough, not enough, too much, too little, too many, too few, nearly, about the same as, length, height, long, short, tall, high, low, wide, narrow, deep, shallow, thick, thin, longer, shorter, taller, higher, longest, shortest, tallest, highest, weigh, balances, heavy/light, heavier/lighter, heaviest/lightest, full, half full, empty, holds, container, time	Key Vocabulary: Double, half, heavier than, lighter than, taller than, longer than, shorter than, capacity, volume, more than half full, less than half full, quarter full, quick, quicker, quickest, quickly, slow, slower, slowest, slowly, earlier, later, minutes, hours, seconds, coins, pence, before, after, first, next, today, yesterday, tomorrow, morning, afternoon, evening, days, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, months, January, February, March, April, May, June, July, August, September, October, November, December, morning, afternoon, evening, night time, takes longer, takes less time, hour, o'clock, half past, clock watch, hands.	Key Vocabulary: Metres, centimetres, grams, kilograms, temperature, degrees Celsius, capacity, litres, millilitres, thermometers, measuring vessels, amount, change, intervals, quarter past, quarter to