

Developing an approach to teaching and learning in mathematics

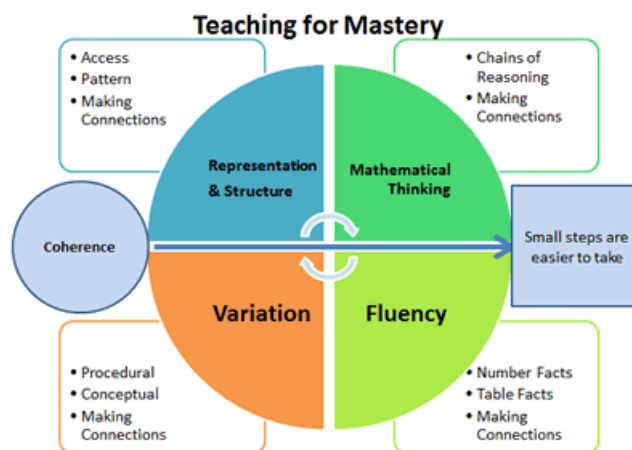
Mathematics is a creative and highly interconnected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject. NC 2014

At Wormley CE Primary School, our vision and aim is to promote maths as a **social, creative and interconnected subject**. We believe that **everybody** is capable of being a successful mathematician. We aim to nurture a **love and curiosity** of the subject for all. The subject is **essential** to everyday life and provides a **foundation** for understanding the world. Our aim is to provide our learners with **rich opportunities** in maths to learn **independently and actively** in order that they:

- Become **fluent** in the fundamentals of mathematics;
- Are able to **reason** and justify mathematically;
- Can **solve problems** within a range of contexts.

Our approach to teaching and learning mathematics is informed by the work of the NCETM on a mastery approach to maths; the EEF research into 'Improving Mathematics' (2020); and Ofsted's Review of mathematics (2021)

We have adopted the **principles of mastery maths**, basing lesson design on the 5 big ideas of: **coherence; representation and structure; mathematical thinking; fluency and variation.**



Children are taught **at the pace appropriate to them** taking small, coherent steps of learning. Those who grasp concepts rapidly will be **challenged through rich and sophisticated problems** before being presented with new material; those who are not sufficiently fluent with earlier material will be **allowed to consolidate** their understanding before moving on. In order to **interrupt forgetting** and help children to **remember** and **recall** previous learning, 3 or 4 maths questions, drawn from mathematical concepts learnt: recently; last month; last term; and last year will take place at least 3 times per week. These questions are a variety of fluency, problem-solving and reasoning and are answered by all children.

Resources can be drawn from the spines, Oak, White Rose, past SATs questions, RtP questions etc but it is essential that they are matched to what your children need to practise
Recording can be on whiteboards or in jotters

Through **varied, engaging and open-ended** scenarios, which are **relevant** to the learner, we aim to **nurture a love and curiosity** of the subject. We teach maths across the curriculum and in different contexts.

We encourage a **breadth and depth of understanding** by building conceptual understanding through intelligent fluency practice, addressing misconceptions through reasoning and solving problems.

Fluency is highly valued and practised daily. Procedural variation is valued, explored and encouraged.

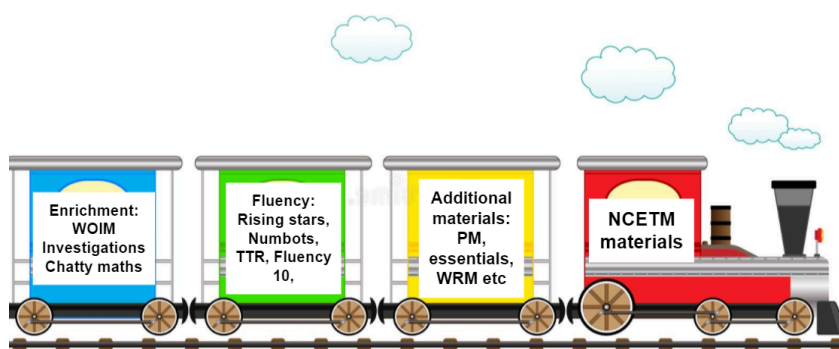
We believe **mixed attainment** groups and paired work is vital with a strong emphasis on '**talk**' in activities such as **chatty maths** to allow children to 'think aloud' and build the skills necessary to be confident mathematicians. We encourage children to '**pause and notice**' to identify efficient methods, estimate answers, avoid careless mistakes and to create space for deliberate thinking.

Mistakes are valued and shared in our maths classrooms as teaching points and as evidence of the 'sparks' created in children's brains as they learn new concepts.

Children of every age and attainment level have access to **concrete resources** (for example dienes blocks, number lines, Numicon, Cuisenaire rods, place value counters, tens frames) to aid their understanding. Children are encouraged to make jottings to help their understanding.

Curriculum

We use the **NCETM prioritised curriculum** as the spine of our curriculum which meets the requirements of the National Curriculum 2014 for the teaching and learning of mathematics (see appendix 1). This is supplemented with additional intelligent practice materials drawn from Herts Essentials maths learning sequences, Power Maths and White Rose mathematics. This is represented in the image below:



We focus on the **DfE Ready-to-Progress criteria** within each unit in recognition that these high value objectives are essential to pupils moving forward in their maths understanding.

Each year group have a fluency focus. Currently, in early years and KS1 we follow the NCETM Mastering Number project and in KS2 there is a structured programme for learning times tables facts, including Mastering Number in Year 4 and Year 5.

Curriculum coverage is monitored through the completion of the formative assessment trackers within Arbor and other monitoring activities.

Structure of maths teaching and learning

Maths lesson	KS1 KS2	50 mins daily*	These lessons follow the small steps of learning as set out in our prioritised curriculum. Each lesson will be designed to incorporate the 5 big skills of mastery providing opportunities to practise fluency skills, reason mathematically and to talk about mathematics. The NCETM materials are supplemented with materials drawn, primarily, from White Rose, Power maths, Herts essentials, or Nrich where needed. Each pupil has access to the same teaching. Children are not grouped by attainment.
Fluency	EY KS1 KS2	10 mins daily	EY / KS1: Mastering Number LKS2: Times table booklets Y4 / Y5 / Y6: Mastering Number All year groups: regular arithmetic practice
Online resources	EY KS1 KS2	Support home and class learning	EY: Numberblocks KS1: Numbots, Numberblocks KS2: Freckle, Times table rockstars
Inspirational maths	EY KS1 KS2	Whole school days / weeks	Opportunities for investigation and problem-solving with a focus on developing maths skills, collaborative working and positive mindset. They usually take place at the start of a term or between units. resources are usually sourced from youcubed.org or nrich.

EYFS:

In Early Years, the focus is on understanding number at the beginning of the school year, however within this focus other areas are incorporated, such as pattern. Mathematics adult led teaching is planned in line with the EYFS Framework/Development Matters guidance and Early Learning Goals outcomes. Shape, space and measure is also incorporated throughout the academic year.

- In **Reception**, from September children have a daily ten minute adult-led session building up to a daily twenty minute whole class adult-led session (EY Practitioners

support children). These sessions are planned using the mastering number materials and materials that are designed in conjunction with Numberblocks episodes. They highlight and develop the key mathematical ideas that are embedded in the programmes by following the **Early Learning Goals**:

Number:

Children at the expected level of development will: - Have a deep understanding of number to 10, including the composition of each number; 14 - 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.

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.

- In **Nursery**, a daily ten minute adult-led session in key groups starts in the Spring term.

SEND

We believe that inclusive education means supporting all pupils to learn, contribute and participate in all aspects of school life alongside their peers. Our curriculum includes, not only the formal requirements of the National Curriculum, but also a range of additional opportunities to enrich the experiences of our children. Our curriculum also includes the social aspects that are for life-long learning, personal growth and development of independence.

Some of the actions we may take to achieve this are:

- Help all pupils achieve the best of their abilities, despite any special educational need or disability they may have.
- Ensure that staff are aware of and sensitive to the needs of individual pupils and that teaching is appropriate to meet those needs.
- Make suitable adaptations to the curriculum for children with SEND to fully develop their abilities, interests and aptitudes and gain maximum access to the curriculum.
- In Maths, in order for all children to be successful, we use assessment for learning to ensure that children are developing their skills at their own level and pace. We plan for adaptations, such as, access to additional resources, additional time, adult support and small group pre-teaching or overlearning.

Mathematics Policy

All teaching staff use the progression, representations and language laid out in our maths policy to encourage **consistency**.

Learning Environment and resources

Each classroom has a maths learning wall and display material such as vocabulary, a number line and a hundred square. Display materials are age appropriate. Maths resources are available and readily accessible by children in every lesson and in every year group. Resources are kept in a central place for all to access. There are 2 maths displays in public areas.

Each class keeps a maths investigation book to capture and evidence practical maths activities.

Pre-teaching & Intervention

Pre-teaching is delivered for those who would benefit as regularly as can be timetabled. This will prepare children for the learning they will encounter in class and also be in direct response to teacher AfL. The sessions will be ideally delivered by teachers.

Numberstacks is an intervention programme delivered by TAs to support pupils who have gaps in previous knowledge which is holding them back. These will be delivered in blocks of 12 in groups of no more than 3 with similar need (as identified in the initial assessment)

In Y2-Y6, the children all take a diagnostic star maths assessment each half term. Those identified as being 'on watch' will be focus children for that half term and will be taught the next key objective identified from the assessment. This could be through **precision teaching**, or **Numberstacks**

We may, on occasions, run a small group tutoring to support pupils over a defined period. These are primarily targeted at children in receipt of **pupil premium funding** who have evident gaps which need addressing outside of the normal maths lesson.

Some children in receipt of pupil premium funding have weekly online tutoring from **Third Space learning**.

Children who have been identified as having **dyscalculia** have dedicated support.

Assessment

We assess against the **DfE Ready to progress criteria**. Assessment is recorded on an ongoing basis using the **formative assessment grids** on **Arbor**. These trackers are accessed by subsequent class teachers in order to provide a historic and complete picture of a child's progress.

At termly intervals, **summative judgements** are made and are recorded on Arbor.

Understanding of a concept is assessed using '**assessment pit stops**', such as from the **Ready to progress exemplification materials**, Twinkl, HfL, White Rose or Testbase, some time after the initial teaching.

Progress is also assessed through arithmetic test scores, SATs practice papers (in year 6) and day to day assessment for learning.

In **Early Years**, assessment is recorded on Arbor and observations logged onto the Tapestry Online Learning Journal system also form part of the ongoing assessment process. In addition, three children become a focus child on a termly basis to inform assessment.

All assessments are passed on to new teachers in order to provide a historic and complete picture of a child's progress.

Marking and feedback

Children are encouraged to provide collaborative feedback wherever appropriate.

Teachers adhere to the school's policy on marking, ensuring that each piece of work is acknowledged and children are regularly provided with feedback, usually verbal, to help them make progress. This can be in the form of a development task for which children will be given time to reflect on and respond to.

Monitoring and Moderation

Maths is **monitored** through a variety of means e.g. observations, learning walks, pupil consultations, planning reviews and book looks.

Termly **phase reviews** are also a source of information.

Phases are expected to **moderate** assessment at least termly. Teachers attend moderation clusters with local schools and we undertake a whole school moderation twice a year. The subject leader holds a **maths surgery** termly to review progress and curriculum coverage as well as to provide support and advice to teachers.

Home Learning

Children have the opportunity for extending their maths skills through maths based activities on the home learning choice charts / learning menus. This is usually delivered through the **Google classroom**. They are encouraged to use Freckle (KS2) and play maths games to practise fluency skills each night at home. Teachers will communicate any fluency focus through this. All pupils from YR-Y6 have a log-in to **Numbots** to develop their mental fluency in number. They also have access to **TT Rockstars** to develop multiplication tables.

Website

This is an important interface with parents which has links to our maths policy, an overview of learning and curriculum overviews for each year group as well as curriculum foci.

Resources

We recommend, and subscribe to where necessary, a few high quality resources for teachers to use to plan lessons: NCETM, HfL Essentials planning , Power Maths, White Rose Premium, Nrich, TTRockstars, Numbots, Numberblocks.

On the Google Drive, within Curriculum - Maths, there are teaching and assessment materials to help with lesson design and assessment to inform our teaching and learning. There are also a selection of challenge cards to stretch children.

CPD and research

Maths CPD for teachers is held at least termly, usually within school although external providers are used as required. Phases and individual teachers are also encouraged to ask for specific support from the maths leadership team when required. Materials from CPD sessions can be found on the Google Drive.

Teaching assistants CPD is delivered in the form of bite sized chunks and they do attend external training from time to time. Many have also undertaken collaborative development projects in maths.

Our maths leader is a Primary Mastery Specialist and Assistant Maths Hub Lead for the Matrix Maths Hub. The school works closely with the Matrix maths hub and 2 members of staff have been part of a Teacher Research Group (TRG). The school is now in the sustaining phase.

The school worked with HfL to trial their development of Maths Essentials for YR and has been involved in a range of research projects with Herts for Learning and The University of Hertfordshire.

In addition, two members of staff have the MaST (maths specialist teacher) qualification and one is a maths SLE and had articles published in educational publications about maths pedagogy.

Teaching staff are provided with academic articles and teaching ideas when appropriate and it is also suggested that teachers subscribe to the NCETM newsletter to keep abreast of current thinking in maths teaching and learning.

We follow the recommendations of the Education Endowment Fund (EEF) documents 'Improving Mathematics in the Early Years and Key Stage 1' and 'Improving Mathematics in KS2 and 3'

Appendix 1: Maths Prioritised Curriculum Map

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y1	Counting within 100	Comparison of quantities and part-whole relationships Numbers 0-5	Recognise, compose, decompose and manipulate 2D and 3D shapes Numbers 0 to 10	Additive structures Addition and subtraction facts within 10	Numbers 0 to 20	Unitising and coin recognition Position and direction Time
Y2	Numbers 10 to 100 Calculations within 20	Fluently add and subtract within 10 Addition and subtraction of 2 digit numbers (1) Introduction to multiplication	Introduction to multiplication (cont'd) Introduction to division structures	Shape Addition and subtraction of 2 digit numbers (2)	Money Fractions Time Position and direction	Multiplication and division - doubling, halving, quotitive and partitive division Sense of measure - capacity, volume, mass
Y3	Adding and subtracting across 10 Numbers to 1,000	Numbers to 1,000 (cont'd)	Right angles Manipulating the additive relationship and securing mental calculation	Column addition 2,4,8 times tables Column subtraction	Unit fractions	Non-unit fractions Parallel and perpendicular sides in polygons Time
Y4	Review of column addition and subtraction Numbers to 10,000	Perimeter 3, 6, 9 times tables	7 times table and patterns Understanding and manipulating multiplicative relationships	Understanding and manipulating multiplicative relationships (cont'd) Coordinates	Review of fractions Fractions greater than 1	Symmetry in 2D shapes Time Division with remainders
Y5	Decimal fractions Money	Negative numbers Short multiplication & short division	Area and scaling Calculating with decimal fractions	Calculating with decimal fractions (cont'd) Factors, multiples and primes	Fractions	Converting units Angles and transformations
Y6	Calculating using knowledge of structures Multiples of 1,000	Numbers up to 10,000,000 Draw, compose and decompose shapes	Multiplication and division Area perimeter, position and direction	Fractions and percentages	Statistics KS2 tests	Ratio and proportion Calculating using knowledge of structures Solving problems with 2 unknowns Order of operations Mean average