# River Primary School
# Mathematics Policy

**Our school policies reflect our commitment to an inclusive, creative and exciting curriculum, based around high quality teaching and learning.**

## Purpose of Study

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.

## Intent

At River Primary School, our intent for mathematics is to teach a rich, balanced and progressive curriculum, using Maths to reason, problem solve and develop fluent, conceptual understanding in each area. We intend for all our children to develop 'Number Sense' (have a well-developed sense of the size of a number and where it fits into the number systemd during their time at our school; giving them the tools they need to tackle mathematical problems.

Through a programme of Continued Professional Development (CPD) teachers are supported and aided in their roles, ensuring confidence in the skills and facts they are required to teach. Lessons are child focused and Maths is kept engaging and current in school.
Our policies, resources and schemes support our intent e.g. our calculations policy, NCETM [National Centre for Excellence in Teaching Mathematics) Teaching for Mastery resources and the White Rose planning documents. We have a clear progression document (see Appendix 1), showing how the different mathematical concepts are built on through the child's time at River.

The mapping of Mathematics across school shows clear progression in line with age related expectations. Yearly overviews (Appendix 2) have been designed with a number of factors in mind – thinking about continually teaching number through all areas of maths, using the outside environment where possible and linking with topics being taught in class.

Lessons are carefully planned and adapted to meet the needs of learners, based on the NCETM Mastery Materials; building on previously learnt concepts. Children who are lower achieving in Maths are supported through 'in the moment keep up intervention', pre-teaching, scaffolded activities or targeted teaching support.

## AIMS

The National Curriculum (2014) for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems

• 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.

Our intent focuses on equipping all pupils with the mathematics they need to master the curriculum for each year group, which requires that all pupils:

- recall key number facts with **speed and accuracy** and use them to calculate and work out unknown facts;
- develop their ability to **apply** mathematical skills with confidence and understanding when **solving problems.**
- apply 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
- express themselves and their ideas using the **language of mathematics** with assurance.
- have sufficient depth of knowledge and understanding to **reason and explain** mathematical concepts and procedures and use them to **solve a variety of problems.**
- develop **positive attitudes** to mathematics, recognising that mathematics can be both useful and enjoyable.
- nurture a fascination and excitement of mathematics
- are able to **use and apply** the skills in other curricular areas.

Our expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of the pupil's understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly are offered rich and sophisticated problems before any acceleration through new content. Those children who are not sufficiently fluent with key content and materials will consolidate their understanding, including through additional practice, before moving on.

**Collaboration:** Pupils work together, sharing and developing ideas for a range of different purposes such as: solving number problems, exploring shape challenges and comparing their findings. Throughout problem-solving, communication is a key tool for success. Pupils learn how to engage in a collaborative dialogue, listening to and acting upon each other's thoughts and ideas, discussing the next steps in their learning, working together to achieve the end goal and overcoming any issues that may arise along the way. The children have a mathematics learning coach who they work alongside, offering support and challenge to each other. As a result, they develop positive relationships with their peers and learn how to empathise with and accommodate the thoughts and feelings of those around them. Through regular problem-solving sessions, the children get the opportunity to see other approaches to a problem and begin to gain an understanding that 'two minds are better than one.' This begins to prepare them for the future workplace and enables them to become active participants in an ever-changing world.

**Initiative:** Through regular practice, children become fluent in number. They are able to build on the solid foundations established at a young age. They are able to use their mathematical experiences to solve problems and to become confident in making predications and testing out their ideas. When tackling challenges, they are not worried about making mistakes as they

know that this is an important part of their learning journey. Children will recall the facts which they need when working on reasoning problems. They will be able to explain why they have given their answers, using reasoning language and showing worked examples. Children will of course develop resilience and will need to make decisions and modify approaches when errors occur, especially when problem-solving.

**Diversity:** We encourage children to develop a tolerance towards each other's ideas and articulate their thoughts and feelings. We encourage them to develop a sense of excitement and curiosity about the mathematical world – the curriculum providing them with a wide range of opportunities to be fascinated by the world of maths. They are encouraged to be curious and ask questions about what they notice and are encouraged to explore the findings of previous mathematicians – from testing out divisibility rules to exploring how patterns can be interconnected and manipulated. Real-life links are made across the curriculum, enabling the children to see how important mathematics is in the world. When celebrating the NSPCC Number Day, a whole school topic is chosen for the week; giving the children the opportunity to work in mixed year groups. This encourages the older children to support the younger ones and for the children to work together, raising money for others. Other fundraising opportunities are given throughout the year, through innovate tasks and special days

**Implementation**

**Organisation**

- A daily mathematics lesson of 45-60 minutes is taught in Year 1 and Year 2 and a 60-minute mathematics lesson is taught in all KS2 classes.
- In EYFS pupils experience mathematics on a daily basis, through teacher directed tasks and child initiated play. Opportunities for an additional hour of mathematics should be developed through daily routines and all areas of learning.
- The skills acquired in the Maths lessons are applied across the curriculum. For example, data analysis in Science; Chronology of time in History; 4 and 6 grid map references in Geography, the use of spreadsheets in computing and geometry within Art. Teachers look to revisit information covered in Maths lessons to ensure children have opportunities to consolidate understanding.
- Through encouraging a Concrete, Pictorial, Abstract (CPA) approach we recognise resources are required to ensure high quality instruction. The use of the NCETM Materials requires a wide range of manipulatives. Resources are readily available in each shared teaching area across the school. Teachers are encouraged to request additional resources as needed.
- The Concrete Pictorial Abstract (CPA) approach is a system of learning that uses physical and visual aids to build a child's understanding of abstract topics.
- Children are introduced to a new mathematical concept through the use of concrete resources (e.g. fruit, Dienes blocks etc.). When they are comfortable solving problems with physical aids, they are given problems with pictures – usually pictorial representations of the concrete objects they were using.
- Then they are asked to solve problems where they only have the abstract i.e. numbers or other symbols. Building these steps across a lesson can help pupils better understand the relationship between numbers and the real world, and therefore helps secure their understanding of the mathematical concept they are learning.

A typical 45- 60-minute lesson may include:

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| Fluency Warm up - practising the skills needed to become fluent in maths. Mixed times tables/missing number problems/Daily 10/writing own number sentences etc. Key Instant Recall Facts (KIRFS) See Appendix 1 for KIRF overview<br><br>Links to previous learning – 4 from before/nothing new, just review |
| Whole class input - possibly using whiteboards or sat with manipulatives at desks. Work through input as a class.<br>Modelled examples and high quality questioning.<br>Add any stem sentences/key vocabulary to maths working wall<br>TA/s and Teacher to move around the class – checking understanding and discussing any misconceptions/misunderstandings.<br>Question the children – get them to think deeper/ask each other questions about their learning. (lots of suggestions for good questioning in NCETM materials. |
| **Independent work**<br>Think of this as the children practising and applying what they have learnt in the intro.<br>This could be:<br>Some questions to stick in and have a go at.<br>Scaffolded examples to support<br>A whole class challenge on the board to work through<br>Some paired, then independent work<br>This work can come from a range of resources |
| **End of lesson**<br>This could include self-marking as a class<br>Looking at something which they will be working on the next day<br>Looking back at initial pre-assessment task and adding any new knowledge in pink pen<br>Going back over something which was challenging/done well – ask children to show how they did something successfully. |

**Teaching strategies**

In order to provide the children with active and stimulating learning experiences, a variety of teaching and learning opportunities are adopted:

Children may work individually on a task, in pairs or in a small group, depending on the nature of the activity. Children are paired with a Learning Coach who they sit with on a regular basis. It is at teachers' discretion how regularly these are changed and how they are organized to best facilitate learning.

Opportunities to transfer skills learnt, to real situations, are used whenever possible.

The whole school calculation policy is shared with all school staff by the Maths Lead. The Maths Lead Teaching Assistant introduces new members of the TA team to the policy; to ensure consistency of approach.

Activities are planned to encourage the full and active participation of all pupils.

Teachers use carefully planned questions throughout the lesson in order to meet the needs of all abilities. Teachers direct questions at individual children to encourage independent thinking. We encourage independence and initiative in lessons. Self-differentiation is used regularly in order for children to challenge themselves. This may be through question selection, use of the scaffolded model or through the use of resources. Low threshold, high-ceiling questions are used to encourage all learners to get started and contain opportunities for self-extension.

A CPA approach is utilised in all year groups, all classes have access to a range of mathematical manipulatives to support learning and understanding. Our CPA calculation policy is followed by all year groups. The NCETM Professional Development (PD) Materials support teachers with the planning of this approach.

Teachers place a strong emphasis on correct use of mathematical language; this is supported by key vocabulary being displayed. Stem sentences are used and modeled during whole class input. These are accessed through the NCETM PD Materials.

Teachers value pupils' oral contributions and create an ethos in which all children feel they can contribute. Children are encouraged to 'have a go' and to not be concerned about incorrect answers. Questions with incorrect answers are modelled for the children, encouraging them to make their own corrections, showing that the correct answer isn't always found the first time.

Throughout the school, children learn number facts and times tables using exciting videos and songs daily, alongside Times Tables Rockstars (TTRS).

Reasoning skills are taught explicitly by teachers as part of maths lessons in order to model the use of correct mathematical vocabulary and written reasoning. Each class has a reasoning vocaulbary poster on their Working Wall for children to refer to.

Problem-solving skills are taught weekly in Years 1-6. The different ways to approach a problem are taught in this session and children are encouraged to use these skills when working during their daily maths sessions. Mathematics is only "useful" to the extent to which it can be applied to a particular situation and it is the ability to apply mathematics to a variety of situations which we tackle during these sessions. Children are tasked with open ended problems, supplied with a

range of resources they think they need to solve the problem and encouraged to work collaboratively with their classmates.

## Curriculum Planning

### Long Term Planning

The teachers have worked alongside the Maths Leader to map Mathematics across the school, showing clear progression in line with age related expectations. Yearly overviews (Appendix 2) have been designed with a number of factors in mind – thinking about continually teaching number through all areas of maths, using the outside area where possible and linking with topics being taught in class. Teachers use the NCETM PD Materials, to support them with the planning of lessons. Primary Mastery Professional Development | NCETM
All mathematical topics will be taught in blocks so that children can master each mathematical concept and apply it across a range of contexts. A progression of skills document is to be used when planning, to ensure that learning is building on the previously taught knowledge. The White Rose Hub planning documents are used for planning lessons focusing on shape, space and measure. White Rose Maths | Free Maths Teaching Resources | CPD Training

Teachers have adapted the Long-term planning in light of school closures, depending on any topics which were missed or covered during home learning.

### Medium Term Planning

Teachers will use The White Rose Hub to support them in planning lessons. They also have access to the NCETM PD Materials and use these to support them in the small steps of learning within number focused lessons. The emphasis is to develop a sequence of teaching and learning that encompasses the cycle of assess, plan, teach, practice, apply, and review through every unit. A strong emphasis on using and applying, including reasoning in mathematics, is embedded within the curriculum.

### Short term planning

Teachers plan together across the year group, making the lessons appropriate for the needs of their class. Teachers regularly amend their planning based on the outcomes of assessment for learning opportunities. Teachers plan and teach problem solving and investigational activities every week to ensure that pupils develop the skills of mathematical thinking and enquiry. Teachers will also plan for regular pre-teaching sessions, for children identified through the initial elicitation task. These children will be given extra support with the vocabulary they will encounter and early misconceptions will be tackled to ensure they can feel confident when back within the classroom setting.

### Impact

### Assessment, recording and reporting (please see Assessment policy)

Assessment takes place at three connected levels: short-term, medium-term and long-term. These assessments are used to inform teaching in a continuous cycle of planning, teaching and assessment.

### Formative assessment

Teachers will make use of an elicitation task at the beginning of a new piece of learning to ascertain the current levels of understanding. Lessons are then planned accordingly.

Live marking is to be used to enable teachers to support with any misconceptions or to direct children in the next steps in their learning.

See **Feedback and Marking** policy for further details.

Learners will also be taught to assess and evaluate their own achievements by recognising successes, learning from their own mistakes and identifying areas for improvement. Class teachers regularly update Target Tracker statements weekly, assessing every pupil against the objectives from the National Curriculum.

**Summative assessments**

NFER Summative assessments will be carried out in November and May (Years 3-5)
NFER Summative assessments will be carried out in April (Year 1)
Year 6 practice SATs Papers will be carried out x3 per year to inform progress and next steps.
Year 2 practice end of KS1 assessments carried out in January
End of KS1 and KS2 NC tests will be carried out in May
Year 4 Multiplication Check in June
Gap analysis will be carried out and used to inform planning.

**Opportunities to build on learning outside of school**

We recognise the importance of making links between home and school and encourage parental involvement with the learning of mathematics. Mathematical tasks are part of the homework grid given to the children at the beginning of each new term. All children have access to Maths Shed and children in Years 3-6 have access to TTRS. Additional Maths activities may be sent home to provide opportunities to practice a learnt skill. The school's calculation policy is published on the school website; this ensures parents are able to see how we teach the four calculations at each stage of learning.

**Mastery Approach**

At River Primary we will ensure that children are challenged to think deeply in maths through a mastery approach. This approach means that we keep the class together, until specific concepts or skills are mastered and then move on together. For any children who have not met the expected outcomes or have gaps in their understanding, a short, keep-up session with take place at another point in the day. For any children that have mastered the learning objective, they will be presented with higher- order thinking activities (including open-ended problem-solving tasks) rather than moving ahead, straight onto the next area of the curriculum

**Intervention programmes**

The school operates a flexible approach to intervention programmes based on weaknesses identified in termly pupil progress meetings and through ongoing data analysis by class teachers. Teachers use guided groups led by themselves and teaching assistants to tackle children's misconceptions in maths. These 'keep up' sessions are where children have encountered challenges with new concepts in the lesson, and are same day interventions. They may take place at the end of the maths session or in the afternoon where time is set aside for a short, focused intervention.

**Pre-teaching** is used with those children who are on the cusp or experiencing a degree of maths anxiety at least 3 times a week.

**Tuition** is used to target those children who struggled to keep up with learning throughout the pandemic. They participate in a twice-weekly tuition session – focused on the key concepts which need to be secured, before moving on in the curriculum.

**Higher Achieving Pupils**

Pupils demonstrate high ability in mathematics in a range of ways and at varying points in their development. Pupils who are gifted in mathematics are likely to:

- learn and understand mathematical ideas quickly;
- work systematically and accurately;
- be more analytical;
- think logically and see mathematical relationships;
- make connections between the concepts they have learned;
- find rules and identity and explain patterns easily;
- be able to visualise, imagine and explain properties of shape quickly;
- be able to apply their knowledge to new or unfamiliar contexts;
- communicate their reasoning and justify their methods;
- ask questions that show clear understanding of, and curiosity about, mathematics;
- challenge or questions mathematical rules;
- prove/disprove rules/generalisations based on mathematical evidence;
- Create algebraic rules based on sequences and patterns
- take a creative approach to solving mathematical problems;
- sustain their concentration throughout longer tasks and persist in seeking solutions, absorbed in their work;
- be more adept at posing their own questions and perusing lines of enquiry;
- have an ability to work calculations/problems out in their head very quickly;
- Able to relate their understanding of maths to areas such risk and uncertainty;
- verbally articulate their strategies, findings, observations with peers/adults;
- apply mathematics to different contexts and environments;
- apply their mathematics to both routine and non-routine problems easily.

**Equal Opportunities**

All pupils will have equal opportunity to reach their full potential across the mathematics curriculum regardless of their race, gender, cultural background, ability or physical disability.

The two strands to ensuring equality in the curriculum

**Equality of access to learning:** This means that we have a responsibility to ensure that all children, regardless of their profile, have access to the same opportunity to learn within each subject. This means that adaptations need to be made to resources and facilities, ensuring that children feel safe and any barriers to learning are addressed. This is the means to give each child an equal chance of success.

**Equality as part of the Curriculum:** This means that our topics for study reflect the diverse population and that our curriculum supports social inclusion through promoting acceptance and appreciation the differences of ourselves and of others. Our focus on diversity as a driver reflects our commitment to equality. Through valuing diversity, we learn to expect, respect and value difference in others. We aim for children to recognize and understand their responsibilities towards themselves and others.

**Children with Special Educational Needs**

We have a firm commitment to inclusion so that appropriate adjustments are made for children with special educational needs or disabilities. All children in school have an entitlement to a full

education and we will modify and differentiate the curriculum to ensure access to the curriculum for all children. In order to achieve inclusion in maths, we use a range of strategies and resources. These include additional scaffolding such as modelled examples on the working wall. We ensure children have access to multiplication squares, number lines or hundred squares. We also have pre-printed whiteboards with grids and diagrams, to support children with partitioning numbers and with place value work. All classrooms have a range of resources which children have access to at all times.

**Environment**

It is important that both the whole school and classroom environment supports both the learning and teaching of mathematics.
The school aims to provide a mathematically stimulating environment:

- through the use of working walls to support learning and teaching in a lesson or series of lessons.
- through displays of pupils' work that celebrate achievement, including modeled examples• by providing a good range of resources and manipulatives for teacher and pupil use.

In every classroom, resources such as number lines, hundred squares, place value counters, double-sided counters, place value charts and multiplication squares are displayed as appropriate and used for whole class or individual work. Children are encouraged to access these independently.

Signed:_____Date: _____
Chair of Learning and Development Team