Cambrai Primary School

Mathematics Strategy

"With me, everything turns into mathematics."

Descartes

The primary intent for our Mathematics Curriculum: (what does ready for KS3 mean?)

- We believe that all children 'Can do' mathematics; therefore, all children can reach a mastery level and succeed. We intend for all children to be secure in the key age related content and reach the expected standards at EYFS, Key Stages 1 and 2, and exceed them where they can. It is our intent that pupils build their learning progressively from year to year.
- We want our children to be fluent mathematicians. Procedural fluency and conceptual understanding are developed in tandem because each supports the development of the other. Understanding the relative size of numbers at all levels and being able to move fluently between operations and representations is key to success.
- We want our children to be 'brave mathematicians' – knowing 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.
- We aim for our children to develop a real love for mathematics and understand that it underpins all subjects and opportunities in life – rather than see mathematics as a 'memory test' or something we do on a morning.

The implantation of this intent is based on:

- The daily maths lesson will follow the medium term plans set ('White Rose Mastery' Approach alongside the National Curriculum) with key understanding of place value, number operations and related problem solving, reasoning and justification taking priority. There is a main focus on arithmetic - as we want our pupils to be fluent in arithmetic strategies which will enable them to tackle reasoning and problem solving exercises more efficiently.
- There will be several variations of the same and related content to facilitate children's overlearning, varied fluency and confidence in mathematical concepts. We will 'over–teach' concepts, in the core areas of: number and place value, the four operations, times table and division facts.
- Our Pupils are taught through whole-class interactive teaching, where the focus is on all pupils working together on the same lesson content at the same time. This ensures that all can master concepts before moving to the next part of the curriculum sequence, allowing no pupil to be left behind. As much of the learning happens through talk, mixed ability setting is a key expectation at our school.
- More importantly, as all children work on the same task, children are not categorised as being lower or higher ability. Pupil confidence and a joy of mathematics will grow.
- If a pupil fails to grasp a concept or procedure, this is identified quickly and early intervention ensures the pupil is ready to move forward with the whole class in the next lesson. Intervention will be in the form of pre-teaching and catch up sessions, based on specific issues and content.
- From Year R, in addition to a daily mathematics lesson, children will also experience a daily short mental fluency lesson – based upon counting, number facts, relationships and calculations.
- Key facts such as multiplication tables and addition facts within 10 are learnt automaticity to avoid cognitive overload in the working memory and enable pupils to focus on new concepts.
- From Y1, every morning, before registration, the children will practise their prior learning (simmering pot) to afford daily recall opportunities. We believe that daily retrieval practice of important taught concepts will strengthen the neural pathways and aid retention of learning. The prior learning will come from yesterday, last week, last term, last year and in preparation for maths in another subject e.g. data handling in a science lesson.

The Maths Mastery Approach

- Through a 'White Rose Mastery' approach all children will be challenged and have time to develop a deep understanding of a mathematical concept before moving onto new content.
- Approximation is seen to be a key skill in our school – children will be taught the skill of estimation and this will be an expectation in all calculation based lessons.
- Children are taught conceptually through problem-solving contexts, which are initially linked to real-life situations and real objects that they can manipulate. Pupils start by being able to understand and relate to the questions in a 'concrete' method. As the pupil progresses in their understanding, the context is then represented in a 'pictorial' state (actual pictures of the objects at first, then later moving onto more abstract representations like bar models). The final stage, 'abstract' refers to the more formal methods of calculations such as column multiplication or the bus-stop method.
- Carefully chosen manipulatives and representations will be used to teach all mathematic concepts not forgetting that they are a temporary scaffold until independence is achieved.
- Through teacher facilitation, expert questioning, deepening challenges and peer discussions, all children are challenged at their level. Communication is a vital part of this process. It is through peer discussion, and the proving and disproving of ideas, that metacognition happens (being aware of one's thought processes). This enables greater depth of understanding.
- Challenge is something which is key to all children being successful in mathematics and this is central to our vision. Children are challenged in a variety of ways and are exposed to a wide variety of manipulatives and representations based on the same concept.
- Together, we're building a whole new culture of deep understanding, confidence and competence in mathematics. A culture that produces strong, secure learning and real progress. No matter what their starting points, we help all of our children to achieve excellence. The movement towards a mastery vision includes regular and robust assessment which gives clear indicators as to what progress children have made, the concepts children have mastered and what the next steps in their learning will be. *(see appendix – 'TSL Manipulatives')*

Our mastery approach allows children to:

- Develop a positive attitude towards mathematics.
- Develop their resilience when faced with the unknown and therefore develop a growth mind-set as opposed to fixed.
- Make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems.
- Be curios, explore patterns and explain their reasoning through rich mathematical discussion with their peers.
- Find a more 'elegant' way of solving a problem.
- Build up a wide range of mathematical vocabulary to use across all subject areas.

Our mathematics planning includes:

- White Rose Yearly overview and Medium term schemes of work
- Lingfield Trust's 25 key objectives, Early Years maths curriculum
- Weekly plan includes: Daily focus (small steps), counting/arithmetic focus, key vocabulary, key questions, challenge for more-able (reasoning, problem or solving or greater depth Q), prior learning (previous year), end of year expectations (in-line with NC 'ready to progress' document.
- Arithmetic tests (from Y2) followed by weekly arithmetic lesson (Friday) to practice taught concepts, identify misconceptions, and address gaps in learning.

Planning for retention and recall opportunities

- Each year group's curriculum has built in opportunities for revisiting key concepts (number, place value, calculation and fractions)

- Each year group's planning will highlight prior learning expectation from the previous year in relation to the topic being taught. This is taken from the EYFS expectations (Trust Ready document), the NC and the trusts 'progression in maths' document.
- All year groups from YR – Y6 will access a daily arithmetic session (Counting session R –Y2) to develop mental fluency.
- Every morning, before registration, the children will practise their prior learning (simmering pot) as a retrieval opportunity. We believe that daily retrieval practice of important taught concepts will strengthen the neural pathways and aid retention of learning. The prior learning will come from yesterday, last week, last term, last year and in preparation for mathematics in another area of the curriculum.
- Mathematics will be used and applied within other areas of the curriculum. See paragraph below Mathematics across the curriculum.
- From Y1 we use the WRM assessments at the end of every unit to allow children to apply their knowledge and skills of what has just been taught.

(see appendix – 'simmering pot')

Children with SEND within the Maths Mastery Curriculum Approach

Our Maths Mastery Curriculum Approach is designed to give all learners, particularly the most disadvantaged and those with special educational needs and/or disabilities (SEND) or high needs, the knowledge and cultural capital they need to succeed in life. We believe that everyone, no matter what their starting point is, can learn and improve at maths.
This will clearly depend on individuals' needs. We need to remember also that children with SEND are not always low attainers, so for some it will be the usual curriculum with additional resources suitable for meeting their particular needs. If some other pupils are operating one or two years behind the expectations for their year group then our school will consider what is realistic for these pupils, given their needs, in terms of catching up and keeping up. Therefore, we ensure that if a SEND pupil is working below, at or above the expected standard they are given the appropriate support and resources needed to ensure they reach their full learning potential, and wherever possible, catch up to their peers over time. A curriculum for all.

Children who are More-Able within the Maths Mastery Curriculum Approach

Children who consistently work at greater depth can:

- Work confidently and independently.
- Deal with increases in complexity, deduction and reasoning.
- Ask their own mathematical questions and follow their own lines of enquiry.
- Develop a real love and understanding of the subject.
- Very rarely be phased when they solve problems where the concept remains intact whilst changing the context.
- Apply their knowledge consistently, confidently and fluently in one area of a subject to another.
- Be able to explain what they have been doing to others, including teaching other children what they have learned.

A curriculum for all.

Multiplication Tables Teaching and Expectations

The quick recall of multiplication and division facts (x tables) is an essential skill for children. The ability to instantly recall these facts enables children to answer relative questions with ease. Therefore, it is important that

we approach the teaching and testing of times tables in a similar and progressive format from Y2 to Y6. However, we embed counting in steps from EYFS, to enable our children to be times-table ready!

End of Year expectations:

- YR count in 1s, begin to count in 2s, 10s, 5s
- Y1 count in 1s, 2s, 5s and 10s
- Y2 count in 3s, x1, x2, x10 and x5 table
- Y3 x4, x8, x11, and x3 table
- Y4 x6, x12, x7 table – ready for National Times Table Tests
- Y5 All x and ÷ facts (up to 12x12)
- Y6 All x and ÷ facts (up to 12x12) and the times table challenge e.g 3X4 = 2X6

We have decided to follow an '***everyone can times'*** approach building up the times tables in a methodical and progressive format, ensuring that facts are retained and revised along the journey. From Y2, children will be taught the times tables with a taught x table lesson each week. Connections will be made to the x table facts they already know as well as doubles/ halves/ addition and subtraction. The children will access 'Times Table Rock Stars'(TTRS) which is a carefully sequenced programme of daily times tables practice both in school and at home. This allows and engages children to take part in a fun and competitive way.

Multiplication facts are assessed through termly tests called '***everyone can times'***, which is 50 questions based upon a given times table. The children have 10 minutes to complete the test. There are three levels to complete.

L1 – Autumn Term L2 – Spring Term L3 – Summer Term

Order: x1, x2, x10, x5, x4, x8, x11, x3, x6, x9, x7, x12

Note: Children are given the opportunity to attempt any times-table if they feel confident that they can achieve it.

We also follow an '***everyone can use number bonds'*** *and* ***'doubles and halves'*** approach building up the skills in a progressive format and in the same way as 'everyone can times'. These tests can be found in the Trust's shared area for mathematics.

(see appendix – 'Everyone can')

Progression in Mathematics

The trust has designed this document to ensure that mathematics is progressive across the curriculum, from an exemplification of the Early Learning Goals from our 'Trust Ready' curriculum through to Year 6 expectations.

From Year 1 onwards, individual strands of national curriculum mathematics are mapped across the year groups, so teachers can see prior learning expectations and the foundations of their current curricula. In addition to this, staff identify on their weekly planning document prior learning in relation to the maths focus. This enables teachers to see what has been retained or any gaps in learning.

The 'Ready-to-progress' criteria for all groups produced by the DFE summarises the most important knowledge and understanding within each year group and the important connections between the mathematical topics. Teachers will use the document to bring greater coherence to the National Curriculum by exposing core concepts and demonstrating progression from Y1 to Y6 thus closing the gaps in learning. It must be noted that the document does not address the whole of the mathematics primary curriculum but only areas that have been identified as a priority.

(see appendix –Trust's progression in mathematics R-Y6)

Early Mathematics

We believe that all children 'can do' mathematics and developing a sound understanding of mathematics when young is essential. EYFS staff will nurture positive attitudes and help children to build confidence. Self-regulation and metacognitive skills are seen to be crucial for success therefore the development of these skills will be paramount in Autumn term. We want all of our children to develop a growth mind-set from an early age as opposed to a fixed mind-set. It is important to remember that children's early mathematical understanding is strongly associated with their later school achievement.

The teaching of mathematics will build upon what children already know and can do. Young children learn best when they are interested therefore we will teach maths through stories, songs, rhymes, board games and carefully chosen computer programmes such as Ten Town, Number Jacks and MiniMash. Developmental progressions will be used in-line with the new Early Learning Goals, White-Rose Mathematics and the trust ready EYFS curriculum.

We want our children to achieve a mastery level, in relation to recognising and understanding numbers, quantity and patterns. Further, we want them all to have 'number sense'. This will be important to ensure children have the confidence and strong grasp of basic numbers in preparation for Key Stage One. EYFS staff understand the importance of the 5 counting principles:

1. the one-to one principal
2. the stable order principal
3. the cardinal principal
4. the abstraction principal
5. the order irrelevance principal

The staff will also understand the developmental stages *(see appendix – Progression Early Mathematics)*

Carefully chosen manipulatives and representations will be used to teach all mathematic concepts. Discussion will be encouraged through talk partners and age appropriate mathematical vocabulary will be expected. We will insist upon the accurate pronunciation of number names as well as accurate number formation.

The classroom will provide many opportunities for the children to play with and secure their understanding of number, shapes and measures not forgetting to provide both challenge and support as required.

Mathematics Across the Curriculum

Mathematics at our school will ensure that our children are 'ready for life'. Throughout the primary years, children will be given the opportunity to use and apply mathematical skills in other areas of the curriculum. This will enable them to see how maths is used in the real world. Teachers will carefully identify where prior learning (previous year, term, week) can be practised e.g data handling in science, measures in DT, PE and so on. It is important to remember that new skills are learned in a mathematics lesson and practised in other areas of the curriculum.

Outdoor Learning

We expect teachers to take maths outdoors wherever possible. In addition to making the subject fun and real, outside learning also provides opportunities to:

- **Access concrete materials –** children need to feel and move around objects to help develop mathematical concepts. Natural treasures such as sticks, stones, seed pods and so on are brilliant materials to support counting, measurement, comparison and so on.

- **Develop pictorial understanding –** This involves being able to represent concepts through drawing pictures, diagrams, charts and more. Outside learning means that children can experience this in 3D and from all angles, which promotes their pictorial representation and the spatial imagery needed for geometry.
- **Understand language and mathematical symbols –** concepts such as bigger, smaller, longer, shorter, deeper, shallower, more, less, fewer etc can be practised and better understood with real life experience. Climbing a tree and looking down helps to develop a child's sense of scale and finding something longer than, shorter than, heavier than helps to develop a deep understanding of size and unit.

Tackling a written problem - RUCSAC approach

The children are taught to solve word problems by using the RUCSAC approach. The poster must be displayed in all classrooms Y1 – Y6.

- Read – Read the question. What is the important information?
- Understand – Understand the question. What do you need to find out?
- Choose – Choose the correct method of calculation and operation(s).
- Solve – Solve the problem. Make sure you follow the steps.
- Answer – Answer the question. What were you meant to find out?
- Check – Check your answer. Use the inverse to check your working out.

(see appendix – RUCSAC display poster)

Vocabulary Expectations

We believe that the understanding and use of mathematical vocabulary is key to success. The vocabulary that the children are expected to understand and use is progressive across the mathematics curriculum. This is identified on the White rose Medium term plans and also on the weekly plan. The key vocabulary will be displayed on the working wall. Staff are aware of key vocabulary in terms of that expected of the children and also mathematical terms.

(see appendices – Vocabulary list Reception – Year 6, The Ultimate Maths vocabulary list)

Assessing Mathematics and trust Moderation

At the end of teaching each unit of WRM, teachers use the WRM assessments and use the results of this to plan next steps and to identify children who need catch up sessions.

The trust's mini assessments are also used in relation to the end of year 25 key objectives. These are chosen for standardisation purposes across the trust. Moderation happens across the trust in the Summer Term using results from the mini assessments.

Arithmetic test will happen x1 per half term and scores will be recorded after each test. A weekly arithmetic lesson will come from prior learning and analysis of test result. Nntervention given to those who are not keeping up.

Mathematics Homework Expectations

The main focus of our maths homework is for the children to practise and refine their arithmetic skills (mental fluency) In Year 1 children are set homework in relation to key mathematical knowledge such as number bonds within 10 and counting in steps of 1,2,5,10

From Year 2 to Year 6 children are set homework in relation to the times table they are learning. Teachers may also set consolidation activities for homework.

The Maths Environment

A consistent maths environment is vital to ensure that in every classroom, our children have access to what they need to help them learn and retain learning. As such, we have developed a classroom checklist (non-negotiables) to ensure that each classroom has a rich 'maths environment'. These expectations are a minimum and teachers are of course free to design their classroom environments as they see for their children.

Our classrooms will have age appropriate learning prompts to support learning:

- An appropriate number line/ 100 square, number words
- Appropriate number facts (number bonds / times tables / division facts etc)
- Key vocab for 4 operations
- Key vocabulary – e.g. shapes and properties, days of week, months of years
- Working wall – showing models and methods, current vocabulary
- A working clock

(see appendix – classroom check list - outstanding environment)

Cultural Capital – Maths in today's world

We will promote a positive message – all children 'can do' mathematics. There is no such thing as being bad at maths.

We will send leaflets of yearly expectations in Autumn Term.

We will invite parents into EYFS to celebrate National Number Day.

We will always make time to show parents how we do maths.

Each year the maths lead will select a famous/important mathematician that impacted upon the way we know maths today or how they use their mathematical knowledge in their everyday work to achieve brilliance. We will provide engagement activities for parents, training sessions to show them how we use resources and to share our methods of calculation.

Appendices:

1	Trust's Progression in Mathematics Documentation
2	Medium Term Planning for Mathematics
3	Early Mathematics progression– Termly expectations
4	RUCSAC - Tackling problem solving activities
5	TSL Mathematics Vocabulary Expectations
6	Assessing Mathematics
7	Classroom Checklist (outstanding environment)
8	Calculation Policy
9	Everyone can times
10	simmering pot
11	TSL Manipulatives